Right to Know Hazardous Substance Fact Sheets

Emergency Responder Quick Reference

This handbook contains comprehensive safety and health information for over 400 hazardous substances to assist emergency responders in the event of a chemical emergency.

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Governor

Public Health Services Branch Division of Epidemiology, Environmental and Occupational Health Occupational Health Service Right to Know Program (609) 984-2202 http://nj.gov/health/workplacehealthandsafety/right-to-know/



Cathleen D. Bennett Commissioner



Common Name: ACEPHATE

Synonyms: N-(Methoxy(methylthio)phosphinoyl)acetamide; Orthene™; Lancer® CAS No: 30560-19-1 Molecular Formula: C₄H₁₀NO₃PS RTK Substance No: 3140 Description: Colorless to white crystal or powder with an odor of rotten cabbage. It may be dissolved in a liquid "carrier."

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Acephate does not burn, however it is often dissolved in a liquid carrier which may be	Acephate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,
1 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	CHLORINE, BROMINE and FLUORINE); ALKALINE MATERIALS or STRONG BASES (such as SODIUM
DOT#: UN 2783	POISONOUS GASES ARE PRODUCED IN FIRE,	HYDROXIDE and POTASSIUM HYDROXIDE); and
ERG Guide #: 152	including Phosphorus Oxides, Sulfur Oxides and	HYPOCHLORITES.
Hazard Class: 6.1 (Poison)	Nitrogen Oxides. Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS

Isolation Distance:

Solid Spill: 25 meters (50 feet) Liquid Spill: 50 meters (175 feet) Fire: 800 meters (1/2 mile)

Moisten solid spilled material, or use a HEPA-filter vacuum for clean-up, and deposit in sealed containers.

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

Acephate is hazardous to the environment and specific attention should be given to birds and honeybees.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Acephate**.

Acephate is skin absorbable.

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Headache, dizziness, blurred vision, sweating, nausea and vomiting, muscle twitching, loss of coordination, convulsions, coma and death
Chronic:	Carcinogen (liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Rotten cabbage
Flash Point:	199°F (93°C)
Vapor Pressure:	<1 mm Hg at 77°F (25°C)
Specific Gravity:	1.35 (Water = 1)
Water Solubility:	Soluble
Melting Point:	149° to 194°F (65° to 90°C)
Decomposes:	311°F (155°C)
Molecular Weight	: 183.2
pH:	3.5-4.5 (1% in water)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and SilverShield®/4H®
Coveralls:	DuPont Tyvek® for solid Acephate
Respirator:	Outdoors: Full facepiece APR with Organic vapor
	cartridge and pesticide pre-filters
	Indoors or Liquid: Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: ACETALDEHYDE

Synonyms: Ethanal; Ethyl Aldehyde; Acetic Aldehyde CAS No: 75-07-0 Molecular Formula: C₂H₄O RTK Substance No: 0001

Description: Clear, colorless liquid, or a gas above 69°F (21°C), with a sharp, fruity odor

		HAZA	R	D DATA		
Hazard Rating	Firefighting				Reactiv	vity
Hazard Rating 3 - Health 4 - Fire 2 - Reactivity DOT#: UN 1089 ERG Guide #: 129 Hazard Class: 3 (Flammable)	FirefightingReactivityAcetaldehyde can spontaneously decompose or polymerize to form explosive <i>Peroxides</i> when heated, distilled, evaporated or contaminated.Acetaldehyde is REACTIVE and can form explosive <i>Peroxides</i> on prolonged contact with AIR.FLAMMABLE AND REACTIVE LIQUID Use dry chemical, CO2, water spray or alcohol-resistant foam as extinguishing agents.Acetaldehyde reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMMONIA; ALCOHOLS; ISOCYANATES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); KETONES; AMINES; and TRACE AMOUNTS of METALS resulting in violent or explosive polymerization (uncontrolled reactions).Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flashback. Acetaldehyde may form an ignitable vapor/air mixture in element functionReactivityAcetaldehyde may form an ignitable vapor/air mixture in element functionReactivity					
closed tanks or containers. SPILL/LEAKS PHYSICAL PROPERTIES						
 Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquid with fly ash, cement powder or commercial sorbent place into sealed containers for disposal. Use only non-sparking tools and equipment, especially when ope and closing containers of Acetaldehyde. Metal containers involving the transfer of Acetaldehyde should the grounded and bonded. Neutralize water spills with Sodium Bisulfite. Keep Acetaldehyde out of confined spaces, such as sewers, be of the possibility of an explosion. DO NOT wash into sewer. Acetaldehyde is harmful to aquatic life in very low concentration 		bening be ecause		Odor Threshold:0.067 to 0.21 ppmFlash Point:-36°F (-38°C)LEL:4%UEL:60%Auto Ignition Temp:347°F (175°C)Vapor Density:1.52 (air = 1)Vapor Pressure:740 mm Hg at 68°F (20°C)Specific Gravity:0.8 (water = 1)Water Solubility:Floats and MixesBoiling Point:69°F (21°C)Freezing Point:-190°F (-123°C)Ionization Potential:10.22 eVMolecular Weight:44.06PROTECTIVE EQUIPMENTves:Butyl, Viton/Butyl and Barrier® (>8-hr breakthrough)eralls:Tychem® BR, Responder® and TK (8-hr breakthrough)pirator:>25 ppm - SCBA		-36°F (-38°C) 4% 60% 347°F (175°C) 1.52 (air = 1) 740 mm Hg at 68°F (20°C) 0.8 (water = 1) Floats and Mixes 69°F (21°C) -190°F (-123°C) 10.22 eV 44.06
OSHA: 200 ppm, 8-hr TWA G NIOSH: Lowest Feasible Concentration G ACGIH: 25 ppm, Ceiling C IDLH: 2.000 ppm C			era			
HEAL	HEALTH EFFECTS FIRST AID AND DECONTAMINATION		D DECONTAMINATION			
Skin: Irritation, Inhalation: Nose, the and seve edema) Headach passing of	and severe burns rash and burning feeling on contact roat and lung irritation, with coughing, ere shortness of breath (pulmonary ne, dizziness, lightheadedness, and but nose and larynx) in animals	 Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed. 				



Common Name: ACETAMIDE

Synonyms: Acetic Acid Amide; Acetimidic Acid CAS No: 60-35-5 Molecular Formula: C₅H₅NO RTK Substance No: 2890 Description: Colorless, crystalline (sand-like) material

	HAZARD DATA				
Hazard Rating	Firefighting	Reactivity			
2 - Health	Use dry chemical, CO ₂ , water spray or foam as extinguishing agent.	Acetamide reacts with OXIDIZING AGENTS (such as			
1 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and			
0 - Reactivity	including Nitrogen Oxides.	FLUORINE); STRONG ACIDS (such as			
DOT#: UN 3077	Use water spray to keep fire-exposed containers cool.	HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and			
ERG Guide #: 171		POTASSIUM HYDROXIDE); and REDUCING AGENTS.			
Hazard Class: 9 (Miscellaneous)					

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers. Potential for bioconcentration in aquatic organisms is low.

PHYSICAL PROPERTIES

Odor Threshold:	140 to 160 mg/m ³
Flash Point:	Combustible
Specific Gravity:	1.16 (water = 1)
Vapor Pressure:	10 mm Hg at 221°F (105°C)
Water Solubility:	Soluble
Boiling Point:	430°F (222°C)
Melting Point:	176°F (81°C)
Ionization Potential:	9.65 eV
Molecular Weight:	59.1

EXPOSURE LIMITS

No occupational exposure limits have been established for Acetamide. The Protective Action Criteria values are:

PAC-1 = 21 mg/m³; PAC-2 = 230 mg/m³;

 $PAC-3 = 1,400 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	No information
Skin:	No information
Inhalation:	Nose and throat irritation
Chronic:	Carcinogen - (Liver) in animals

	PROTECTIVE EQUIPMENT
Gloves:	Rubber
Coveralls:	DuPont Tyvek®, Tychem® Polycoat, QC, CPF 1, SL, CPF 2 or equivalent
Boots:	No information
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. Transfer to a medical facility.



Common Name: ACETIC ACID

Synonyms: Glacial Acetic Acid; Ethanoic Acid; Ethylic Acid CAS No: 64-19-7 Molecular Formula: CH₃ COOH or C₂H₄O₂ RTK Substance No: 0004 Description: Colorless liquid with vinegar odor

	HAZARD DATA				
Hazard Rating	Firefighting	Reactivity			
3 - Health	Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foaming agent.	Reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,			
2 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORATES, NITRATES, CHLORINE, BROMINE and			
0 - Reactivity	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to cool containers and disperse	FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).			
DOT#: UN 2789	vapors.	Acetic Acid attacks many METALS forming flammable			
ERG Guide #: 132	Vapor is heavier than air and may explode if ignited in an enclosed space.	and explosive Hydrogen gas.			
Hazard Class: 8 (Corrosive)		Incompatible with CHROMIC ACID; SODIUM PEROXIDE; NITRIC ACID; ACETONE; and AMMONIUM NITRATE.			

SPILL/LEAKS

Isolation Distance: 50 to 100 meters (160 to 330 feet)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Use water spray to disperse vapors.

Soda Ash (Sodium Carbonate) can be used to neutralize spills.

This substance is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA:	10 ppm 8-hr TWA
NIOSH:	10 ppm 10-hr TWA, 15 ppm STEL
ACGIH:	10 ppm 10-hr TWA, 15 ppm STEL
IDLH:	50 ppm
ERPG-1:	5 ppm
ERPG-2:	35 ppm
ERPG-3:	250 ppm

	HEALTH EFFECTS
Eyes:	Irritation, burns, possible eye damage
Skin:	Irritation, burns
Acute:	Nose, throat and lung irritation, pulmonary edema, coughing, shortness of breath
Chronic:	Bronchitis, thickening and cracking of the skin

PHYSICAL PROPERTIES

Odor Threshold:	0.48 to 1.0 ppm
Flash Point:	103ºF (39ºC)
LEL:	4%
UEL:	19.99%
Vapor Density:	2.1 (air = 1)
Vapor Pressure:	15 mm Hg at 77°F (25°C)
Water Solubility:	Soluble
Boiling Point:	244°F (118°C)
Ionization Potential:	10.66 eV

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene, Butyl Rubber
Coverall:	DuPont Tychem® CPF4, Responder®, TK, Reflector®; CHEMFAB Challenger® 4000.
Boot:	Neoprene or Butyl
Respirator:	>10 ppm - air purifying respirator with organic vapor cartridges, >100 ppm - supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Immediate medical attention is necessary. **Remove** contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Medical observation is recommended for 24 to 48 hours as symptoms may be delayed.



Common Name: ACETONE Synonyms: Dimethyl Ketone; 2-Propanone CAS No: 67-64-1 Molecular Formula: C₃H₆O RTK Substance No: 0006

Description: Clear colorless liquid with a sweet odor

	Н	AZARD D	ATA	
Hazard Rating	Firefighting		Reactiv	/ity
1 - Health 3 - Fire 0 - Reactivity DOT#: UN 1090 ERG Guide #: 127 Hazard Class: 3 (Flammable)	FIRETIGNTING FLAMMABLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source and flashback. Acetone may form an ignitable vapor/air mixture in closed tanks or containers.		Acetone may explode when mixed with NITROSYL PERCHLORATE; and CHLOROFORM or BROMOFORM in the presence of a BASE. Acetone reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ACETIC ACID; and NITRIC ACID to form explosive <i>peroxides</i> . Acetone attacks PLASTICS.	
SP	ILL/LEAKS		PH	YSICAL PROPERTIES
and place into sealed Use only non-sparkin Metal containers invo should be grounded Keep Acetone out of sewers, because of t DO NOT wash into se aquatic life in high co	2 mile) sand, earth, or a similar material d containers for disposal. g tools and equipment. living the transfer of Acetone and bonded. confined spaces, such as the possibility of an explosion. ewer as Acetone is dangerous to oncentrations.	Odor Thres Flash Point LEL: UEL: Auto Ignitio Vapor Dens Vapor Press Specific Gra Water Solut Boiling Poin Freezing Poi Ionization P Molecular V	n Temp: ity: sure: avity: bility: bility: int: otential: /eight:	13 to 62 ppm -4 °F (-20 °C) 2.5% 12.8% 869 °F (465 °C) 2 (air = 1) 180 mm Hg at 68 °F (20 °C) 0.8 (water = 1) Soluble 133 °F (56 °C) -140 °F (95.6 °C) 9.69 eV 58.1
EXPO	SURE LIMITS		PRO	TECTIVE EQUIPMENT
OSHA: 1,000 ppm, 8 NIOSH: 250 ppm, 10- ACGIH: 500 ppm, 8-h IDLH: 2,500 ppm The Protective Action C PAC-1 = 200 ppm PAC-3 = PAC-3 =	hr TWA r TWA; 750 ppm, STEL riteria values are:	Gloves: Coveralls: Respirator:	Tyche break >250	Silver Shield®/4H® and Barrier® (>8-hr breakthrough) em® BR, CSM and TK; Trellchem® HPS and VPS (>8-hr through) ppm - full facepiece APR with <i>Organic vapor cartridges</i> 0 ppm - SCBA
HEAL	TH EFFECTS	FIF	RST AI	D AND DECONTAMINATION
wheezir Headac	nd throat irritation with coughing and	contact lens Quickly rem amounts of Begin artific	with large am es if worn. ove contami soap and wa al respiratior	nounts of water for at least 15 minutes. Remove nated clothing and wash contaminated skin with large



Common Name: ACETONITRILE

Synonyms: Methyl Cyanide; Cyanomethane CAS No: 75-05-8 Molecular Formula: C₂H₃N RTK Substance No: 0008

0..... - Kanalahan di karan **F**ukaan Kina

Description: Colo	rless liquid with an Ether-like	odor			
		HAZAR	RD DA	TA	
Hazard Rating	Firefighting			Reactiv	ity
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1648 ERG Guide #: 127 Hazard Class: 3 (Flammable)	 FLAMMABLE LIQUID Use dry chemical, CO₂, alcohol-resistant foam as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Cyanide</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. 		N Niners	PERCHLO CHLORAT FLUORIN Acetonitri HYDROCC (such as S REDUCIN and their I NITRATIN NITROGE ACID; IND NITROGE	le is not compatible with STRONG ACIDS (such as HLORIC, SULFURIC and NITRIC); STRONG BASES CODIUM HYDROXIDE and POTASSIUM HYDROXIDE); IG AGENTS (such as LITHIUM, SODIUM, ALUMINUM HYDRIDES); ALKALI METALS (such as POTASSIUM); IG AGENTS; IRON SALTS of PERCHLORATE; N-FLUORINE COMPOUNDS; CHLOROSULFONIC DIUM; PERFLUOROUREA; and SULFUR and N TRIOXIDES. with WATER, MOISTURE and STEAM to form toxic and
SP	ILL/LEAKS			PH	SICAL PROPERTIES
Isolation Distance: Small Spills: 50 meters (150 feet) Large Spills: 300 meters (1,000 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep Acetonitrile out of confined spaces, such as sewers, because of the possibility of an explosion. May be toxic to aquatic life at high levels.		Flasi LEL: UEL Auto Vapo Vapo Spec Boili Ioniz	: o Ignitio or Dens or Press cific Gra er Solut ing Poir	n Temp: ity: sure: ivity: ility: it: otential:	98 ppm 42°F (6°C) 3% 16% 975°F (524°C) 1.42 (air = 1) 73 mm Hg at 68°F (20°C) 0.78 (water = 1) Miscible 179°F (82°C) 12.2 eV 41.1
EXPO	SURE LIMITS			PRO	TECTIVE EQUIPMENT
values are	0-hr TWA -hr TWA inute Protective Action Criteria		ves: eralls: pirator:	breakth DuPont Kapple (>8-hr b	Silver Shield®/4H® and Viton/Butyl (>8-hr prough) t CPF 4, BR, LV, Responder®, CSM and TK; r® Zytron® 500; and Saint-Gobain ONESuit® TEC preakthrough) m - Supplied air
HEAL	.TH EFFECTS		FIR	ST AID	AND DECONTAMINATION
Flushir headad		Flush conta Quicl large Begin nece Trans	n eyes wi act lense: kly remo amount: n artificia ssary. sfer to a	s, if worn, w ve contamin s of soap an respiration medical faci	unts of water for at least 15 minutes. Remove hile rinsing. ated clothing and wash contaminated skin with d water. Seek medical attention. if breathing has stopped and CPR if



Common Name: ACETOPHENONE

Synonyms: Acetyl Benzene; Phenyl Methyl Ketone CAS No: 98-86-2 Molecular Formula: C₈H₈O RTK Substance No: 2961 Description: Colorless to yellow-tinted liquid with a sweet, strong odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE LIQUID	Acetophenone may react with STRONG ACIDS (such as
2 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	HYDROCHLORIC, SULFURIC and NITRIC); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	HYDRIDES); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) to produce
DOT#: UN 1993	FIRE.	heat and flammable and explosive <i>Hydrogen gas</i> .
ERG Guide #: 128	Use water spray to keep fire-exposed containers cool.	Acetophenone is not compatible with OXIDIZING AGENTS
Hazard Class: 3 (Flammable)		(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE BROMINE and FLUORINE); CYANIDES; ALDEHYDES; and ANHYDRIDES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Acetophenone**.

EXPOSURE LIMITS

ACGIH: 10 ppm, 8-hr TWA

The Protective Action Criteria values are:

- PAC-1 = 6 ppm
- PAC-2 = 10 ppm
- PAC-3 = 71 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, nausea and loss
of coordination

PHYSICAL PROPERTIES

Odor Threshold:	0.36 to 0.6 ppm
Flash Point:	170°F (77°C) to 180°F (82°C)
LEL:	1.1%
UEL:	6.7 %
Auto Ignition Temp:	1,058°F (570°C)
Vapor Density:	4.1 (air = 1)
Vapor Pressure:	1 mm Hg at 60°F (16°C)
Specific Gravity:	1 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	396°F (202°C)
Freezing Point:	68°F (20°C)
Ionization Potential:	9.28 eV
Molecular Weight:	120.15

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, Silver Shield®/4H® and Viton (>8-hr breakthrough)
Coveralls:	Tychem® CPF 4 and Responder® (>8-hr breakthrough for <i>Ketones</i> , <i>aromatic</i>)
Respirator:	>10 ppm - full facepiece APR with <i>Organic Vapor</i> filters >70 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Chemical Name: 2-ACETYLAMINOFLUORENE

Synonyms: AAF; 2-Fluorenylacetamide CAS No: 53-96-3 Molecular Formula: $C_{15}H_{13}NO$ RTK Substance No: 0010 Description: Tan powder or crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 0 - Fire 0 - Reactivity DOT#: N/A ERG Guide #: N/A Hazard Class: N/A	 2-Acetylaminofluorene is considered a combustible solid, but does not readily ignite. Use dry chemical, CO₂, water spray or alcohol- resistant foam. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. Use water spray to keep fire-exposed containers cool. 	- 2-Acetylaminofluorene is not compatible with CYANIDES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID ANHYDRIDES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).

SPILLS/LEAKS

Isolation Distance: 25 meter (75 feet)

- Dampen solid spills with water before collection.
- Collect spilled material using a wet method or a vacuum with a HEPA filter.

PHYSICAL PROPERTIES

Flash Point:	531 °F (277 °C)
Boiling Point:	577 °F (303 °C)
LEL:	No Information
UEL:	No Information
Vapor Density:	No Information
Vapor Pressure:	0.0000287 mm Hg at 25 °F (estimated)
Water Solubility:	Insoluble
Melting Point:	381 °F (194 °C)
Ionization Potential:	No Information

EXPOSURE LIMITS

OSHA:	Refer to 29 CFR 1910.1014
NIOSH:	Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.
ACGIH:	N/A
IDLH LEVEL:	N/A
PAC LEVELS:	PAC-1 = 1.2 mg/m ³ ; PAC-2 = 14 mg/m ³ ;
	$PAC-3 = 480 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation
Inhalation:	Nose, throat and lung irritation.
Skin:	May cause skin irritation.
Chronic:	Carcinogen (bladder, kidney and liver) in animals.

PROTECTIVE EQUIPMENT

Gloves:	Chemical-resistant gloves (e.g. Nitrile)
Coverall:	Protective clothing to prevent skin contact
Boot:	Protective boots to prevent skin contact
Respirator:	Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses, if worn, while rinsing.

Remove contaminated clothing. Wash contaminated skin with soap and water.

Begin respirator support if breathing becomes difficult.



Common Name: ACETYL CHLORIDE

Synonyms: Acetic Chloride; Ethanoyl Chloride CAS No: 75-36-5 Molecular Formula: C₂H₃CIO **RTK Substance No: 0013** Des

Description: Colorless to pale yellow, fuming liquid with a pungent odor			
HAZARD DATA			
Hazard Rating	Firefighting		Reactivity
3 - Health 3 - Fire	Acetyl Chloride is a FLAMMABLE LIQUID. Use dry chemical or CO ₂ as exting		Acetyl Chloride reacts violently with WATER to release heat and toxic and corrosive Hydrogen Chloride and Acetic Acid.
2	DO NOT USE WATER OR FOAM. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Phosgene</i> .		Acetyl Chloride reacts violently with ALCOHOLS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); OXIDIZING
ERG Guide #: 155 Hazard Class: 3 (Flammable)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Do not get water inside containers. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); AMINES; POWDERED METALS; PHOSPHORUS TRICHLORIDE; and DIMETHYL SULFOXIDE.
SPILL/LEAKS		PH	IYSICAL PROPERTIES
Isolation Distance: Small Spill in Water: 30 meters (100 feet) Large Spill in Water: 120 meters (400 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a		Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density:	Pungent 40°F (4°C) 5% 19% 734°F (390°C) 2.7 (air = 1)

Vapor Pressure:

Specific Gravity:

Water Solubility:

Boiling Point:

Freezing Point:

Molecular Weight:

similar material and deposit in sealed containers. DO NOT USE WATER. Keep Acetyl Chloride out of confined spaces, such

as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Hazardous to the environment, especially to water.

EXPOSURE LIMITS

No occupational exposure limits have been established for Acetyl Chloride.

PAC Levels: PAC-1 = 0.85 ppm; PAC-2 = 9.4 ppm; PAC-3 = 56 ppm

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Severe irritation, burns, dryness, redness and blisters
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PROTECTIVE EQUIPMENT Gloves: Butyl (3-hr breakthrough) DuPont Tychem® F and TK; Kappler® Zytron® 300 or Coveralls: 500; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for Acid Halides) **Respirator:** Supplied air FIRST AID AND DECONTAMINATION

249 mm Hg at 68°F (20°C)

1.1 (water = 1)

124°F (51°C)

78.5

Violently reactive

-170°F (-112°C)

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: ACETYLENE

Synonyms: Ethyne; Narcilene; Ethenylene; Vinylene CAS No: 74-86-2 Molecular Formula: C₂H₂ RTK Substance No: 0015 Description: Colorless, odorless gas or the commercial product may have an *Ether*-like or garlic-like odor

		HAZARD	DATA	
Hazard Rating 0 - Health 4 - Fire 3 - Reactivity DOT#: UN 1001 ERG Guide #: 116 Hazard Class: 2.1 (Flammable)	Firefighting Acetylene is a FLAMMABLE G Stop flow of gas or let fire burn POISONOUS GASES ARE PRO FIRE, including flammable Hyd CONTAINERS MAY EXPLODE Use water spray to disperse gas exposed cylinders cool, and pro individuals attempting to stop let Vapors may travel to a source of flash back.	itself out. ODUCED IN <i>Irogen gas.</i> IN FIRE. s, keep fire- otect eak.	PERCHLC CHLORAT FLUORIN Acetylene POTASSII POWDER MERCUR sensitive Acetylene HYDRIDE FERROSI Acetylene Acetylene	reacts violently with OXIDIZING AGENTS (such as DRATES, PEROXIDES, PERMANGANATES, FES, NITRATES, CHLORINE, BROMINE and
SF	PILL/LEAKS			YSICAL PROPERTIES
sewers, because of Use only non-sparki	ters (1/2 mile)	Odor Thre Flash Poir LEL: UEL: Auto Igniti Vapor Der Vapor Pre Specific G Water Solu Boiling Po Freezing F Critical Te Ionization Molecular	nt: on: ssity: ssure: ravity: ubility: ubility: point: Point: mp: Potential: Weight:	226 ppm (with contaminants) Extremely flammable gas 2.5% 100% 581°F (305°C) 0.9 (air = 1) 4.04 x 10 ⁴ mm Hg at 77°F (25°C) 0.65 (water = 1) Very slightly soluble -118°F (-83°C) -113°F (-80.6°C) 97.3°F (36.3°C) 11.4 eV 26 TECTIVE EQUIPMENT
				•
The Protective Actio PAC-1 = 65,000	n, Ceiling 9.5% <i>Oxygen</i> content n Criteria values are: ppm; PAC-2 = 230,000 ppm; C-3 = 400,000 ppm	Gloves: Coveralls: Respirator	Insula	<i>ted</i> Neoprene, Viton and Viton/Butyl <i>ted</i> materials % <i>Oxygen</i> or 2,500 ppm - SCBA
HEA	LTH EFFECTS	FI	RST AID	D AND DECONTAMINATION
frostbi Skin: Conta frostbi Inhalation: Heada	ct with the <i>liquid</i> can cause	Immediate minutes, li while flush Immerse a Begin artif necessary	fting upper a ing. Seek m iffected part i icial respiratio	large amounts of warm water for at least 30 nd lower lids. Remove contact lenses, if worn, iedical attention immediately. n warm water. on if breathing has stopped and CPR if



Common Name: ACETYL IODIDE

Synonyms: Ethanoyl Iodide CAS No: 507-02-8 Molecular Formula: C_2H_3IO RTK Substance No: 0017 Description: Colorless, fuming liquid which turns brown on contact with air or moisture

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 1 - Fire 1 - Reactivity DOT#: UN 1898 ERG Guide #: 156 Hazard Class: 8	Acetyl lodide may burn, but does not readily ignite. Use dry chemical or CO ₂ as extinguishing agents. DO NOT USE WATER directly on material itself. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>lodine vapor</i> and other <i>lodides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool and to knock-down vapors.	Acetyl lodide will react with WATER or MOISTURE to release toxic and corrosive <i>Hydrogen lodide</i> . Acetyl lodide reacts vigorously with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) to give off heat and may react explosively if mixed with DIISOPROPYL ETHER and other ETHERS in the presence of small amounts of
(Corrosive)		METAL SALTS. Acetyl lodide is corrosive to METALS.

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (75 to 150 feet)

Neutralize spilled material with crushed limestone, soda ash or lime.

EXPOSURE LIMITS	
OSHA:	N/A
NIOSH:	N/A
ACGIH:	N/A
IDLH LEVEL:	N/A

HEALTH EFFECTS	
Irritation and burns	

Eyes:

Skin:	Irritation and burns
Acute:	Lung irritation with coughing and shortness of breath (pulmonary edema)
Chronic:	Bronchitis with coughing, phlegm and/or shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Pungent odor
Flash Point:	No information
LEL:	No information
UEL:	No information
Vapor Density:	No information
Vapor Pressure:	No information
Water Solubility:	Decomposes
Boiling Point:	221°F (105°C)

Gloves: Silver Shield®/4H® for Acetic Acid Coveralls: DuPont Tychem® Responder®, CSM, and TK for corrosive heavy liquid chemicals Boots: No information Respirator: Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. **Begin** artificial respiration if breathing has stopped and CPR if

necessary.

Transfer to a medical facility.

Medical observation is recommended as symptoms may be delayed.

August 2007



Common Name: ACRYLAMIDE

Synonyms: Acrylic Amide; 2-Propenamide CAS No: 79-06-1 Molecular Formula: C₃H₅NO RTK Substance No: 0022 Description: Colorless to white, odorless flake-like solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 2 - Fire 2 - Reactivity DOT#: UN 2074 ERG Guide #: 153P Hazard Class: 6.1 (Poison)	 Acrylamide is a COMBUSTIBLE SOLID. Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Acrylamide decomposes and polymerizes above 184°F (85°C) releasing <i>Ammonia</i> and <i>Hydrogen gases</i>. Polymerization may be violent. 	Acrylamide may polymerize violently when HEATED to its melting point; when exposed to ULTRAVIOLET LIGHT; or when exposed to STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) or OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Acrylamide is not compatible with MINERAL ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OLEUM; AMMONIA; ISOCYANATES; and COMPOUNDS containing HYDROXYL-, AMINO-, and SULFHYDRYL GROUPS.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile) in all directions

- Moisten spilled material first, or use a HEPA-filter vacuum for clean-up, and deposit into sealed containers.
- DO NOT wash into sewer.
- May bioaccumulate in aquatic life.
- Severe marine pollutant.

EXPOSURE LIMITS

OSHA:	0.3 mg/m ³ , 8-hr TWA
NIOSH:	0.03 mg/m ³ , 10-hr TWA
ACGIH:	0.03 mg/m ³ , 8-hr TWA
IDLH:	60 mg/m ³

HEALTH EFFECTS		
Eyes:	Irritation, watering and inflammation	
Skin:	Irritation, rash or burning feeling	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Confusion, disorientation, fatigue and tremors	

Chronic: Cancer (pancreas) in humans

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PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	280°F (138°C)
Auto Ignition Temp:	464°F (240°C)
Vapor Density:	2.45 (air = 1)
Vapor Pressure:	0.007 mm Hg at 68°F (20°C)
Specific Gravity:	1.22 (water = 1)
Water Solubility:	Soluble (Mixes)
Boiling Point:	347° to 572°F (175° to 300°C)
Melting Point:	184°F (85°C) (Violent polymerization)
Ionization Potential:	9.5 eV
Molecular Weight:	71.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough)	
Coveralls:	DuPont Tychem® Fabrics; Kappler® Zytron® 400; and Saint-Gobain ONESuit TEC (>8-hr breakthrough for <i>Amides</i>)	
Respirator:	>0.03 mg/m ³ - Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: ACRYLIC ACID

Synonyms: Propene Acid; Ethylene Carboxylic Acid; Vinylformic Acid CAS No: 79-10-7 Molecular Formula: $C_3H_4O_2$ RTK Substance No: 0023 Description: Clear liquid with a sharp and irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Acrylic Acid is a COMBUSTIBLE LIQUID.	Acrylic Acid reacts with PURE NITROGEN;
2 - Fire	Use dry chemical, CO_2 , water spray or alcohol- resistant foam as extinguishing agents.	OXIDIZING AGENTS (such as PERCHLORATES, PERMANGANATES, CHLORATES, NITRATES,
2 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG
DOT#: UN 2218	CONTAINERS MAY EXPLODE IN FIRE.	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM
ERG Guide #: 132P	Use water spray to keep fire-exposed containers cool.	HYDROXIDE and POTASSIUM HYDROXIDE).
Hazard Class: 8 (Corrosive)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	Acrylic Acid may polymerize explosively on contact with AMINES; AMMONIA; CHLOROSULFONIC
	Vapors may travel to a source of ignition and flash back.	ACID; PEROXIDES; and OLEUM, or when exposed to HEAT or DIRECT SUNLIGHT.

SPILL/LEAKS

Isolation Distance:

Small Spill - 60 meters (200 feet)

Large Spill - 500 meters (1,600 feet)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Do not wash into sewer.

EXPOSURE LIMITS

OSHA:		
NIOSH:		
ACGIH:		
IDLH LEVEL:		

N/A 2 ppm, 10-hr TWA 2 ppm, 8-hr TWA No information

HEALTH EFFECTS

Eyes:	Irritation and burns	
Skin:	Irritation, burns and rash	
Acute:	Nose, throat and lung irritation	
Chronic:	Skin allergy with rash and itching	

PHYSICAL PROPERTIES

Odor Threshold: Flash Point:	0.06 ppm to 1 ppm 124°F (51°C)
LEL:	2.0%
UEL:	8.0%
Vapor Density:	2.5 (air = 1)
Relative Density:	1.05 (water = 1)
Vapor Pressure:	3 mm Hg at 68°F (20°C)
Water Solubility:	Miscible
Boiling Point:	286°F (141°C)

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene
Coveralls:	DuPont Tychem® CPF-2, SL, CPF-4, Responder®, TK or F
Boots:	Butyl, Neoprene
Respirator:	>2 ppm - Full facepiece APR with OV cartridges
-	>20 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: ADIPONITRILE

Synonyms: 1,4-Dicyanobutane; Hexanedinitrile Tetramethylene Cyanide CAS No: 111-69-3 Molecular Formula: C₆H₈N₂ RTK Substance No: 0027 Description: Colorless, nearly odorless, oily liquid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID	Adiponitrile reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
2 - Fire	Use dry chemical, CO ₂ , water spray, or alcohol- resistant foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	CHLORINE, BROMINE and FLUORINE). Adiponitrile is not compatible with STRONG ACIDS
DOT#: UN 2205	including <i>Hydrogen Cyanide</i> . Use water spray to keep fire-exposed containers cool.	(such as HYDROCHLORIC, SULFURIC and
ERG Guide #: 153	Vapor is heavier than air and may travel a distance	NITRIC) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
Hazard Class: 6.1 (Poison)	to cause a fire or explosion far from the source.	Adiponitrile decomposes above 194°F (90°C) to release toxic <i>Hydrogen Cyanide gas</i> .

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SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

Animals and aquatic life are endangered by potential Cyanide production.

EXPOSURE LIMITS

4 ppm, 10-hr TWA NIOSH: ACGIH: 2 ppm, 8-hr TWA IDLH: None The Protective Action Criteria values are: PAC-1 = 3.85 ppm PAC-2 = 3.85 ppm PAC-3 = 150 ppm

Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Headache, weakness, confusion, nausea and vomiting, pounding of the heart and trouble breathing, coma and death	

PHYSICAL PROPERTIES

Odor Threshold:	Nearly odorless
Flash Point:	199°F (93°C)
LEL:	1 to 1.7%
UEL:	5%
Auto Ignition Temp:	1,022°F (550°C)
Vapor Density:	3.73 (air = 1)
Vapor Pressure:	0.002 mm Hg at 68°F (20°C)
Specific Gravity:	0.97 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	563°F (295°C)
Freezing Point:	34°F (1°C)
Molecular Weight:	108.1

PROTECTIVE EQUIPMENT	
Gloves:	Butyl Rubber, Silver Shield®/4H® and Barrier® (>8-hr breakthrough for <i>Nitriles, aliphatic</i>)
Coveralls:	Tychem® BR, Responder® and TK; Zytron® 400 and 500; ONESuit®TEC; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Nitriles, aliphatic</i>)
Respirator:	>2 ppm - Supplied air >150 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility.



Common Name: AFLATOXINS

Synonyms: Aflatoxins B1, B2, G1 and G2 CAS No: 1402-68-2 Molecular Formula: $C_{13}H_{12}O_6$; $C_{17}H_{14}O_7$; $C_{17}H_{12}O_7$; $C_{17}H_{14}O_6$ RTK Substance No: 0029 Description: Colorless to pale yellow crystals when used in research

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health Fire	May be COMBUSTIBLE in <i>liquid</i> form. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Aflatoxins are not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
Reactivity DOT#: None		CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM
		HYDROXIDE and POTASSIUM HYDROXIDE);
ERG Guide #: None		AMMONIA; and AMINES.
Hazard Class: 6.1 (Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 75 meters (250 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

Ventilate and wash area after clean-up is complete. DO NOT wash into sewer.

Bioaccumulation is low in aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Aflatoxins**.

HEALTH EFFECTS

Eyes:	No information	
Skin:	No information	
Inhalation: Chronic:	Headache, nausea and vomiting Cancer (liver) in humans	

PHYSICAL PROPERTIES

Odor Threshold:	Not available	
Flash Point:	May be combustible (liquid form)	
Water Solubility:	Soluble	
Melting Point:	514° to 516°F (268° to 269°C)	
Molecular Weight:	312 to 330	

PROTECTIVE EQUIPMENT		
Gloves:	oves: Nitrile and Natural Rubber	
Coveralls:	DuPont Tyvek®	
Respirator:	Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Transfer** promptly to a medical facility.

August 2008



Common Name: ALDOL

Synonyms: Acetaldol; 3-Hydroxybutanal CAS No: 107-89-1 Molecular Formula: $C_4H_8O_2$ RTK Substance No: 0032 Description: Thick, colorless to pale yellow liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
3 - Health		Aldol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,		
2 - Fire	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Aldol reacts with METALS to form flammable and explosive <i>Hydrogen gas</i> .		
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.			
DOT#: UN 2839	Use water spray to keep fire-exposed containers cool.			
ERG Guide #: 153				
Hazard Class: 6.1				
(Toxic)				

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

PHYSICAL PROPERTIES

Flash Point:	150 °F (66 °C)	
Auto Ignition Temp:	482 °F (250 °C)	
Vapor Density:	3 (air = 1)	
Vapor Pressure:	21 mm Hg at 68 °F (20 °C)	
Specific Gravity:	1.1 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	174 $^{\circ}$ to 176 $^{\circ}$ F (79 $^{\circ}$ to 80 $^{\circ}$ C)	
Molecular Weight:	88.1	

EXPOSURE LIMITS

No occupational exposure limits have been established for **Aldol**.

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Viton/Butyl (>8-hr breakthrough for <i>Aldehydes</i> , <i>aliphatic</i>)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for <i>Aldehydes</i> , <i>aliphatic</i>)

Respirator: SCBA

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Headache, dizziness, and passing out

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes.	Remove
contact lenses if worn.	

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ALDRIN

Synonyms: HHDN; Octalene CAS No: 309-00-2 Molecular Formula: C₁₂H₈Cl₆ RTK Substance No: 0033

Description: White to brown, crystalline solid, or a brown liquid, with a mild chemical odor

		HAZARD DA	ГА
Hazard Rating	Firefighting		Reactivity
3 - Health 0 (Solid) - Fire 3 (Liquid)- Fire 0 - Reactivity DOT#: UN 2761 (Solid) UN 2762 (Liquid) ERG Guide #: 151 (Solid) 131 (Liquid) Hazard Class: 6.1 (Poison) (Solid)	Firefighting Aldrin does not burn, however, it is often dissolved in a liquid carrier which may be flammable or combustible. Use dry chemical, CO ₂ , water spray, alcoh resistant foam or other foam as extinguish agents. POISONOUS GASES ARE PRODUCED I FIRE, including <i>Hydrogen Chloride</i> . Use water spray to keep fire-exposed control.		Aldrin is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ACID CATALYSTS; and PHENOL. Aldrin may attack METALS in the presence of WATER.
3 (Flammable) (Liquid)	L/LEAKS	Π	PHYSICAL PROPERTIES
earth, or a similar material for disposal. Moisten <i>solid</i> Aldrin first or clean-up and place into sea DO NOT wash into sewer. Keep Aldrin in <i>liquid solutic</i> sewers, because of the pos Use only non-sparking tools opening and closing contai Aldrin is very toxic to aquat	0 feet) <i>tion</i> in vermiculite, dry sand, and place into sealed containers use a HEPA-filter vacuum for aled containers for disposal. <i>on</i> out of confined spaces, such as ssibility of an explosion. and equipment, especially when hers of Aldrin in <i>liquid solution</i> .	Odor Threshol Vapor Pressur Specific Gravit Water Solubilit Boiling Point: Melting Point: Molecular Weig	e: 8 x 10 ⁻⁵ mm Hg at 68°F (20°C) y: 1.6 (solid) (water = 1) y: Very slightly soluble Decomposes 219°F (104°C)
EXPOSI	JRE LIMITS		PROTECTIVE EQUIPMENT
OSHA: 0.25 mg/m³, 8-hr NIOSH: 0.25 mg/m³, 10-h ACGIH: 0.05 mg/m³, 8-hr IDLH: 25 mg/m³ The Protective Action Criter PAC-1 = 0.25 mg/m³ PAC-3 = 25 m	r TWA TWA ia values are: PAC-2 = 10 mg/m ³	Gloves: Coveralls: Respirator:	Silver Shield®/4H®, Viton and Barrier® (>4-hr breakthrough for <i>Hydrocarbons</i> , <i>aliphatic</i> , <i>unsaturated</i>) Tychem® BR, Responder®, and TK; Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons</i> , <i>aliphatic</i> , <i>unsaturated</i>) SCBA
HEALTI	H EFFECTS	FIRS	T AID AND DECONTAMINATION
convulsions	dizziness, nausea and vomiting, and even death r) in animals	Flush eyes with la contact lenses if Quickly remove of large amounts of Begin artificial res	contaminated clothing and wash contaminated skin with



Common Name: d-trans-ALLETHRIN

Synonyms: d-Allethrolone Chrysanthemumate; Bioallethrin CAS No: 28434-00-6 Molecular Formula: $C_{19}H_{26}O_3$ RTK Substance No: 3647

Description: Clear to amber colored, thick liquid with a mild odor (Pyrethroid insecticide)

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
2 - Health	d-trans-Allethrin does not burn, however, it is often dissolved in a liquid carrier which may be	d-trans-Allethrin is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
1 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,		
0 - Reactivity	Use dry chemical, CO ₂ or foam as extinguishing agents.	CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and		
DOT#: UN 3352	POISONOUS GASES ARE PRODUCED IN FIRE.	NITRIC).		
ERG Guide #: 151	Use water spray to keep fire-exposed containers	d-trans-Allethrin can be decomposed by STRONG BASES (such as SODIUM HYDROXIDE and		
Hazard Class: 6.1	cool.	POTASSIUM HYDROXIDE) and ULTRAVIOLET LIGHT.		
(Poison)				

SPILL/LEAKS PHYSICAL PROPERTIES **Isolation Distance:** Flash Point: 180° to 266°F (82° to 130°C) (dependent on "carrier" for a 90% solution) Spill: 50 meters (150 feet) **Specific Gravity:** 0.995 (water = 1) Fire: 800 meters (1/2 mile) Water Solubility: Insoluble Absorb liquids in dry sand, earth, or a similar material **Boiling Point:** 284° to 320°F (140° to 160°C) and place into sealed containers for disposal. DO NOT wash into sewer. **Molecular Weight:** 302.4 d-trans-Allethrin is highly toxic to fish and aquatic animals.

EXPOSURE LIMITS

No occupational exposure limits have been established for **d-trans-Allethrin**.

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Viton/Butyl, Nitrile, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Hydrocarbons</i>)
Coveralls:	Tychem® F, BR, CSM and TK (>8-hr breakthrough for <i>Hydrocarbons</i>)
Respirator:	Spill - full facepiece APR with Organic vapor filters and <i>P100 prefilters</i> Fire/Large Spill - SCBA

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes:	Irritation and burns	Remove the person from exposure.
Skin:	Irritation and burns with rash, itching and redness	Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath		Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary.
	Headache, nausea, vomiting, dizziness, seizures, and a loss of consciousness	Transfer promptly to a medical facility.



Common Name: ALLYL ALCOHOL

Synonyms: 2-Propen-1-ol; Allylic Alcohol; Vinylcarbinol CAS No: 107-18-6 Molecular Formula: C_3H_6O RTK Substance No: 0036 Description: Colorless liquid with a mustard-like odor

HAZARD DATA				
Hazard Rating	Hazard Rating Firefighting		Reactivity	
4 - Health 3 - Fire 1 - Reactivity DOT#: UN 1098 ERG Guide #: 131 Hazard Class: 6.1 (Poison	Firefighting Allyl Alcohol is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Vapors may travel to a source of ignition and flash back.		 Allyl Alcohol will explode upon contact with SULFURIC ACID. Allyl Alcohol will react with CARBON TETRACHLORIDE to form potentially explosive <i>halogenated epoxides</i> (such as <i>Dichlorobutylene</i> and <i>Trichlorobutylene</i> Oxides). Allyl Alcohol is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); TRIAZENES; BROMOMELAMINE; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); NITRIC ACID; CHLOROSULFONIC ACID; PHOSPHORUS TRICHLORIDE; and DIALLYL PHOSPHITE. 	
SP	ILL/LEAKS		PHYSICAL PROPERTIES	
Isolation Distance: Small Spills: 30 meters (100 feet) Large Spills: 60 meters (200 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep Allyl Alcohol out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Very toxic to aquatic organisms.		Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Densit Vapor Pressu Specific Grav Water Solubi Boiling Point Molecular We	$70^{\circ}F(21^{\circ}C)$ 2.5% 18% Temp: $713^{\circ}F(378^{\circ}C)$ y: 2 (air = 1) ire: $17.2 \text{ mm Hg at } 68^{\circ}F(20^{\circ}C)$ vity: 0.9 (water = 1) lity: Miscible : $206^{\circ}F(97^{\circ}C)$	
EXPO	SURE LIMITS		PROTECTIVE EQUIPMENT	
OSHA: 2 ppm, 8-hr TWA NIOSH: 2 ppm, 10-hr TWA; 4 ppm, STEL ACGIH: 0.5 ppm, 8-hr TWA IDLH LEVEL: 20 ppm		Gloves: Coveralls: Respirator:	Butyl, Silver Shield®/4H® and Viton (>8-hr breakthrough) DuPont Tychem® CPF 4, BR and LV, CSM, Responder®, and TK; Kappler Zytron® 400; and Saint- Gobain ONESuit®TEC (>8-hr breakthrough) >0.5 ppm -full facepiece APR with Organic vapor filters	
HEAL	TH EFFECTS	FIR	>5 ppm - Supplied air ST AID AND DECONTAMINATION	
Skin: Irritatio Inhalation: Nose, cough breath	on and burns on, burns and blisters throat and lung irritation with ing, phlegm and shortness of (pulmonary edema) ache, dizziness and passing out	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing. Wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. 		



Common Name: ALLYL CHLORIDE

Synonyms: 3-Chloropropene; 1-Chloro-2-propene CAS No: 107-05-1 Molecular Formula: C_3H_5CI RTK Substance No: 0039 Description: Colorless, brown, yellow or purple liquid with a strong, unpleasant odor

HAZARD DATA				
Lleserd Deting	Firefichting			Beestivity
Hazard Rating 3 - Health 3 - Fire 1 - Reactivity DOT#: UN 1100 ERG Guide #: 131 Hazard Class: 3 (Flammable)	alth FLAMMABLE LIQUID e Use dry chemical, CO ₂ , foam or water spray as activity extinguishing agents. May polymerize and explode at elevated temperatures POISONOUS GASES ARE PRODUCED IN FIRE, Guide #: 131 d Class: 3		ated temperatures. CED IN FIRE, losgene. IRE. d containers cool. tion and flash	ReactivityAllyl Chloride may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID CATALYSTS; AMINES; IRON or ALUMINUM CHLORIDES; CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); and SODIUM HYDROXIDE.Allyl Chloride may decompose in WATER or MOIST AIR to release Hydrogen Chloride gas. Attacks PLASTIC, RUBBER and COATINGS.
SPIL	LL/LEAKS		l i	PHYSICAL PROPERTIES
Isolation Distance: Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Absorb liquids in vermiculite, dry sand, earth, or activated carbon and deposit in sealed containers. Liquid floats on water. Harmful to aquatic life in very low concentrations.			Odor Threshold: Flash Point: LEL: UEL: Relative Vapor Density: Vapor Pressure: Water Solubility: Ionization Potent Boiling Point: Molecular Weigh	113°F (45°C)
EXPOS			PI	ROTECTIVE EQUIPMENT
OSHA:1 ppm, 8-hr TWANIOSH:1 ppm, 10-hr TWA, 2 ppm STELACGIH:1 ppm, 8-hr TWA; 2 ppm STELIDLH LEVEL:250 ppm			Coveralls: Du TI Boots: No Respirator: >1	H®/Silver Shield® (>4-hr breakthrough) Pont Tychem®, CPF-4, BR and LV, Responder® and K (>8-hr breakthrough) o information ppm - Full-facepiece APR with Organic Vapor artridges 0 ppm - Supplied air
HEALT	TH EFFECTS		FIRST	AID AND DECONTAMINATION
Skin: Irritation, Acute: Nose, thr coughing Headache unconscie Limited et May caus	burns leading to eye damage severe burns oat and lung irritation with and shortness of breath e, dizziness and ousness vidence - Cancer in animals. se mutations hlegm and shortness of breath		 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. 	



Common Name: ALLYL FORMATE

Synonyms: Formic Acid, Allyl Ester CAS No: 1838-59-1 Molecular Formula: C₄H₆O₂ RTK Substance No: 0042 Description: Colorless, clear liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Allyl Formate is a FLAMMABLE LIQUID.	Allyl Formate is not compatible with OXIDIZING
3 - Fire	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Solid streams of water may spread fire.	CHLORINE, BROMINE and FLUORINE) and
DOT#: UN 2336	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
ERG Guide #: 131	Use water spray to keep fire-exposed containers cool.	
Hazard Class: 3 (Flammable)	Vapors may travel to a source of ignition and flash back.	
	Allyl Formate may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Formate.

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep AllvI Formate out of confined spaces, such as sewers, because of the possibility of an explosion. Use only non-sparking tools and equipment, especially when opening and closing containers of Allyl

EXPOSURE LIMITS

PHYSICAL PROPERTIES

Flash Point: **Specific Gravity:** Water Solubility: Slightly soluble **Boiling Point: Molecular Weight:** 86.1

 5° to 67° F (-15° to 19.4°C) 0.95 (water = 1) 180° to 183°F (82° to 84°C)

PROTECTIVE EQUIPMENT	
Gloves:	Butyl (1 to4-hr breakthrough for <i>Esters, Carboxylic, Formates</i>)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for <i>Esters, Carboxylic</i>)
Respirator:	SCBA

No occupational exposure limits have been established for Allyl Formate.

The Protective Action Criteria values are:

 $PAC-1 = 12.5 \text{ mg/m}^3$ (4 ppm) $PAC-2 = 75 \text{ mg/m}^3$ (21 ppm)

 $PAC-3 = 400 \text{ mg/m}^3$ (114 ppm)

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation Inhalation: Nose and throat irritation

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: ALLYL IODIDE

Synonyms: 3-Iodopropene CAS No: 556-56-9 Molecular Formula: C_3H_5I RTK Substance No: 0044 Description: Yellowish, corrosive liquid that darkens on contact with air.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 3 - Fire 1 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Iodide</i> . CONTAINERS MAY EXPLODE IN FIRE.	Allyl lodide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 1723 ERG Guide #: 132 Hazard Class: 3 (Flammable)	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back.	Allyl lodide is AIR and LIGHT sensitive.
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spill - 60 m (200 feet)

Large Spill - 330 m (1,100 feet)

Cover with dry lime, sand or soda ash, and place in covered containers for disposal.

EXPOSURE LIMITS

No occupational exposure limits have been established.

	HEALTH EFFECTS	
Eyes:	Irritation, burns and possible eye damage	
Skin:	Irritation and burns	
Acute:	Irritation of the nose, throat and lungs with coughing, wheezing and shortness of breath	
Chronic:	Coughing, phlegm and/or shortness of breath	

PHYSICAL PROPERTIES

Odor Threshold: Flash Point:	Unpleasant, irritating 61°F (16°C)
Specific Gravity:	1.84 (water = 1)
Vapor Density:	5.8 (air = 1)
Water Solubility:	Insoluble
Boiling Point:	217°F (103°C)
Molecular Weight:	168

	PROTECTIVE EQUIPMENT
Gloves:	Viton (31 minutes permeation) or Silver Shield®/4H® (240 minutes permeation)
Coveralls:	DuPont Tychem® F, CPF-4, BR and LV, Responder® and TK for <i>Alylic Halogens</i> (8-hr breakthrough)
Boots:	No information
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

 $\label{eq:resonance} \textbf{Remove} \text{ the person from exposure}.$

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Chemical Name: ALLYL ISOTHIOCYANATE

Synonyms: Mustard Oil CAS No: 57-06-7 Molecular Formula: C₄H₅NS RTK Substance No: 0045 Description: Colorless to pale yellow, oily liquid with an irritating odor.

	HAZARD DATA		
Hazard Rating 3 - Health 2 - Fire 1 - Reactivity DOT#: UN 1545 ERG Guide #: 155 Hazard Class: 6.1 (Poison)	Firefighting - Combustible liquid - Fire extinguishers – use dry chemical, CO ₂ , or foam - DO NOT USE WATER - Decomposition Products - Nitrogen Oxides, Sulfur Oxides and Hydrogen Cyanide - Vapors may travel to a source of ignition and flash back Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	Reactivity - Reacts with WATER, ALCOHOLS, STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANTES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); AMINES; MOISTURE; and HEAT.	

SP	ILL	./LE	:Ak	(S

Isolation Distance: Isolate spill or leak in all directions for at least 50 meters (150 feet)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

EXPOSURE LIMITS

ACGIH:	N/A
OSHA:	N/A
NIOSH:	N/A
IDLH LEVEL:	N/A

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, burns and blisters
Acute:	Nose and throat irritation
Chronic:	Cancer -Tested (Not Classifiable) May damage the fetus Symptoms of asthma - coughing and wheezing

PHYSICAL PROPERTIES		
Odor Threshol	hold: No Information	
Flash Point:	115°F (46°C)	
LEL:	No Information	
UEL:	No Information	
Vapor Density:	3.4 (air = 1)	
Vapor Pressure	e: 3.7 mm Hg at 86°F (30°C)	
Water Solubilit	y: Insoluble	
Boiling Point:	304°F (151°C)	
Ionization Pote	ntial: No Information	
	PROTECTIVE EQUIPMENT	
Gloves:	No Information	
Coveralls:	No Information	
Boots:	No Information	
Respirator:	Supplied air	
FIRST AID AND DECONTAMINATION		
 Remove the person from exposure. Flush eyes with cool water for at least 15 minutes. Remove contaminated clothing and wash contaminated skin with soap and water. Begin rescue breathing and CPR if necessary. Transfer to a medical facility. 		



Common Name: ALLYL TRICHLOROSILANE

Synonyms: Allylsilicone Trichloride CAS No: 107-37-9 Molecular Formula: C₃H₅Cl₃Si RTK Substance No: 0047 Description: Colorless liquid with a pungent and irritating odor

-	less liquid with a pungent ar	-		
HAZARD DATA				
Hazard Rating	Firefighting		Reactivity	
 3 - Health 3 - Fire 2 ₩ - Reactivity DOT#: UN 1724 (Stabilized) ERG Guide #: 155 (page 258) Hazard Class: 8 (Corrosive) 	ealthUse dry chemical, CO2 or dry sand DO NOT USE WATER or FOAM of Reignition may occur as Allyl Tric difficult to extinguish.• ReactivityPOISONOUS GASES ARE PROD including Hydrogen Chlorides, Ph Silicon Dioxide.Guide #: 155 e 258)CONTAINERS MAY EXPLODE IN 		AIR or STEAM to produce toxic and corrosive <i>Hydrogen Chloride gas</i> and flammable and explosive <i>Hydrogen gas</i> . Allyl Trichlorosilane is not compatible with ORGANIC ACIDS; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALCOHOLS; AMINES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMMONIA;	
SPI	Allyl Trichlorosilane may autop		PHYSICAL PROPERTIES	
Isolation Distance: Small Spills - 30 meters (100 feet) Large Spills - 180 meters (600 feet) Cover and neutralize spill with crushed limestone, soda ash, lime or cement powder. Keep out of sewers to prevent explosions.		Odor Thresh Flash Point: LEL: UEL: Vapor Densi Vapor Press Specific Gra Water Solub Boiling Point	95°F (35°C) No Information No Information ty: 6.05 (air = 1) ure: 10 mm Hg at 61° F (16° C) vity: 1.2 lity: Reactive	
EXPOS	SURE LIMITS		PROTECTIVE EQUIPMENT	
OSHA, NIOSH and ACGIH EPA Acute Exposure Guideline Levels: (AEGLs)	No occupational exposure limits established AEGL1 = 0.60 ppm (8-hr) AEGL2 = 3.7 ppm (8-hr) AEGL3 = 8.7 ppm (8-hr) AEGL3 = 210 ppm (10 min)	Gloves: Coveralls: Boots: Respirator:	Viton® for <i>Organosilicon compounds</i> DuPont Tychem® Responder®, CSM, and TK (for heavy liquid chemicals which are toxic and corrosive) No Information >1 ppm - Supplied Air	
HEALTH EFFECTS		FIR	ST AID AND DECONTAMINATION	
Skin: Irritation Inhalation: Nose, th coughing	and burns and burns roat and lung irritation with g and severe shortness of breath ary edema) mation	Flush eyes w contact lense Quickly remo large amoun Begin artificia necessary.	berson from exposure. ith large amounts of water for at least 30 minutes. Remove if worn. Seek medical attention immediately. we contaminated clothing and wash contaminated skin with ts of soap and water. Seek medical attention immediately. al respiration if breathing has stopped and CPR if medical facility.	

Transfer to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: ALUMINUM CHLORIDE

Synonyms: Aluminum Trichloride; Anhydrous Aluminum Chloride CAS No: 7446-70-0 Molecular Formula: AICI₃ RTK Substance No: 0057 Description: Yellowish or grayish-white crystalline solid or powder with a sharp odor that is water reactive

HAZARD DATA					
Hazard Rating 3 - Health 0 - Fire 2-W - Reactivity DOT#: UN 1726 ERG Guide #: 137 Hazard Class: 8 (Corrosive)	Firefighting Non-flammable Use dry chemical or CO ₂ as extinguishing agents. DO NOT USE WATER. Use water spray to keep fire-exposed containers cool. DO NOT get water inside tanks. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> . Aluminum Chloride may ignite		Reactivity Aluminum Chloride may react violently with WATER and MOIST AIR to form toxic Hydrogen Chloride gas and heat. Aluminum Chloride is not compatible with ALUMINUM OXIDE; CARBON OXIDE; PHENYL AZIDE; GLYCIDOL; NITROBENZENE; ALKENES; BENZOYL CHLORIDE; NAPHTHALENE; ETHYLENE OXIDE; OXYGEN DIFLUORIDE; NITROMETHANE; ANILINES; ETHYLENIMINE; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); EPICHLOROHYDRIN; HALOGENATED HYDROCARBONS; and ALCOHOL.		
	combustibles (wood, paper and oil).				
Isolation Distance: Small Spills: 30 meter Large Spills: 120 meter water Fire: 800 meters (1/2) Collect powdered mate safe manner and depo Keep Aluminum Chlo where water may be p because of the possib Harmful to aquatic life	erial in the most convenient and osit in sealed containers. ride out of confined spaces present (such as sewers), ility of an explosion. at low concentrations. SURE LIMITS	Flas Vapo Spec Wate Boili Melt Mole	ves: N eralls: [pirator: >	I: :: /: /: ht: PRO Natural gas is p DuPont Hydrog >2 mg/r	Sharp Nonflammable 2.5 (air = 1) 1 mm Hg at 212°F (100°C) 2.7 (water = 1) Decomposes 360°F (182°C) 374°F (190°C) 133.34 FECTIVE EOUIPMENT Rubber and Nitrile (for <i>solid</i>) and Neoprene (if <i>HCl</i> present) Tyvek® (for <i>solid</i>) and Tychem® Responder (if <i>een Chloride gas</i> is present) m ³ - Full facepiece APR with High efficiency filter ogen Chloride gas is present, use Supplied air
HEAL	TH EFFECTS		FIRST		AND DECONTAMINATION
Skin: Severe Inhalation: Nose, th coughin	irritation and burns irritation and burns nroat and lung irritation with ng, wheezing and severe ss of breath (pulmonary edema)	 Remove the person from exposure. Quickly brush off excess chemical from the face. Immediately flush with large amounts of water for at least 30 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. Seek medical attention immediately. Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash gently with large amounts of water for at least 30 minutes. Seek medical attention immediately. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. 			



Common Name: ALUMINUM FLUORIDE

Synonyms: Aluminum Trifluoride CAS No: 7784-18-1 Molecular Formula: AIF_3 RTK Substance No: 0059 Description: Odorless, white or colorless, crystalline powder

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Aluminum Fluoride itself does	Aluminum Fluoride , in contact with SODIUM and POTASSIUM, is sensitive to impact and a violent reaction
0 - Fire	not burn.	may occur.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Aluminum Oxides</i> , <i>Fluorine</i> and	Aluminum Fluoride will explode when heated with REDUCING AGENTS (such as LITHIUM, SODIUM,
DOT#: UN 1759	Hydrogen Fluoride (in the presence of water).	ALUMINUM and their HYDRIDES).
ERG Guide #: 154	Use water spray to keep fire-exposed containers cool.	Aluminum Fluoride is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
Hazard Class: 8 (Corrosive)		NITRIC) and ACID FUMES.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into covered containers for disposal.

Harmful to aquatic life in very low concentrations.

EXPOSURE LIMITS

OSHA:2.5 mg/m³, 8-hr TWANIOSH:2.5 mg/m³, 10-hr TWAACGIH:2.5 mg/m³, 8-hr TWAIDLH:250 mg/m³(All of the above are for Fluorides)

HEALTH EFFECTS

Eyes:	Irritation	
Skin:	Irritation	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Headache, nausea and vomiting, weakness, convulsions and collapse	

PHYSICAL PROPERTIES

dorless
oncombustible
9 (air = 1)
mm Hg at 2,260°F (1,238°C)
1 (water = 1)
bluble
799°F (1,537°C)
356°F (1,291°C)

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene, Natural Rubber, Polyvinyl Chloride and Viton
Coveralls:	DuPont Tyvek®
Respirator:	>2.5 mg/m 3 - Full facepiece APR with High efficiency filter >25 mg/m 3 - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ALUMINUM HYDRIDE

Synonyms: Alane; Aluminum Trihydride CAS No: 7784-21-6 Molecular Formula: AIH₃ **RTK Substance No: 0060** Description: Colorless, white or gray powder which ignites spontaneously in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
1 - Health	FLAMMABLE and REACTIVE. Use dry chemical, soda ash, lime, or sand as	Aluminum Hydride ignites spontaneously in AIR or OXYGEN.	
3 - Fire 2 -₩ - Reactivity	extinguishing agents. DO NOT USE WATER OR FOAM.	Aluminum Hydride reacts explosively with WATER and MOISTURE to form flammable Hydrogen gas.	
DOT#: UN 2463	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Aluminum Oxides</i> .	Aluminum Hydride reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
ERG Guide #: 138	CONTAINERS MAY EXPLODE IN FIRE.	PERMANGANATES, CHLORATES, NITRATES,	
Hazard Class: 4.3	FIRE MAY RESTART AFTER IT HAS BEEN EXTINGUISHED.	CHLORINE, BROMINE and FLUORINE); and ETHERS with CARBON DIOXIDE as an impurity.	
(Water Reactive/ Dangerous when wet)		Aluminum Hydride is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and METAL SALTS.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit into sealed containers.

DO NOT USE WATER OR WET METHOD.

Keep Aluminum Hydride out of confined spaces, such as sewers, because of the possibility of an explosion.

No information is available about environmental effects.

EXPOSURE LIMITS

OSHA:	5 mg/m ³ , 8-hr TWA (<i>respirable Aluminum</i>) and 15 mg/m ³ , 8-hr TWA (total <i>Aluminum</i>)
NIOSH:	5 mg/m ³ , 10-hr TWA (<i>Aluminum, pyro powders</i>)
ACGIH:	1 mg/m ³ , 8-hr TWA (<i>Aluminum</i> , respirable fraction)
IDLH:	None

HEALTH EFFECTS

Eves: Irritation and burns Skin: Irritation and burns Nose, throat and lung irritation with Inhalation: coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Unknov
Flash Point:	Flamma
Water Solubility:	Reactiv
Boiling Point:	Decom
Melting Point:	302°F (
Molecular Weight:	30

мп able /e poses (150°C)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
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DuPont Tyvek® Coveralls:

Respirator:

>1 mg/m³ - Full facepiece APR with High efficiency filters >10 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: ALUMINUM NITRATE

Synonyms: Aluminum Trinitrate CAS No: 13473-90-0 Molecular Formula: Al₃HNO₃ RTK Substance No: 0061 Description: Odorless, colorless to white solid

ΗΔΖ	DATA	
1174		

Hazard Rating	Firefighting	Reactivity	
2 - Health	Aluminum Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Aluminum Nitrate dissolves in WATER to form <i>Nitric</i> Acid.	
0 - Fire	combustion of other substances.	Aluminum Nitrate is not compatible with COMBUSTIBLE	
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or CO ₂ extinguishing agents.	MATERIALS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG	
DOT#: UN 1438	POISONOUS GASES ARE PRODUCED IN FIRE,	ACIDS (such as HYDROCHLORIC, SULFURIC and	
ERG Guide #: 140	including Aluminum Oxide and Nitrogen Oxides.	NITRIC); METALS; METAL SALTS; CYANIDES;	
Hazard Class: 5.1 (Oxidizer)	Use water spray to keep fire-exposed containers cool.	THIOCYANATES; ORGANIC MATERIALS; and HALOGENATED HYDROCARBONS (such as METHYL CHLORIDE and TRICHLOROETHYLENE).	
	Aluminum Nitrate may ignite combustibles (wood, paper and oil).		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Neutralize water spills with Sodium Bicarbonate (soda ash).

Aluminum Nitrate is harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

OSHA: 5 mg/m³ (as *respirable dust*), 8-hr TWA **NIOSH:** 2 mg/m³ (as *soluble salt*), 10-hr TWA

- **ACGIH:** 1 mg/m³ (as the *respirable fraction*)
- (All the above are for Aluminum)

The Protective Action Criteria values are:

PAC-1 = 50 mg/m³ PAC-2 = 350 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/or shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Specific Gravity:	>1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	302°F (150°C) (Decomposes)
Melting Point:	163°F (73°C)
Molecular Weight:	213

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>1 mg/m ³ - full facepiece APR with <i>P100 filters</i> >50 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ALUMINUM OXIDE

Synonyms: alpha-Alumina; Aluminum Trioxide CAS No: 1344-28-1 Molecular Formula: Al₂O₃ RTK Substance No: 2891 Description: White, odorless, crystalline powder

HAZARD DATA		
Hazard Rating 2 - Health 0 - Fire 0 - Reactivity DOT#: None ERG Guide #: None Hazard Class: None	Firefighting Extinguish fire using an agent suitable for type of surrounding fire. Aluminum Oxide itself does not burn. Dusts may form explosive mixtures in air.	Reactivity Aluminum Oxide is not compatible with CHLORINE TRIFLUORIDE; ETHYLENE OXIDE; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and HOT CHLORINATED RUBBER.

Gloves:

Coveralls:

Respirator:

SP	ILL/	LE	AKS
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Isolation Distance:

Spill: 25 meters (75 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	0 mm Hg at 68 °F (20 °C)
Specific Gravity:	4 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	5,396 °F (2,980 °C)
Melting Point:	3,632 °F (2,030 °C)
Molecular Weight:	101.9

PROTECTIVE EQUIPMENT

Nitrile, Neoprene and Natural Rubber

EXPOSURE LIMITS

OSHA: 5 mg/m³ (as *respirable dust*) and 15 mg/m³ (as *total dust*), 8-hr TWA

ACGIH: 1 mg/m³ (as the *respirable fraction*), 8-hr TWA

The Protective Action Criteria values are: $PAC-1 = 15 \text{ mg/m}^3$ $PAC-2 = 170 \text{ mg/m}^3$ $PAC-2 = 0.020 \text{ mg/m}^3$

PAC-3 = 990 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

>1 mg/m³ - full facepiece APR with *High efficiency filters*

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Tyvek®

(N, R or P95)

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ALUMINUM PHOSPHATE

Synonyms: Aluminum Monophosphate CAS No: 7784-30-7 Molecular Formula: AIPO₄ RTK Substance No: 0062 Description: Solid, corrosive chemical which may be in a liquid or gel form

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of	Aluminum Phosphate reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and
0 - Fire	surrounding fire. Aluminum Phosphate itself does	POTASSIUM HYDROXIDE) and STRONG ACIDS
0 - Reactivity	not burn. POISONOUS GASES ARE PROCUDED IN FIRE, including <i>Aluminum Oxides</i> and <i>Phosphorus Oxides</i> .	(such as HYDROCHLORIC, SULFURIC and NITRIC).
DOT ID #: UN 1760		
ERG Guide #: 154		
Hazard Class: 8		
(Corrosive)		

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 150 feet)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

EXPOSURE LIMITS

OSHA:	15 mg/m ³ 8-hr TWA (Total Dust) 5 mg/m ³ 8-hr TWA (Respirable Dust)
NIOSH:	10 mg/m ³ 10-hr TWA (Total Dust) 5 mg/m ³ 10-hr TWA (Respirable Dust)
ACGIH:	1 mg/m ³ 8-hr TWA (Respirable Fraction)

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Acute:	Nose and throat irritation with coughing and wheezing
Chronic:	Bronchitis, coughing, wheezing and/or shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Not Combustible
LEL:	N/A
UEL:	N/A
Specific Gravity:	2.56 (water = 1)
Vapor Pressure:	0 mm Hg at 68 ^o F (20 ^o C)
Water Solubility:	Insoluble
Melting Point:	>2,732 ^o F (1,500 ^o C)

PROTECTIVE EQUIPMENT

Gloves: Coverall:	No Information DuPont Tychem® Responder® for inorganic acid salts in solution, DuPont Tychem® for hazardous dusts
Boot: Respirator:	No Information >1 mg/m ³ N95 >10 mg/m ³ Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Immediate medical attention is necessary.
- Remove contaminated clothing and wash contaminated skin with soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility.



Common Name: ALUMINUM SULFATE

Synonyms: Alum; Aluminum Trisulfate CAS No: 10043-01-3 Molecular Formula: Al₂(SO₄)₃ RTK Substance No: 0068 Description: Odorless, white or colorless, crystalline solid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	CORROSIVE when in a water solution.	Aluminum Sulfate will react with WATER; MOISTURE;	
0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Aluminum Sulfate itself does	STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMMONIA; and AMINES.	
0 - Reactivity	not burn.	Aluminum Sulfate is corrosive to METALS in the	
DOT#: UN 3077	DO NOT USE WATER directly on Aluminum Sulfate as heat and toxic <i>Sulfuric Acid</i> may form.	presence of WATER and MOISTURE.	
ERG Guide #: 171	POISONOUS GASES ARE PRODUCED IN FIRE.		
Hazard Class: 9 (Environmentally Hazardous Material)	including Aluminum Oxides and Sulfur Oxides.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

For water spills, neutralize with Agricultural Lime, Crushed Limestone or Sodium Bicarbonate.

Aluminum Sulfate may be hazardous to the environment, especially to fish.

EXPOSURE LIMITS

- **NIOSH:** 2 mg/m³, 10-hr TWA (as *Aluminum*, *soluble salts*)
- **ACGIH**: 1 mg/m³, 8-hr TWA (as *Aluminum metal*, respirable fraction)

The Protective Action Criteria values are:

PAC-1 = 38 mg/m ³	PAC-3 = 380 mg/m ³
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PAC-2 = 64 mg/m³

HEALTH EFFECTS

Eyes:IrritationSkin:Irritation with rash and burning feelingInhalation:Nose, throat and lung irritation, with
coughing, wheezing and shortness of
breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	2.71 (water = 1)
Water Solubility:	Soluble
Boiling Point:	>2,912°F (1,600°C)
Melting Point:	1,292°F (700°C)
Molecular Weight:	342.1

PROTECTIVE EQUIPMENT

Gloves:	Natural Rubber and Nitrile
Coveralls:	Tyvek®
Respirator:	>2 mg/m ³ - full facepiece APR with High efficiency filter >19 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: 2-AMINOANTHRAQUINONE

Synonyms: AAQ; beta-Aminoanthraquinone CAS No: 117-79-3 Molecular Formula: $C_{14}H_9NO_2$ RTK Substance No: 0069 Description: Red, needle-shaped crystal or a dark brown powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire 0 - Reactivity DOT#: None ERG Guide #: None Hazard Class: None	May be combustible. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	2-Aminoanthraquinone is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).

PH	YSICAL PROPERTIES
Vapor Pressure:	5 x 10 ⁻¹¹ mm Hg at 77°F (25°C)
Water Solubility:	Insoluble
Boiling Point:	Sublimes
Melting Point:	558° to 583°F (292° to 306°C)
Molecular Weight:	223.23
	Vapor Pressure: Water Solubility: Boiling Point: Melting Point:

EXPOSURE LIMITS

No occupational exposure limits have been established for **2-Aminoanthraquinone**.

The Protective Action Criteria values are:

No information

Cancer (liver, lymph) in animals

- $PAC-1 = 25 \text{ mg/m}^3$
- $PAC-2 = 150 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

Eyes:

Skin:

Inhalation:

Chronic:

HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Irritation	Remove the person from exposure.
Irritation	Flush eyes with large amounts of water for at least 15 minutes. Rem

Gloves:

Coveralls:

Respirator:

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

PROTECTIVE EQUIPMENT

Full facepiece APR with Organic vapor and Acid gas

Nitrile and Natural Rubber

cartridges with P100 prefilters

>25 mg/m³ - SCBA

Tyvek®

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: 4-AMINODIPHENYL

Synonyms: 4-Phenylaniline; 4-Aminobiphenyl CAS No: 92-67-1 Molecular Formula: $C_6H_5C_6H_4NH_2$ RTK Substance No: 0072 Description: Colorless to tan, crystalline solid

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Hazard Rating	Firefighting	Reactivity	
4 - Health	Use dry chemical, CO ₂ , water spray, alcohol-resistant foam or other foam as extinguishing agents.	4-Aminodiphenyl may react violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and	
1 - Fire	······································	NITRIC); OXIDIZING AGENTS (such as	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and HEXANITROETHANE.	
DOT#: None			
ERG Guide #: N/A		4-Aminodiphenyl is not compatible with	
Hazard Class: N/A		ANHYDRIDES; ORGANIC SUBSTANCES (such as CRESOLS, ISOCYANATES, KETONES, and ALDEHYDES); METALS (such as ALUMINUM, COPPER, ZINC and their ALLOYS); and	
		GALVANIZED STEEL.	

SPILL/LEAKS

Isolation Distance: 25 meters to 50 meters (80 to 160 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

EXPOSURE LIMITS

OSHA:	Eliminate exposure
NIOSH:	Lowest feasible exposure
ACGIH:	Lowest level possible
IDLH LEVEL:	No information

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Acute:	Headache, dizziness, blue color to the skin and lips, trouble breathing, collapse, and even death
Chronic:	Cancer (bladder)

PHYSICAL PROPERTIES

Odor Threshold:	Floral odor
Flash Point:	>230 [°] F (110 [°] C)
LEL:	No information
UEL:	No information
Vapor Density:	5.8 (air = 1)
Vapor Pressure:	1 mm Hg at 227 ^o F (108.3 ^o C)
Water Solubility:	Slightly soluble
Boiling Point:	576°F (302°C)
Specific Gravity:	1.16

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield® (for aromatic Amines)
Coveralls:	DuPont Tychem® Polycoat, QC, CPF1, SL and CPF2 (for hazardous dry powders and solids)
Boots:	No information
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing. Wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: 2-(2-AMINOETHOXY)ETHANOL

Synonyms: DGA; Diglycolamine CAS No: 929-06-6 Molecular Formula: C₄H₁₁NO₂ RTK Substance No: 0073 Description: Colorless liquid with a faint, fish-like or Amine odor

HAZARD DATA					
Hazard Rating	Firefighting			Reac	tivity
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 3055 ERG Guide #: 154 Hazard Class: 8 (Corrosive)	 Firefighting 2-(2-Aminoethoxy)Ethanol may burn, but does not readily ignite. Use dry chemical, CO₂, water spray or foam as extinguishing agents. Water or foam may cause frothing. DO NOT use solid streams of water. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Ammonia</i>. Use water spray to keep fire-exposed containers cool. 		2-(2-Ai STRC SULF 2-(2-Ai AGEN their H Hydro 2-(2-Ai ISOC TRICH META and G	minoethoxy)Ethanol reacts violently with NG ACIDS (such as HYDROCHLORIC, URIC and NITRIC). minoethoxy)Ethanol reacts with REDUCING ITS (such as LITHIUM, SODIUM, ALUMINUM and HYDRIDES) to produce flammable and explosive ogen gas. minoethoxy)Ethanol is not compatible with YANATES; HALOGENATED ORGANICS (such as HLOROETHANE and METHYLENE CHLORIDE); ALS and their ALLOYS (such as COPPER, ZINC, GALVANIZED IRON); PHENOLS; ALCOHOLS; (IDES; ANHYDRIDES; and ACID HALIDES.	
SP	ILL/LEAKS			PH	YSICAL PROPERTIES
 Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Use only non-sparking tools and equipment, especially when opening and closing containers of 2-(2-Aminoethoxy)Ethanol. DO NOT wash into sewer. 			Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight: pH:		Amine odor $255^{\circ}F (124^{\circ}C)$ 2.6% 11.7% $694^{\circ}F (368^{\circ}C)$ 3.6 (air = 1) $0.01 \text{ mm Hg at } 68^{\circ}F (20^{\circ}C)$ 1.1 (water = 1) Soluble $430^{\circ}F (221^{\circ}C)$ $10^{\circ}F (-12^{\circ}C)$ 105.2 11.8
EXPOSURE LIMITS No occupational exposure limits have been established for 2-(2-Aminoethoxy)Ethanol.			Gloves: Coveralls: Respirator:	PROTECTIVE EQUIPMENT Silver Shield®/4H® (>4-hr breakthrough) Tychem® fabrics; Zytron® 300; Saint-Gobain ONESuit® TEC; and Trellchem® fabrics (>8-hr breakthrough for Diethylamine) Supplied air or SCBA	
HEAL	TH EFFECTS				D AND DECONTAMINATION
Skin: Irritatior blisters Inhalation: Nose, th coughin	n and burns n and burns with redness and nroat and lung irritation with ng and severe shortness of pulmonary edema)		 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility Medical observation is recommended as symptoms may be delayed. 		

INFORMATION FOR EMERGENCY RESPONDERS

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Common Name: AMINOETHYLETHANOLAMINE

Synonyms: A-EA; (2-Hydroxyethyl)Ethylenediamine CAS No: 111-41-1 Molecular Formula: $C_4H_{12}N_2O$ RTK Substance No: 0074

Description: Clear, colorless, slightly thick liquid with an Ammonia-like odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health 1 - Fire 0 - Reactivity	May burn, but does not readily ignite. Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing agents. Using water or foam directly on	Aminoethylethanolamine reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and CELLULOSE NITRATE.		
DOT#: UN 2735 ERG Guide #: 153 Hazard Class: 8 (Corrosive)	Aminoethylethanolamine may cause frothing and solid streams of water may be ineffective. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE.	Aminoethylethanolamine is not compatible with HALOGENATED SOLVENTS (such as TRICHLOROETHANE and METHYLENE CHLORIDE); NITRITES; ALCOHOLS; ALDEHYDES; CRESOLS; EPICHLOROHYDRIN; ISOCYANATES; KETONES; PHENOL; and VINYL ACETATE.		
	Use water spray to keep fire-exposed containers cool.	In the presence of ALUMINUM and HEAT, explosive and flammable Hydrogen gas may be formed.		

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)

Large Spill: 60 meters (200 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers. DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are: PAC-1 = 35 mg/m³ PAC-2 = 250 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes: Irritation and burns

Skin:

Irritation and burns

Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath.

PHYSICAL PROPERTIES

Odor Threshold:	Ammonia-like
Flash Point:	270°F (132°C)
LEL:	1%
UEL:	8%
Auto Ignition Temp:	695°F (368°C)
Vapor Density:	3.6 (air = 1)
Vapor Pressure:	<0.01 mm Hg at 68°F (20°C)
Specific Gravity:	1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	470°F (243°C)
Freezing Point:	-49°F (-45°C)
pH:	11.5
Molecular Weight:	104

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H® and Barrier® (>4-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder®, and TK; Zytron® 500; ONESuit® TEC; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Diethylamine</i>)
Respirator:	Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility



Common Name: n-AMINOETHYLPIPERAZINE

Synonyms: 1-(2-Aminoethyl) Morpholine

CAS No: 140-31-8 Molecular Formula: $C_6H_{15}N_3$ RTK Substance No: 0075 Description: Thick, colorless to light colored liquid with an *Ammonia*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	n-Aminoethylpiperazine is a COMBUSTIBLE LIQUID.	n-Aminoethylpiperazine is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
2 - Fire	Use alcohol foam fire extinguishers.	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC,
DOT#: UN 2815	including Nitrogen Oxides.	SULFURIC and NITRIC); ACID CHLORIDES; ACID
ERG Guide #: 153	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers	ANHYDRIDES; ISOCYANATES; VINYL ACETATE; ACRYLATES; SUBSTITUTED ALKYLS; ALKYLENE
Hazard Class: 8	cool.	OXIDES; EPICHLOROHYDRIN; KETONES;
(Corrosive)	n-Aminoethylpiperazine may ignite combustibles (wood, paper and oil).	ALDEHYDES; ALCOHOLS; CAPROLACTAM SOLUTION; CHLOROFORMATES; COMBUSTIBLES; CARBON MONOXIDE; and NITRITES.

SPILL/LEAKS

Isolation Distance:

Small Spills: 60 meters (200 feet)

Large Spills: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Not readily biodegradable.

EXPOSURE LIMITS

No occupational exposure limits have been established for **n-Aminoethylpiperazine**.

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Ammonia-like odor
Flash Point:	200°F (93°C)
LEL:	1.6%
UEL:	6.5%
Auto Ignition Temp:	>572°F (300°C)
Vapor Density:	4.4 (air = 1)
Vapor Pressure:	0.1 mm Hg at 68°F (20°C)
Specific Gravity:	0.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	432°F (222°C)
Molecular Weight:	129.24

PROTECTIVE EQUIPMENT

Gloves:	Butyl (4 hour breakthrough)
Coveralls:	DuPont Tychem® Responder®, CSM and TK; Kappler Zytron® 300; and Saint-Gobain ONESuit®TEC (>8-hour breakthrough)
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: AMITROLE

Synonyms: Aminotriazole; 3-Amino-1,2,4-Triazole CAS No: 61-82-5 Molecular Formula: $C_2H_4N_4$ RTK Substance No: 0083 Description: An odorless, colorless to off-white crystalline solid or chip

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Not combustible but may be dissolved in flammable or combustible liquids.	Amitrole is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Fire 0 - Reactivity	Use dry chemical, CO ₂ , water spray, alcohol foam or a foaming agent.	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
DOT ID #: UN 2588	POISONOUS GASES ARE PRODUCED IN FIRE.	NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDES); ACID
ERG Guide #: 151 Hazard Class: 6.1	including Nitrogen Oxides.	ANHYDRIDES and ACID CHLORIDES.
(Poison)		Corrosive to IRON, COPPER and ALUMINUM.
		Decomposes in LIGHT.

Odor Threshold:

Vapor Pressure:

Water Solubility:

Melting Point: Specific Gravity:

Flash Point:

LEL:

UEL:

SPILL/LEAKS

Isolation Distance: No Information

- May be hazardous to the environment, especially to plants.
- Severe marine pollutant.

EXPOSURE LIMITS

OSHA: N/A

NIOSH 0.2 mg/m³, 10-hr TWA

ACGIH: 0.2 mg/m³, 8-hr TWA

IDLH LEVEL: No Information

HEA	LTH	EFFI	ECTS

PROTECTIVE EQUIPMENTGloves:No InformationCoverall:No InformationBoot:No InformationRespirator:>0.2 mg/m³ - Supplied air

PHYSICAL PROPERTIES

Less than 0.000008 mm Hg at $68^{\circ}F(20^{\circ}C)$

Odorless

N/A

N/A

Soluble 318^oF (159^oC)

1.14

Not Combustible

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing. Wash contaminated skin with water. Transfer to a medical facility.



Common Name: AMMONIA

Synonyms: Anhydrous Ammonia CAS No: 7664-41-7 Molecular Formula: NH₃ RTK Substance No: 0084 Description: Colorless gas with a strong, sharp, irritating odor

	HAZARD DATA			
Hazard Rating 3 - Health 1 - Fire 0 - Reactivity DOT#: UN 1005 ERG Guide #: 125 Hazard Class: 2.3 (Toxic Gases	Firefighting Reactivity Non-flammable gas which can ignite and burn with explosive force. Ammonia reacts violently with HALOGENS (such as FLUORINE, CHLORIDE and BROMINE); ACIDS (such as HYDROGEN CHLORIDE, HYDROGEN FLUORIDE and HYDROGEN BROMIDE); NITROSYL CHLORIDE; CHROMYL CHLORIDE; IN FIRE, including Nitrogen Oxides. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool, and to absorb and disperse vapors. TRIFLUORIDE; CALCIUM HYPOCHLORITE; and forms explosive compounds that are pressure and temperature sensitive with MERCURY; GOLD OXIDES; and SILVER SALTS and OXIDES. Ammonia is incompatible with CHLOROFORMATES; CYANIDES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES); DIMETHYL SULFATE; and MANY METALS and their ALLOYS (such as ZINC, COPPER and BRASS). Ammonia dissolves in WATER to release heat. Keep away from HEAT, MOISTURE and DIRECT SUNLIGHT.			
S	PILL/LEAKS	\square	PHYSICAL PROPERTIES	
Isolation Distance Small spills – 30 m Large spills – 60 m Stop flow of gas. Use water spray to Hazardous to the e DO NOT wash into	neters (100 feet) neters (200 feet) o absorb and disperse vapors. environment.	Flas LEL UEL Vapo Vapo Wato Boili Ioniz		
EXP	EXPOSURE LIMITS PROTECTIVE EQUIPMENT			
NIOSH: 2 ACGIH: 2 IDLH LEVEL: 3 ERPG-1: 2 ERPG-2: 1	0 ppm (8-hr TWA) 5 ppm (10-hr TWA), 35 ppm STEL 5 ppm (8-hr TWA), 35 ppm STEL 00 ppm 5 ppm 50 ppm ,500 ppm	Boo	Neoprene eralls: Dupont Tychem® CPE and Kappler Zytron® 500	
HEA	HEALTH EFFECTS FIRST AID AND DECONTAMINATION			
Skin: Irritation cause Acute: Nose, cough Chronic: An as	on and burns on and burns. Contact with liquid s frostbite. throat and lung irritation with ing and shortness of breath thma-like allergy with shortness of n, wheezing, coughing and/or chest ess	Flus cor Imm Beg	hove the person from exposure. sh eyes with large amounts of water for at least 30 minutes. Remove htact lenses if worn. Seek medical attention immediately. herse affected part in warm water if in contact with liquid. jin artificial respiration if breathing has stopped and CPR if necessary. hsfer to a medical facility.	



Common Name: AMMONIUM ACETATE

Synonyms: Acetic Acid, Ammonium Salt CAS No: 631-61-8 Molecular Formula: $C_2H_7NO_2$ RTK Substance No: 0085 Description: White, crystalline solid with a slight vinegar-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health 1 - Fire	Ammonium Acetate may burn, but does not readily ignite.	Ammonium Acetate is not compatible with SODIUM HYPOCHLORITE and OTHER OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
0 - Reactivity	Use dry chemical, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Ammonia</i> and <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).	
DOT#: UN 9079 ERG Guide #: 171			
Hazard Class: 9 (Miscellaneous Hazardous Substance)		Ammonium Acetate readily absorbs moisture from the air and releases Ammonia under normal conditions.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Ammonium Acetate rapidly degrades in water.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 7.5 \text{ mg/m}^3$
- $PAC-2 = 50 \text{ mg/m}^3$
- PAC-3 = 250 mg/m^3

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/ shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:Vinegar-like odorSpecific Gravity:1.1 (water = 1)Water Solubility:SolubleMelting Point:237°F (114°C)Molecular Weight:77.1

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with <i>High efficiency filters</i> >7.5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: AMMONIUM ARSENATE

Synonyms: Diammonium Arsenate CAS No: 7784-44-3 Molecular Formula: (NH₄)₂ HAsO₄ RTK Substance No: 0086

Description: White powder or colorless, crystalline solid with a characteristic Ammonia odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Arsenate itself	Ammonium Arsenate reacts with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM		
0 - Fire	does not burn.	HYDROXIDE) to produce Ammonia.		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Arsenic fumes, Ammonia and Nitrogen	Ammonium Arsenate reacts with METALS (such as IRON, ALUMINUM and ZINC), in the presence of		
DOT#: UN 1546	Oxides.	WATER, to produce toxic <i>Arsine gas</i> .		
ERG Guide #: 151	Use water spray to keep fire-exposed containers			
Hazard Class: 6.1	cool.			
(Poison)				

SPILL/LEAKS

Isolation Distance:

Spill: 25 to 50 meters (80 to 160 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

May be hazardous to the environment, especially to aquatic and soil organisms.

EXPOSURE LIMITS

OSHA:	0.01 mg/m³, 8-hr TWA
NIOSH:	0.002 mg/m ³ , Ceiling
ACGIH:	0.01 mg/m³, 8-hr TWA
IDLH:	5 mg/m ³
PAC	PAC-1 = 1.5 mg/m ³ ; PAC-2 = 17 mg/m ³ ;
LEVELS:	$PAC-3 = 100 \text{ mg/m}^3$
	(All of the above are for inorganic Arsenic)

HEALTH EFFECTS

Eyes: Skin:	Irritation, burns, and red, watery eyes Irritation, burns, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing and hoarseness
	Weakness, headache, nausea, vomiting, and muscle cramps
Chronic:	Inorganic Arsenic compounds cause skin, lung, and liver cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Ammonia-like odor
Flash Point:	Noncombustible
Vapor Density:	2 (air = 1)
Water Solubility:	Soluble
Molecular Weight:	176

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
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Coveralls: DuPont Tyvek®

Respirator: <0.1 mg/m³ - Full facepiece APR with cartridges specific for Ammonia and High efficiency particulate pre-filters <5 mg/m³ - Supplied air >5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.
- Transfer to a medical facility.



Common Name: AMMONIUM BISULFITE

Synonyms: Ammonium Hydrogen Sulfite; Ammonium Sulfite CAS No: 10192-30-0 Molecular Formula: NH₄HSO₃ RTK Substance No: 0090 Description: Colorless to yellow, crystalline solid that is commonly used in a water solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Bisulfite itself does	Ammonium Bisulfite reacts with WATER, STEAM and STRONG ACIDS (such as HYDROCHLORIC,		
0 - Fire	not burn.	SULFURIC and NITRIC) to form Ammonia and other		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	toxic gases.		
DOT#: UN 2693	including Sulfur Oxides, Nitrogen Oxides and Ammonia.	Ammonium Bisulfite reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
ERG Guide #: 154	Use water spray to keep fire-exposed containers	PERMANGANATES, CHLORATES, NITRATES,		
Hazard Class: 8	cool.	CHLORINE, BROMINE and FLUORINE) to form flammable and reactive gases.		
(Corrosive)		Ammonium Bisulfite is not compatible with LEAD DIACETATE; ALUMINUM; and MERCURY CHLORIDE.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

 $PAC-1 = 30 \text{ mg/m}^3$

PAC-2 = 330 mg/m³

 $PAC-3 = 2,000 \text{ mg/m}^3$

Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)	

PHYSICAL PROPERTIES

Flash Point:	Nonflammable
Specific Gravity:	2 (water = 1)
Water Solubility:	Soluble
Boiling Point:	302°F (150°C) (Sublimes)
Molecular Weight:	99.1

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with High efficiency filter or Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.





Common Name: AMMONIUM CARBONATE

Synonyms: Diammonium Carbonate; Hartshorn CAS No: 506-87-6 Molecular Formula: $(NH_{4})_2CO_3$ RTK Substance No: 0092

Description: Colorless or white, crystalline powder with a strong Ammonia odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Carbonate itself	Ammonium Carbonate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and	
0 - Fire	does not burn.	NITRIC); ACID SALTS; AMINES and other ALKALOIDS;	
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Ammonia</i> .	ALUM; CALOMEL (MERCURY CHLORIDE); SODIUM HYPOCHLORITE; IRON SALTS; and ZINC SALTS.	
DOT#: UN 3077	Use water spray to knock down vapors.		
ERG Guide #: 171	Sufficient amounts of Ammonia gas may be		
Hazard Class: 9 (Environmentally Hazardous Material)	generated in a fire to become an explosion hazard.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Cover with plastic sheeting.

Ammonium Carbonate is hazardous to the environment

EXPOSURE LIMITS

NIOSH: 25 ppm, 10-hr TWA; 35 ppm, STEL (as Ammonia)

The Protective Action Criteria values are:

 $PAC-1 = 0.31 \text{ mg/m}^3$

 $PAC-2 = 3.5 \text{ mg/m}^3$

PAC-3 = 21 mg/m³

ΗΕΔΙ	тн.	EFF	ECTS

Eyes:	Irritation		
Skin:	Irritation		
Inhalation:	Nose, throat and lung irritation with coughing and shortness of breath.		

PHYSICAL PROPERTIES

Odor Threshold:	Ammonia odor
Flash Point:	Nonflammable
Specific Gravity:	1.5 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	136.4°F (58°C)
Molecular Weight:	157.1

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >0.31 mg/m³ - SCBA >25 ppm (as Ammonia) - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: AMMONIUM CHLORIDE

Synonym: Ammonium Muriate CAS No: 12125-02-9 Molecular Formula: NH₄Cl RTK Substance No: 0093 Description: White powder or finely divided airborne particle.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity					
2 - Health	 Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Chloride itself does 	- Reacts violently with AMMONIUM NITRATE;					
0 - Fire	not burn.	POTASSIUM CHLORATE; BROMINE TRIFLUORIDE: and BROMINE PENTAFLUORIDE					
0 - Reactivity	- POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides, Hydrogen Chloride and	causing fire and explosion.					
DOT#: UN 3077 ERG Guide #: 171 Hazard Class: 9 (Environmentally Hazardous Substance)	Ammonia. - CONTAINERS MAY EXPLODE IN FIRE.	 Incompatible with ALKALIES and their CARBONATES; LEAD SALTS; SILVER SALTS; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). Reacts with HYDROGEN CYANIDE to form explosive Nitrogen Trichloride. 					

SPILL/LEAKS

Isolation Distance: 10 to 25 meters (30 to 80 feet)

- Sweep spilled substance into containers.
- Keep out of waterways as this substance is toxic to aquatic organisms.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
LEL:	N/A
UEL:	N/A
Vapor Density:	1.9 (air = 1)
Vapor Pressure:	1 mm Hg at 321ºF (161ºC)
Water Solubility:	Soluble
Boiling Point:	968°F (520°C)
Melting Point:	640°F (338°C) (decomposes)

EXPOSURE LIMITS

ACGIH: 10 mg/m³ 8-hr TWA, 20 mg/m³ STEL

NIOSH: 10 mg/m³ 10-hr TWA, 20 mg/m³ STEL

IDLH LEVEL: No Information

- (All the above are for Ammonium Chloride fume)
- **PAC:** PAC-1 = 20 ppm; PAC-2 = 110 ppm;

PAC-3 = 330 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation and possible eye damage Irritation
Acute:	Nose, throat and lung irritation,
	headache, drowsiness and confusion
Chronic:	Cancer - Not tested. Asthma-like
	allergy. May affect the kidneys.

PROTECTIVE EQUIPMENT

Gloves:	Natural Rubber, Neoprene, Nitrile, 4H® (for <i>Inorganic Salts</i>)
Coverall:	Dupont Tychem® CPF3
Boot:	Rubber or Neoprene
Respirator:	>10 mg/m ³ N95 or N95 plus Ammonia Cartridge if a liquid
	>100 mg/m ³ SA

FIRST AID AND DECONTAMINATION

- Remove person from exposure.
- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Remove contaminated clothing and wash contaminated skin with soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary.
- Transfer to a medical facility.



Common Name: AMMONIUM DICHROMATE

Synonyms: Ammonium Bichromate; Chromic Acid, Diammonium Salt CAS No: 7789-09-5 Molecular Formula: $(NH_4)_2Cr_2O_7$ RTK Substance No: 0097 Description: Odorless, bright orange to red, crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity					
4 - Health	COMBUSTIBLE SOLID that can be readily ignited and burning produces a large cloud of green residue.	Ammonium Dichromate is a STRONG OXIDIZER that reacts violently with REDUCING AGENTS (such as LITHIUM, SODIUM,					
1 - Fire	Ammonium Dichromate is a STRONG OXIDIZER	ALUMINUM and their HYDRIDES); HYDRAZINE; and STRONG					
1 - Reactivity	that enhances the combustion of other substances. Use water in flooding amounts to extinguish fire.	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and can ignite by friction with CARBIDE.					
DOT#: UN 1439	POISONOUS GASES ARE PRODUCED IN FIRE, including Chromic Oxide and Nitrogen Oxides.	Violent combustion may occur on contact with <i>finely divided</i> COMBUSTIBLES and ORGANICS (such as PAPER and WOOD Ammonium Dichromate is not compatible with STRONG ACIDS (with as UNDROCH ORIG, SUI FUELO, and MUTRIC))					
ERG Guide #: 141	CONTAINERS MAY EXPLODE IN FIRE.						
Hazard Class: 5.1 (Oxidizer)	Use water spray to keep fire-exposed containers cool.	(such as HYDROCHLORIC, SULFURIC and NITRIC); ALCOHOLS; ETHYLENE GLYCOL and MERCURY CYANIDE.					

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Neutralize liquid spills with agricultural lime (CaCO₃) or sodium bicarbonate (NaHCO₃).

DO NOT wash into sewer.

Ammonium Dichromate is dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

OSHA: 0.005 mg/m^3 , 8-hr TWANIOSH: 0.001 mg/m^3 , 10-hr TWAACGIH: 0.05 mg/m^3 , 8-hr TWAIDLH: 15 mg/m^3 (All the above are for *Chromium VI*)The Protective Action Criteria values are:PAC-1 = 1 mg/m^3 PAC-2 = 7.5 mg/m^3PAC-3 = 36.4 mg/m^3

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation and burns (skin absorbable)
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	Cancer (lung) in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless	
Flash Point:	Combustible	
Auto Ignition Temp:	374° to 437°F (190° to 225°C)	
Specific Gravity:	2.15 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	Decomposes	
Melting Point:	338°F (170°C) (Decomposes)	
Molecular Weight:	252.1	

Gloves: Nitrile, Neoprene and Natural Rubber (>8-hr breakthrough for Ammonium Dichromate in solution) Coveralls: Tyvek® (for solid Ammonium Dichromate) and Tychem® BR, CSM and TK (>8-hr breakthrough for Ammonium Dichromate in solution)

Respirator:>0.001 mg/m³ - full facepiece APR with P100 filters>1 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.



Common Name: AMMONIUM HYDROXIDE

Synonyms: Ammonia Water; Aqua Ammonia CAS No: 1336-21-6 Molecular Formula: NH4OH RTK Substance No: 0103 Description: Colorless solution of Ammonia in water with a pungent odor

	HAZARD DATA				
Hazard Rating	Firefighting			Rea	ctivity
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 2672 ERG Guide #: 154 Hazard Class: 8 (Corrosive)	Firefighting Ammonium Hydroxide is not con however in a fire Ammonia vapor can be ignited and may result in a Use dry chemical, CO ₂ , water spr extinguishing agents. POISONOUS GASES ARE PROU including Ammonia and Nitrogen Use water spray to keep fire-expo cool. DO NOT get water inside c		mbustible, s are formed that an explosion. ay or foam as DUCED IN FIRE, <i>Oxides.</i> seed containers containers. Amm SULF		onium Hydroxide reacts with many HEAVY FALS (such as SILVER, COPPER, LEAD and ZINC) their SALTS to form explosive compounds and mable and explosive Hydrogen gas. nonium Hydroxide may read violently with ONG ACIDS (such as HYDROCHLORIC, FURIC and NITRIC); DIMETHYL SULFATE; and OGENS. nonium Hydroxide will react with STRONG BASES h as SODIUM HYDROXIDE and POTASSIUM PROXIDE) to produce Ammonia gas.
SPI	ILL/LEAKS				YSICAL PROPERTIES
 Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT use COPPER, ALUMINUM or GALVANIZED METALS when handling Ammonium Hydroxide. Neutralize with a weak acid such as vinegar (<i>Acetic Acid</i>). DO NOT wash into sewer. Ammonium Hydroxide is harmful to aquatic life in very low concentrations. 			Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Potential: Molecular Weight: pH:		50 ppm Noncombustible 16% 27% 1,202°F (650°C) (25% Solution) 0.6 to 1.2 (air = 1) 360 mm Hg at 68°F (20°C) (25% Solution) 0.9 (water = 1) Miscible 100.4°F (38°C) (25% Solution) -72.4°F (-58°C) (25% Solution) 10.18 eV (as <i>Ammonia</i>) 35.06 13.6
EXPO	SURE LIMITS			PRC	DTECTIVE EQUIPMENT
ACGIH: 25 ppm, 8- IDLH: 300 ppm (All the above	0-hr TWA; 35 ppm, STEL hr TWA; 35 ppm, STEL are for <i>Ammonia</i>)		Gloves: Coveralls: Respirator:	Amm Tyche for A	, Nitrile, Neoprene and Viton (>8-hr breakthrough for nonium Hydroxide in less than 30% solution) em® SL, F, Responder® and TK (>8-hr breakthrough mmonium Hydroxide in less than 30% solution) opm - full facepiece APR with cartridges specific for
The Protective Action Criteria values are:PAC-1 = 6 ppmPAC-2 = 40 ppmPAC-3 = 100 ppm				>100	Ammonia ppm - SCBA
HEALTH EFFECTS			FIRS	ΤΑΙ	D AND DECONTAMINATION
damage Skin: Irritation Inhalation: Nose, th coughin	n, burns and possible eye an and burns nroat and lung irritation, with ng, and severe shortness of pulmonary edema)		contact lenses i Quickly remove large amounts o Begin artificial r Transfer promp	large a f worn conta of soap espirat tly to a	amounts of water for at least 30 minutes. Remove . Seek medical attention minated clothing and wash contaminated skin with o and water. Seek medical attention. tion if breathing has stopped and CPR if necessary.



Hazard Rating

2 - Health

0 - Reactivity

DOT#: UN 2859

0 - Fire

including Ammonia, Vanadium fumes and Nitrogen

Common Name: AMMONIUM METAVANADATE

Synonyms: Ammonium Vanadate CAS No: 7803-55-6 Molecular Formula: H₄NO₃V RTK Substance No: 0104 Description: Clear, white or yellow, crystalline powder

HAZARD DATA				
Firefighting	Reactivity			
Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Metavanadate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE,	Ammonium Metavanadate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);			

ERG Guide #: 154	Use water spray to keep fire-exposed containers
Hazard Class: 6.1	cool.
(Poison)	

SPILL/LEAKS

Oxides.

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

0.05 mg/m³, 15-min Ceiling (as Vanadium NIOSH: dust and fume)

IDLH: 35 mg/m³ (as Vanadium)

	PRUTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	<0.5 mg/m ³ - Full facepiece APR with High efficiency particulate filter

>0.5 mg/m³ (as *Vanadium*) or potential exposure to Ammonia - Supplied air or SCBA

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation, rash and redness Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Headache, dizziness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.

PHYSICAL PROPERTIES

TRIFLUORIDE.

STRONG ACIDS (such as HYDROCHLORIC.

SULFURIC and NITRIC); LITHIUM; and CHLORINE

Flash Point:	Nonflammable
Specific Gravity:	2.3 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	410°F (210°C) (Decomposes)
Melting Point:	392°F (200°C)
Molecular Weight:	117



Common Name: AMMONIUM MOLYBDATE

Synonyms: Ammonium Paramolybdate; Diammonium Molybdate CAS No: 13106-76-8 Molecular Formula: (NH₄)₂MoO₄ RTK Substance No: 0105 Description: White to colorless or greenish-yellow, odorless powder

HAZARD DATA

Hazard Rating Firefighting F		Reactivity	
2 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Molybdate itself does not burn.	Ammonium Molybdate is not compatible with ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); OXIDIZING AGENTS (such as	
1 - Reactivity DOT#: None	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Ammonia</i> and <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as	
ERG Guide #: None Hazard Class: None	cool.	HYDROCHLORIC, SULFURIC and NITRIC); and MOLTEN MAGNESIUM.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	1.4 (water = 1)
Water Solubility:	Soluble
Molecular Weight:	123.6

EXPOSURE LIMITS

OSHA: 5 mg/m³, 8-hr TWA (as *Molybdenum*)

ACGIH: 0.5 mg/m³, 8-hr TWA (as *Molybdenum*)

The Protective Action Criteria values are:

- PAC-1 = 30.7 mg/m³
- $PAC-2 = 51.1 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, weakness, and fatigue

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natura	I Rubber
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Coveralls: Tyvek®

Respirator:

- tor: >0.5 mg/m³ full facepiece APR with High efficiency particulate filters
 - >30 mg/m³ SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



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Common Name: AMMONIUM NITRATE

Synonyms: Nitram; Ammonia Nitrate CAS No: 6484-52-2 Molecular Formula: NH₄NO₃ RTK Substance No: 0106 Description: A colorless to white or gray, crystalline solid or granule

HAZARD DATA

HAZARD DATA					
Hazard Rating	Hazard Rating Firefighting			Reactivity	y
2 - Health 0 - Fire 3- Reactivity DOT ID #: UN 1942 ERG Guide #: 140 Hazard Class: 5.1 (Oxidizer)	Flood with water. DO NOT USE dry chemical, CO ₂ or halogenated extinguishing agents. POISONOUS GASES ARE PRODUCED I FIRE, including <i>Nitrogen Oxides</i> and <i>Ammonia.</i> #: 140 CONTAINERS MAY EXPLODE IN FIRE s: 5.1 Use water spray to keep fire-exposed		ICED IN Id FIRE Id	contamina MATERIA SHOCK. Ammoniur REDUCIN (such as H POWDER AGENTS PERMAN CHLORIN UREA; an Ammoniur	n Nitrate is a STRONG OXIDIZER and when ated with OIL, CHARCOAL or other ORGANIC LS, can EXPLODE and become SENSITIVE TO n Nitrate must be stored to avoid contact with IG AGENTS; COMBUSTIBLES; STRONG ACID HYDROCHLORIC, SULFURIC and NITRIC); ED METALS; METAL SALTS; OXIDIZING (such as PERCHLORATES, PEROXIDES, GANATES, CHLORATES, NITRATES, E, BROMINE and FLUORINE); PHOSPHORUS; d SULFUR. n Nitrate reacts with STRONG BASES (such as HYDROXIDE and POTASSIUM HYDROXIDE).
SPI	LL/LEAKS			PH۱	SICAL PROPERTIES
 Isolation Distance: 10 to 25 meters (30 to 80 feet) Collect with a clean shovel and place in noncombustible containers. Keep Ammonium Nitrate out of a confined space, such as a sewer, because of the possibility of an explosion. This material may be hazardous to water quality but will biodegrade. 			Odor Thro Flash Poi LEL: UEL: Density: Water So Melting P Ionizatior pH:	nt: lubility:	Odorless Nonflammable N/A N/A 1.7 g/cm ³ Soluble 336°F (169°C) Decomposes at 410°F (210°C) No Information 5.4
EXPOSURE LIMITS				PRO	
PAC2: 73 r	ng/m ³ ng/m ³ mg/m ³		Gloves: Coverall: Boot: Respirato	CHEMF Butyl or or: N95 for	Neoprene FAB Challenger® 5200 Neoprene dusts or mists d air for unknown levels or emergency
HEAL	TH EFFECTS		FI	RST AID	AND DECONTAMINATION
Skin: Irritation Acute: Nose, th Methemu fatigue a lips Chronic: Cancer -	and burns and burns roat and lung irritation oglobinemia with headache, nd blue color to the skin and Not tested nation available		Flush eye Remove o Remove o Begin artif	contact lenses	mounts of water for at least 15 minutes. if worn. clothing. Wash contaminated skin with water. on if breathing has stopped and CPR if necessary.



Common Name: AMMONIUM OXALATE

Synonym: Diammonium Oxalate CAS No: 1113-38-8 Molecular Formula: C₂H₈N₂O₄ **RTK Substance No: 0108** Description: Odorless, colorless, crystalline powder

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Ammonium Oxalate may burn, but does not readily ignite.	Ammonium Oxalate will react with solutions of SODIUM HYPOCHLORITE; AMMONIUM ACETATE; and	
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	STRONG ACIDS (such as HYDROCHLORIC,	
0 - Reactivity	extinguishing agents.	SULFURIC and NITRIC).	
DOT#: UN 2811	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Ammonia</i> and <i>Nitrogen Oxides</i> .	Ammonium Oxalate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
ERG Guide #: 154	Use water spray to keep fire-exposed containers	PERMANGANATES, CHLORATES, NITRATES,	
Hazard Class: 6.1 (Poison)	cool.	CHLORINE, BROMINE and FLUORINE).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 0.5 \text{ mg/m}^3$
- $PAC-2 = 4 \text{ mg/m}^3$
- $PAC-3 = 20 \text{ mg/m}^3$

HEALTH EFFECTS		
Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Headache, dizziness, nausea and vomiting, convulsions, coma and even death	

PHYSICAL PROPERTIES

Odor Threshold: Odorless **Specific Gravity:** 1.5 (water = 1) Water Solubility: Slightly soluble **Melting Point: Molecular Weight:** pH: 6.4

158°F (70°C) 124.1

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >0.5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: AMMONIUM PERSULFATE

Synonyms: Ammonium Peroxydisulfuric Acid; Diammonium Persulfate CAS No: 7727-54-0 Molecular Formula: $N_2H_8S_2O_8$ RTK Substance No: 0111

Description: Colorless, white or straw-colored, crystalline powder with a mild, unpleasant odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Ammonium Persulfate is not combustible, but it is a STRONG	AIR, LIGHT, WATER, MOISTURE, CONTAMINATION, and HEAT will cause Ammonium Persulfate to decompose and become
0 - Fire	OXIDIZER that enhances the combustion	unstable.
1 - Reactivity	of other substances.	Ammonium Persulfate reacts violently <i>in solution</i> with IRON; POWDERED ALUMINUM; and SILVER SALTS.
DOT#: UN 1444 ERG Guide #: 140	Use water only. DO NOT USE CO ₂ as an extinguishing agent. POISONOUS GASES ARE PRODUCED	Ammonium Persulfate will react with COMBUSTIBLE and ORGANIC MATERIALS (PAPER, GAS and FUELS) to cause fires.
Hazard Class: 5.1 (Oxidizer)	IN FIRE, including <i>Sulfur Oxides</i> , <i>Nitrogen Oxides</i> , and <i>Ammonia</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Ammonium Persulfate may ignite combustibles (wood, paper and oil).	Ammonium Persulfate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and HEAVY and POWDERED METALS

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Ammonium Persulfate is harmful to aquatic organisms.

EXPOSURE LIMITS

ACGIH: 0.1 mg/m³ (as *Persulfate*)

- The Protective Action Criteria values are:
- $PAC-1 = 0.3 \text{ mg/m}^3$
- $PAC-2 = 22 \text{ mg/m}^3$
- $PAC-3 = 130 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose, throat and lung irritation with
coughing and severe shortness of breath
(pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Mild, unpleasant
Flash Point:	Noncombustible
Specific Gravity:	1.98 (water = 1)
Water Solubility:	Soluble/Reactive
Boiling Point:	Decomposes
Melting Point:	Decomposes
Molecular Weight:	228.18

PROTECTIVE EQUIPMENT

Gloves:	Neoprene and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ - full facepiece APR with High efficiency filter >0.3 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: AMMONIUM POLYSULFIDE

Synonyms: Ammonium Sulfide; Diammonium Polysulfide CAS No: 9080-17-5 Molecular Formula: $(NH_4)_2S_x$ RTK Substance No: 0113

Description: Clear, yellow to red liquid with a rotten egg or Ammonia-like odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health 0 - Fire	Ammonium Polysulfide is noncombustible but can decompose upon heating to release highly flammable gases.	Ammonium Polysulfide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form flammable and toxic <i>Hydrogen Sulfide gas</i> .
1 - Reactivity DOT#: UN 2818	Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing agents.	Ammonium Polysulfide reacts with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) to form <i>Ammonia</i> .
ERG Guide #: 154 Hazard Class: 8 (Corrosive)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> , <i>Sulfur Oxides</i> , and <i>Hydrogen Sulfide</i> . Use water spray to keep fire-exposed containers cool.	Ammonium Polysulfide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and METALS.
		Keep Ammonium Polysulfide away from AIR, HEAT, LIGHT and WATER.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquid with fly ash, cement powder or commercial sorbent and place into sealed containers for disposal. DO NOT wash into sewer.

EXPOSURE LIMITS

ACGIH: 1 ppm, 8-hr TWA; 5 ppm, Ceiling (for *Hydrogen Sulfide*)

PHYSICAL PROPERTIES

Odor Threshold:	Rotten egg or Ammonia-like
Flash Point:	Noncombustible
Boiling Point:	Decomposes
Molecular Weight:	Varies

PROTECTIVE EQUIPMENT

Gloves: Butyl and Viton (>8-hr breakthrough for *liquid Ammonia*)

Coveralls: Tychem® BR, Responder®, and TK (>8-hr breakthrough for *liquid Ammonia* and *Hydrogen Sulfide*)

Respirator:

SCBA

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation:	Irritation and burns Irritation and burns Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, dizziness, nausea and vomiting	 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: AMMONIUM SULFIDE

Synonyms: Ammonium Monosulfide; Diammonium Sulfide CAS No: 12135-76-1 Molecular Formula: (NH₄)₂S RTK Substance No: 0115 Description: Yellow, crystalline solid, usually in a water solution, with a very strong rotten egg and *Ammonia*-like odor

HAZ	DAT	Δ
1174		

Hazard Rating	Firefighting	Reactivity
3 - Health	CORROSIVE AND FLAMMABLE LIQUID Use dry chemical, water spray or foam as extinguishing	Ammonium Sulfide reacts explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire	agents.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Sulfide, Sulfur Oxides, Nitrogen	BROMINE and FLUORINE). Ammonium Sulfide reacts with STRONG ACIDS (such as
DOT#: UN 2683	Oxides and Ammonia.	HYDROCHLORIC, SULFURIC and NITRIC) to produce toxic and flammable <i>Hydrogen Sulfide gas</i> .
ERG Guide #: 132	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Ammonium Sulfide reacts with STRONG BASES (such as
Hazard Class: 8	Vapor is heavier than air and may travel a distance to	SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) to produce Ammonia.
(Corrosive)	cause a fire or explosion far from the source and flash back. Ammonium Sulfide may form an ignitable vapor/air	Ammonium Sulfide slowly produces <i>Hydrogen Sulfide</i> and <i>Ammonia</i> in the presence of MOISTURE.
	mixture in closed tanks or containers.	Ammonium Sulfide corrodes COPPER and ZINC and their

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

Collect *solid* material in the most convenient and safe manner and place into sealed containers for disposal.

Use only non-sparking tools and equipment.

Keep Ammonium Sulfide out of confined spaces, such as

sewers, because of the possibility of an explosion. Dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

 NIOSH:
 10 ppm, 10-minute Ceiling

 ACGIH:
 1 ppm, 8-hr TWA; 5 ppm STEL

 IDLH:
 100 ppm

The Protective Action Criteria values are:

PAC-1 = 10 ppm PAC-2 = 15 ppm PAC-3 = 15 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns with possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath
	Headache, dizziness, lightheadedness, and passing out

PHYSICAL PROPERTIES

Odor Threshold: Flash Point:	Rotten egg and <i>Ammonia</i> -like odor 72°F (22°C)
LEL:	4%
UEL:	46%
Specific Gravity:	1.0 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	Decomposes
pH:	9.5 (45% aqueous solution)
Molecular Weight:	68.14

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Sulfur compounds</i>)
Coveralls:	Tychem® BR, Responder and TK (>8-hr breakthrough for <i>Hydrogen Sulfide</i>)
Respirator:	>10 ppm - SCBA Use turn out gear or flash protection if fire/ignition is the greatest hazard

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: AMMONIUM SULFITE

Synonyms: Ammonium Hydrogen Sulfite; Diamonium Sulfite CAS No: 10196-04-0 Molecular Formula: (NH₄)₂SO₃ RTK Substance No: 0116 Description: Odorless, colorless, crystalline solid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ammonium Sulfite itself does	Ammonium Sulfite reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form	
0 - Fire	not burn.	toxic Hydrogen Sulfide gas.	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Dioxide and Nitrogen Oxides.	Ammonium Sulfite is not compatible with OXIDIZING	
DOT#: UN 3077	Use water spray to keep fire-exposed containers	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,	
ERG Guide #: 171	cool.	CHLORINE, BROMINE and FLUORINE).	
Hazard Class: 9 (Environmentally Hazardous Substance)		Protect from WATER and MOISTURE.	

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Ammonium Sulfite is dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 10 \text{ mg/m}^{3}$
- $PAC-2 = 10 \text{ mg/m}^3$

PAC-3 = 10 mg/m³

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	1.41 (water = 1)
Water Solubility:	Soluble
Boiling Point:	302°F (150°C) (Sublimes)
Melting Point:	140° to 158°F (60° to 70°C) (Decomposes)
Molecular Weight:	116.14

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >10 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



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Common Name: AMYL ALCOHOL

Synonyms: 1-Pentanol; Pentyl Alcohol CAS No: 71-41-0 Molecular Formula: CH₃(CH₂)₃CH₂OH RTK Substance No: 0124 Description: Clear liquid with a mild alcohol odor

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
1 - Health 3 - Fire 0 - Reactivity DOT#: UN 1105 ERG Guide #: 129 Hazard Class: 3 (Flammable)	Firefighting FLAMMABLE LIQUID Use dry chemical, CO2 or alcohol-resistant foam as extinguishing agents. Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		g fires. CED IN FIRE. IRE. d containers cool. tion and flash	 Amyl Alcohol reacts violently with HYDROGEN TRISULFIDE and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Amyl Alcohol attacks ALKALINE and EARTH ALKALINE METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM) to form flammable and explosive <i>Hydrogen gas</i>. Amyl Alcohol is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALIPHATIC AMINES; ISOCYANATES; and ACETALDEHYDE.
SPI	LL/LEAKS			PHYSICAL PROPERTIES
	· · · ·		Odor Threshold Flash Point: LEL: UEL: Relative Density: Vapor Density: Vapor Pressure Water Solubilit Boiling Point: Melting Point: Molecular Weig	91°F (33°C) 1.2% 10.5% ty: 0.18 (water = 1) 3 (air = 1) e: 2 mm Hg at 77°F (25°C) y: Slightly soluble 280°F (138°C) -110°F (-79°C)
EXPOS	SURE LIMITS			PROTECTIVE EQUIPMENT
No occupational expo established.	sure limits have been		Coveralls: Boots:	Viton, Butyl, Nitrile and Neoprene (>8-hr breakthrough) DuPont Tychem®, CPF-2, SL, CPF-4, Responders® and TK for <i>Aliphatic Hydroxylic compounds</i> (>8-hr breakthrough) Neoprene and Butyl Supplied air
HEALT	TH EFFECTS		FIRST	AID AND DECONTAMINATION
with coug of breath	e, dizziness, confusion and		Flush eyes with contact lenses Remove contan and water.	ninated clothing and wash contaminated skin with soap respiration if breathing has stopped and CPR if
Chronic: No inform	nation			



Common Name: ANILINE

Synonyms: Aminobenzene; Phenylamine CAS No: 62-53-3 Molecular Formula: C₆H₅NH₂ RTK Substance No: 0135 Description: Colorless to brown, oily liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE LIQUID	Aniline reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
2 - Fire	Use dry chemical, CO_2 , water spray or foam	CHLORATES, NITRATES, CHLORINE, BROMINE and
0 - Reactivity	as extinguishing agents. POISONOUS GASES ARE PRODUCED IN	FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and may cause
DOT#: UN 1547	FIRE, including Nitrogen Oxides.	fires and explosions.
ERG Guide #: 153	Use water spray to keep fire-exposed containers cool.	Aniline is not compatible with ACETIC ANHYDRIDE; CHLOROSULFONIC ACID; STRONG ACIDS (such as
Hazard Class: 6.1 (Poisonous)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	HYDROCHLORIC, SULFURIC and NITRIC); ALKALIES (such as METAL HYDROXIDES and METAL CARBONATES); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and TOLUENE DIISOCYANATES.

SPILL/LEAKS

Isolation Distance:

Small Spills: 60 meters (200 feet)

Large Spills: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

This substance is very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: NIOSH: ACGIH: IDLH LEVEL: 5 ppm, 8-hr TWA Lowest feasible concentration 2 ppm, 8-hr TWA 100 ppm

HEALTH EFFECTS

Eyes:	Irritation with possible eye damage
Skin:	Irritation and skin rash
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness and blue color to the skin and lips (methemoglobinemia)
	Fatigue, drowsiness, convulsions, disturbance of speech, upset stomach and unconsciousness

PHYSICAL PROPERTIES

Odor Threshold:	0.58 to 10
Flash Point:	158°F (70°
LEL:	1.3%
UEL:	11%
Vapor Density:	3.2 (air = 1
Vapor Pressure:	0.6 mm Hg
Specific Gravity:	1 (water =1
Water Solubility:	Slightly sol
Boiling Point:	363°F (184
Ionization Potential:	7.7 eV
Molecular Weight:	93.1

I: 0.58 to 10 ppm

158°F (70°C) 1.3% 11% 3.2 (air = 1) 0.6 mm Hg at 68°F (20°C) 1 (water =1) Slightly soluble 363°F (184°C) 7.7 eV 93.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H® and Viton (>8-hr breakthrough)
Coveralls:	DuPont Tychem [®] CPF 2, CPF 4, BR, LV, SL, TK and
	Responder®; Kappler Zytron® 200; and Saint-Gobain ONESuit®TEC or equivalent (>8-hr breakthrough)
Respirator:	>2 ppm - full facepiece APR with Organic vapor cartridge >20 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: ANTIMONY

Synonyms: Antimony Metal; Antimony Powder CAS No: 7440-36-0 Molecular Formula: Sb RTK Substance No: 0141 Description: Naturally occurring, silvery-white, hard, brittle metal that is also formed from smelting *Lead* and other metals

HAZARD DATA				
Hazard Rating	Firefighting		Reactivity	
2 - Health 2 - Fire 0 - Reactivity DOT#: UN 2871 ERG Guide #: 170 Hazard Class: 6.1 (Toxic)	 Antimony is not combustible in bulk f Antimony powder and dust may be of Use sand, dry chemical, CO₂, water s extinguishing agents. DO NOT USE WATER on molten An POISONOUS GASES ARE PRODUC including Antimony Oxide and Antim (Stibine). Antimony may form an ignitable dust closed tanks or containers. Finely dispersed Antimony powder a explosive mixtures in air. 	COMBUSTIBLE. apray or foam as timony. CED IN FIRE, <i>ony Hydride</i> t/air mixture in	Antimony reacts violently with HALOGENS (such as FLUORINE, CHLORINE and BROMINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to cause fires and explosions. Contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and freshly formed (nascent) HYDROGEN can also form toxic <i>Antimony Hydride</i> (<i>Stibine</i>) ga Antimony is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, and NITRATES); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); IODINE; and POWDERED METALS.	
SPI	LL/LEAKS		PHYSICAL PROPERTIES	
vacuum for clean-up a for disposal.	mile) naterial first or use a HEPA-filter and place into sealed containers tainers when transferring tools and equipment.	Flash Point: Vapor Pressur Specific Gravi Water Solubili Boiling Point: Melting Point: Molecular Wei	ty: 6.69 (water = 1) ty: Insoluble 2,975°F (1,635°C) 1,166°F (630°C)	
EXPO	SURE LIMITS		PROTECTIVE EQUIPMENT	
OSHA: 0.5 mg/m³, 8-h NIOSH: 0.5 mg/m³, 10- ACGIH: 0.5 mg/m³, 8-h IDLH: 50 mg/m³ The Protective Action Cri PAC-1 = 1.5 mg/m³ PAC-3 = 50	hr TWA nr TWA teria values are: PAC-2 = 20 mg/m ³	Gloves: Coveralls: Respirator:	Nitrile, Neoprene and Natural Rubber Tyvek Spill or >0.5 mg/m ³ : full facepiece APR with <i>P100 filters</i> Fire or >5 mg/m ³ : SCBA	
HEAL	TH EFFECTS	FIRS	T AID AND DECONTAMINATION	
Inhalation: Nose, th coughin breath Headac	, redness and itchy skin rash proat and lung irritation, with g, wheezing and shortness of he, dizziness, nausea, vomiting, lominal pain	Flush eyes wit contact lenses Quickly remov large amounts Begin artificial	erson from exposure. h large amounts of water for at least 15 minutes. Remove e contaminated clothing and wash contaminated skin with of soap and water. respiration if breathing has stopped and CPR if necessary. ptly to a medical facility.	



Common Name: ANTIMONY POTASSIUM TARTRATE

Synonyms: Potassium Antimony Tartrate; Tartar Emetic CAS No: 28300-74-5 Molecular Formula: $C_4H_4KO_7Sb$ RTK Substance No: 0145 Description: Odorless, colorless to white, crystalline powder

HAZARD DATA				
Hazard Rating	Firefighting		Reactivity	
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1551 ERG Guide #: 151 Hazard Class: 6.1 (Poison)	Extinguish fire using an agent suitable for type of surrounding fire. Antimony Potassium Tartrate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.		Antimony Potassium Tartrate is not compatible with MINERAL ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); TANNIC ACID, PERCHLORIC ACID; ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); CARBONATES (such as LIME WATER); LEAD; MERCURY; SILVER SALTS; and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Antimony Potassium Tartrate can react with freshly formed HYDROGEN to form extremely flammable and poisonous <i>Stibine gas</i> .	
SPI	LL/LEAKS		PHYSICAL PROPERTIES	
Isolation Distance:		Odor Threshol	ld: Odorless	
Spill: 25 meters (75 feet)		Flash Point:	Nonflammable	
Fire: 800 meters (1/2 mile)		Specific Gravit	ity: 2.6 (water = 1)	
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.		Water Solubilit	ity: Soluble	
		Melting Point:	630° to 635°F (332° to 335°C)	
DO NOT wash into sewer. Antimony Potassium Tartrate is harmful to aquatic life at very low concentrations.		Molecular Weig	ight: 324.9	

EXPOSURE LIMITS		PROTECTIVE EQUIPMENT
OSHA: 0.5 mg/m^3 , 8-hr TWANIOSH: 0.5 mg/m^3 , 10-hr TWAACGIH: 0.5 mg/m^3 , 8-hr TWAIDLH: 50 mg/m^3 The Protective Action Criteria values are:PAC-1 = 4.11 mg/m ³ PAC-2 = 6.86 mg/m ³ PAC-3 = 137 mg/m ³	Gloves: Coveralls: Respirator:	Nitrile and Natural Rubber Tyvek® >0.5 mg/m ³ - full facepiece APR with <i>P100 filters</i> >50 mg/m ³ - SCBA

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation, burns and rashInhalation:Nose, throat and lung irritation, with
coughing, wheezing and shortness of
breathHeadache, dizziness, nausea and
vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ARGON

Synonyms: None CAS No: 7440-37-1 Molecular Formula: Ar RTK Substance No: 0151 Description: Odorless, tasteless, and colorless asphyxiant gas

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Argon itself does not burn.	Argon may react explosively with <i>liquid</i> NITROGEN. Keep temperatures below 125°F (52°C).	
0 - Fire	CONTAINERS MAY EXPLODE IN FIRE.		
0 - Reactivity	Use water spray to keep fire-exposed containers cool.		
DOT#:			
UN 1006 (Compressed)			
UN 1951 (Cryogenic)			
ERG Guide #: 121			
Hazard Class: 2.2			
(Nonflammable)			

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Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Turn leaking cylinder with leak up to prevent escape of gas in liquid state.

Before entering a confined space where **Argon** is present, check to make sure sufficient *Oxygen* (19.5%) exists.

EXPOSURE LIMITS

Argon decreases the amount of available *Oxygen*. Routinely measure *Oxygen* content to make sure it is at least 19.5% by volume.

The Protective Action Criteria values are:

PAC-1 = 65,000 ppm

PAC-2 = 230,000 ppm

PAC-3 = 400,000 ppm

HEALTH EFFECTS

- Eyes: Irritation and burns
- Skin: Irritation and burns, contact with liquid causes frostbite
- Inhalation: Headache, rapid breathing, dizziness, confusion, loss of coordination and judgment, unconsciousness, coma and death

PHYSICAL PROPERTIES

Odor Threshold:	Odorless		
Flash Point:	Noncombustible		
Vapor Density:	1.38 (air = 1)		
Vapor Pressure:	>760 mm Hg at 68ºF (20ºC)		
Water Solubility:	Slightly soluble		
Boiling Point:	-302°F (-186°C)		
Melting Point:	-308°F (-189°C)		
Molecular Weight:	39.9		

	PROTECT	IVE EQUI	PMENT
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Gloves:	Insulated materials
Coveralls:	Turn Out Gear
Respirator:	< 19.5% <i>Oxygen -</i> SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.
Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
Immerse affected part in warm water. Seek medical attention.
Begin artificial respiration if breathing has stopped and CPR if necessary.
Transfer promptly to a medical facility.



Common Name: ARSENIC

Synonyms: Gray Arsenic; Arsen CAS No: 7440-38-2 Molecular Formula: As RTK Substance No: 0152 Description: Silver-gray or white metallic, odorless, brittle solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Arsenic is noncombustible, however, <i>Arsenic dust</i> or <i>fine powder</i> can explode when exposed to heat,	Arsenic reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Fire	flame or hot surfaces.	CHLORATES, NITRATES, CHLORINE, BROMINE and
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	FLUORINE) to cause fires and explosions.
DOT#: UN 1558	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	Arsenic reacts with ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and HYDROGEN GAS to
ERG Guide #: 152	including Arsenic Oxides.	produce toxic Arsine gas.
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool.	Arsenic is not compatible with <i>powdered</i> METALS (such as ZINC, LITHIUM, RUBIDIUM and PLATINUM); BROMINE AZIDE; LEAD MONOXIDE; and MERCURY OXIDE.

SPILL/LEAKS

Isolation Distance:

Spills: 25 to 50 meters (75 to 150 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

DO NOT wash into sewer.

Toxic to aquatic organisms.

EXPOSURE LIMITS

 OSHA:
 0.01 mg/m³, 8-hr TWA

 NIOSH:
 0.002 mg/m³, 15-min Ceiling

 ACGIH:
 0.01 mg/m³, 8-hr TWA

 IDLH:
 5 mg/m³

HEALTH EFFECTS

Eyes: Skin:	Irritation, burns, red and watery eyes Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing and hoarseness
Chronic:	Weakness, headache, nausea, vomiting, and muscle cramps Cancer (skin and lung) in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible solid
Vapor Pressure:	1 mm Hg at 701°F (372°C)
Specific Gravity:	5.7 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	1,350°F (613°C)
Ionization Potential:	9.87 eV
Molecular Weight:	74.9

	PROTECTIVE EQUIPMENT
Gloves:	Natural Rubber, Nitrile or Silver Shield®
Coveralls:	DuPont Tyvek®
Respirator:	<0.1 mg/m ³ - Full facepiece APR with High efficiency filter
	<0.5 mg/m ³ -Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: ARSENIC DISULFIDE

Synonyms: Red Arsenic Glass; Realgar CAS No: 56320-22-0Molecular Formula: As_2S_2 RTK Substance No: 0156 Description: Reddish brown, odorless solid

HAZARD DATA

Hazard Rating Firefighting Reactivity 3 - Health Extinguish fire using an agent suitable for type of surrounding fire. Arsenic Disulfide Arsenic Disulfide may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PEROX			
3 - Health type of surrounding fire. Arsenic Disulfide AGENTS (such as PERCHLORATES, PEROXIDES,	Hazard Rating	Firefighting	Reactivity
0 - Reactivity itself does not burn. POISONOUS GASES ARE PRODUCED IN POISONOUS GASES ARE PRODUCED IN DOT#: UN 1557 FIRE, including Sulfur Oxides and Arsenic fumes. FIRE, including Sulfur Oxides and Arsenic fumes. CHLORINE, BROMINE and FLUORINE); BROMINE AZI SODIUM SULFIDE; SULFUR; and POTASSIUM NITRAT Hazard Class: 6.1 (Poison) Use water spray to keep fire-exposed containers cool. Use water spray to keep fire-exposed containers cool. HYDROCHLORIC, SULFURIC and NITRIC) and ACID F to form toxic Arsenic, Hydrogen Sulfide and Sulfur Dioxic fumes and vapors.	0 - Fire 0 - Reactivity DOT#: UN 1557 ERG Guide #: 152 Hazard Class: 6.1	 type of surrounding fire. Arsenic Disulfide itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Oxides and Arsenic fumes. Use water spray to keep fire-exposed 	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); BROMINE AZIDE; SODIUM SULFIDE; SULFUR; and POTASSIUM NITRATE. Arsenic Disulfide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and ACID FUMES to form toxic <i>Arsenic, Hydrogen Sulfide</i> and <i>Sulfur Dioxide</i> <i>fumes</i> and <i>vapors</i> . Contact with WATER or STEAM releases toxic <i>Hydrogen</i>

SPILL/LEAKS

Isolation Distance:

Spills: 25 to 50 meters (80 to 160 feet)

Fire: 800 meters (1/2 mile)

Collect solid material in the most convenient and safe manner, or use a HEPA-filter vacuum to clean-up, and deposit in sealed containers.

Harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

OSHA:	0.01 mg/m ³ , 8-hr TWA	
NIOSH:	0.002 mg/m ³ , 15-min Ceiling	
ACGIH:	0.01 mg/m ³ , 8-hr TWA	
IDLH LEVEL:	5 mg/m ³	
	(All of the above are for <i>inorganic Arsenic compounds</i> measured as <i>Arsenic</i>)	

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Eyes:	Irritation, burns, red and watery eyes
Skin:	Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing, and hoarseness
	Weakness, nausea and vomiting, headache and muscle cramps
Chronic:	Arsenic compounds cause lung and skin cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	<0 mm Hg at 68°F (20°C)
Specific Gravity:	3.5 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	1,049°F (565°C)
Melting Point:	585°F (307°C)
Molecular Weight:	214

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	<0.1 mg/m ³ - APR with High efficiency filter <0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ARSENIC PENTAFLUORIDE

Synonyms: Arsenic Fluoride CAS No: 7784-36-3 Molecular Formula: A_8F_5 RTK Substance No: 4171 Description: Colorless gas that forms white fumes in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Stop flow of gas and use fine water spray to disperse and knock down acid vapors.	Arsenic Pentafluoride reacts with WATER; MOIST AIR; STEAM; and STRONG ACIDS (such as HYDROCHLORIC,
0 - Fire	Extinguish fire using an agent suitable	SULFURIC and NITRIC) to form toxic Hydrogen Fluoride and
1 - Reactivity	for type of surrounding fire. Arsenic	Arsenic Pentoxide.
	Pentafluoride itself does not burn.	Arsenic Pentafluoride reacts violently with DIACETYLENE.
DOT#: UN 1955	POISONOUS GASES ARE PRODUCED IN	Arsenic Pentafluoride is not compatible with REDUCING
ERG Guide #: 123	FIRE, including Hydrogen Fluoride and	AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their
Hazard Class: 2.3	Arsenic.	HYDRIDES); STRONG BASES (such as SODIUM HYDROXIDE
(Poison Gas)	CONTAINERS MAY EXPLODE IN FIRE.	and POTASSIUM HYDROXIDE); ORGANIC MATERIALS; and
	Use water spray to keep fire-exposed	MATERIALS containing SILICA (such as GLASS).
	containers cool.	Arsenic Pentafluoride reacts with NICKEL; NICKEL ALLOYS;
		and COPPER in the presence of SULFUR DIOXIDE.

SPILL/LEAKS

Isolation Distance:

Small Spill: 100 meters (300 feet)

Large Spill: 800 meters (1/2 mile)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Use water spray to knock down vapors.

Turn leaking cylinder with leak up to prevent escape of gas in liquid state.

EXPOSURE LIMITS

OSHA: 3 ppm, 8-hr TWA

- **NIOSH:** 3 ppm, 10-hr TWA; 6 ppm, 15-min Ceiling
- ACGIH: 0.5 ppm, 8-hr TWA; 2 ppm, Ceiling
- **IDLH:** 30 ppm The Protective Action Criteria values are: PAC-1 = 1 ppm PAC-2 = 24 ppm PAC-3 = 44 ppm
 - (All of the above are for *Hydrogen Fluoride*)

HEALTH EFFECTS

Eyes:Irritation, burns, red and watery eyesSkin:Irritation, burns, itching, rash and loss of
pigmentInhalation:Nose and throat irritation with coughing,
wheezing and hoarseness
Weakness, headache, nausea, vomiting,
and muscle crampsChronic:Arsenic compounds cause skin, liver,
and lung cancer in humans

PHYSICAL PROPERTIES

Flash Point:	Noncombustible
Vapor Density:	5.86 (air = 1)
Vapor Pressure:	>760 mm Hg at 68°F (20°C)
Specific Gravity:	6.27 (water = 1)
Water Solubility:	Decomposes
Boiling Point:	-63°F (-53°C)
Freezing Point:	-112°F (-80°C)
Molecular Weight:	169.9

PROTECTIVE EQUIPMENT

Barrier®, Teflon® and Kel-F® (>8-hr breakthrough for *Hydrogen Fluoride*)

 Coveralls:
 Tychem® Responder® and TK; and Trellchem® HPS

 (>8-hr breakthrough for Hydrogen Fluoride)

Respirator: SCBA

Gloves:

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Immediately flush with large amounts of water. Apply 2.5% *Calcium Gluconate* gel to the affected skin. Seek medical assistance immediately. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: ARSENIC TRIOXIDE

Synonyms: Arsenous Oxide; White Arsenic CAS No: 1327-53-3 Molecular Formula: As_2O_3 RTK Substance No: 0161 Description: Odorless, colorless to white crystal or powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Arsenic Trioxide itself does	Arsenic Trioxide reacts with CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM
0 - Fire	not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Arsenic fumes</i> . Use water spray to keep fire-exposed containers cool.	and ZINC); METALS (such as ALUMINUM, COPPER,
0 - Reactivity		IRON and ZINC FILINGS); and COMPOUNDS CONTAINING CHLORINE and FLUORINE to produce toxic
DOT#: UN 1561		Arsine gas.
ERG Guide #: 151		Arsenic Trioxide is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM
Hazard Class: 6.1 (Poison)		HYDROXIDE) and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES).

SP		FA	١KS

Isolation Distance:	Odor Threshold:	Odorless
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible
Fire: 800 meters (1/2 mile)	Vapor Pressure:	66 mm Hg at 594°F (312°C)
Moisten spilled material first or use a HEPA-filter	Specific Gravity:	3.74 (water = 1)
vacuum for clean-up and place into sealed containers	Water Solubility:	Insoluble
for disposal. DO NOT wash into sewer.	Boiling Point:	869°F (465°C)
Arsenic Trioxide is harmful to aquatic life and may	Melting Point:	379°F (193°C)
persist in the environment.	Molecular Weight:	197.8

EXPOSURE LIMITS

OSHA: 0.01 mg/m³, 8-hr TWA NIOSH: 0.002 mg/m³, 15-min Ceiling ACGIH: 0.01 mg/m³, 8-hr TWA IDLH: 5 mg/m³ (All of the above are for *inorganic Arsenic*)

The Protective Action Criteria values are: PAC-1 = 0.4 mg/m³ PAC-2 = 3 mg/m³ PAC-3 = 9.1 mg/m³

	HEALTH EFFECTS
Eyes: Skin:	Irritation, burns, red and watery eyes Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing and hoarseness
	Weakness, headache, nausea, vomiting, and muscle cramps
Chronic:	Cancer (lung) in humans and animals

PROTECTIVE EQUIPMENT

PHYSICAL PROPERTIES

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ARSENIC TRISULFIDE

Synonyms: Arsenic Sesquisulfide; Arsenous Sulfide; King's Gold CAS No: 1303-33-9 Molecular Formula: As_2S_3 RTK Substance No: 0162 Description: Odorless, yellow or orange, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1557 ERG Guide #: 152 Hazard Class: 6.1 Poison)	 Extinguish fire using an agent suitable for type of surrounding fire. Arsenic Trisulfide itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Arsenic Oxides, Sulfur Oxides, Hydrogen Sulfide and Arsine. Use water spray to keep fire-exposed containers cool. 	 Arsenic Trisulfide may react violently with POTASSIUM CHLORATE and other OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SULFUR; and SODIUM SULFIDE. Arsenic Trisulfide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and ACID FUMES to produce highly toxic gases and fumes such as <i>Hydrogen Sulfide, Arsine,</i> and <i>Arsenic.</i> When water solutions of Arsenic Trisulfide contact METALS (such as IRON, ALUMINUM and ZINC), highly toxic <i>Arsine gas</i> may be released. Arsenic Trisulfide reacts with WATER, STEAM or MOIST AIR to produce <i>Hydrogen Sulfide gas</i>.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)
Fire: 800 meters (1/2 mile)
Harmful to aquatic life in very low concentrations.
DO NOT wash into sewer.
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit in sealed containers.

EXPOSURE LIMITS

OSHA: 0.01 mg/m³, 8-hr TWA NIOSH: 0.002 mg/m³, 15-min Ceiling ACGIH: 0.01 mg/m³, 8-hr TWA IDLH: 5 mg/m³ (All of the above are for *inorganic Arsenic*)

HEALTH EFFECTS

Eyes:	Irritation, burns, red and watery eyes
Skin:	Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing, wheezing, and hoarseness
	Weakness, nausea and vomiting, headache and muscle cramps
Chronic:	Arsenic compounds cause skin, liver, and lung cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	3.4 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	1,305°F (707°C)
Melting Point:	594°F (312°C)
Molecular Weight:	246

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	<0.1 mg/m ³ - Full facepiece APR with High efficiency filter <0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ARSINE

Synonyms: Arsenic Hydride; Hydrogen Arsenide CAS No: 7784-42-1 Molecular Formula: AsH₃ RTK Substance No: 0163 Description: Colorless gas with a garlic-like odor

HAZARD DATA					
Hazard Rating	Firefighting		Reactivity		
4 - Health 4 - Fire 2 - Reactivity DOT#: UN 2188 ERG Guide #: 119 Hazard Class: 2.3 (Toxic gas)	FLAMMABLE GAS Stop flow of gas or allow fire to burn itself out. POISONOUS GASES ARE PRODUCED IN FIRE, including Arsenic Oxide and Arsenic Trioxide. CONTAINERS MAY VENT RAPIDLY AND EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool and "wash" the aerosol particulate from the air. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		Arsine reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); POTASSIUM; and AMMONIA.		
SPII	L/LEAKS	PHYSICAL PROPERTIES			
Isolation Distance: Small Spills: 60 meters (200 feet) Large Spills: 420 meters (1,400 feet) Fire: 9.5 km (5.9 miles) Keep Arsine out of confined spaces, such as sewers, because of the possibility of an explosion. Can contaminate ground water with <i>Arsenic Trioxide</i> if water is used during a fire.		Odor Threshold Flash Point: LEL: UEL: Vapor Density: Vapor Pressure Specific Gravity Water Solubility Boiling Point: Ionization Poter Molecular Weig	Flammable 5.1% 78% 2.7 (air = 1) 11,000 mm Hg at $68^{\circ}F$ (20°C) 2.69 (water = 1) Soluble -67°F (-55°C) htial: 9.89 eV		

EXP	OSU	RE LI	MITS

 OSHA:
 0.05 ppm, 8-hr TWA

 NIOSH:
 0.0006 ppm, Ceiling (15-min)

 ACGIH:
 0.005 ppm, 8-hr TWA

 IDLH:
 3 ppm

PROTECT	IVE EQUIPMENT
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Gloves:	Teflon® (inner glove); insulated (outer glove)
Coveralls:	DuPont Tychem® BR, LV, Responder® and TK; Kappler Zytron® 500; and Saint-Gobain ONESuit®TEC (>8-hr breakthrough)
Respirator:	>0.0006 ppm - Supplied air

HEALTH EFFECTS				
Eyes:	Contact with liquid can cause frostbite			
Skin:	Contact with liquid can cause frostbite			
Inhalation:	Lung irritation with coughing and/or shortness of breath			
Chronic:	<i>Inorganic Arsenic compounds</i> cause liver, kidney, lung and bladder cancer in humans			

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Immerse affected part in warm water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: ASBESTOS

Synonyms: Actinolite; Amosite; Anthophyllite; Chrysotile; Crocidolite; Tremolite CAS No: 1332-21-4 Molecular Formula: Varies RTK Substance No: 0164 Description: Group of six naturally occurring, fibrous *Silicate* minerals that range in color from white to gray, green blue or brown

	HAZARD DATA				
Hazard Rating	Firefighting	Reactivity			
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Asbestos itself does not burn.	Not reactive			
0 - Fire	surrounding life. Asbestos itself does not burn.				
0 - Reactivity					
DOT#: NA 2212					
ERG Guide #: 171					
Hazard Class: 9					
(Miscellaneous Hazardous Substance)					

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. DO NOT USE COMPRESSED AIR.

EXPOSURE LIMITS

 OSHA:
 0.1 f/cc, 8-hr TWA; 1 f/cc, 30 min. Ceiling

 NIOSH:
 0.1 f/cc, 10-hr TWA

 ACGIH:
 0.1 f/cc, 8-hr TWA

The Protective Action Criteria values are: PAC-1 = 0.05 mg/m^3

 $PAC-2 = 0.06 \text{ mg/m}^3$

 $PAC-3 = 0.3 \text{ mg/m}^3$

HEALTH EFFECTS				
No acute health effects known				
No acute health effects known				
No acute health effects known				
Cancer (lung and gastrointestinal tract) in humans				

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	0 mm Hg at 8°F (20°C) (approx.)
Water Solubility:	Insoluble
Boiling Point:	Decomposes
Melting Point:	1,112°F (600°C)
Molecular Weight:	277 (for Chrysotile Asbestos)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.1 f/cc - full facepiece APR with <i>High efficiency filter</i> >1 f/cc (0.05 mg/m ³) - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: ASPHALT, OXIDIZED

Synonyms: Bitumens, Oxidized; Blown Asphalt CAS No: 64742-93-4 Molecular Formula: Mixture RTK Substance No: 3197

Description: Air-refined or air-blown type of *Bitumens* which are blackish-brown, cement-like solids, semisolids or liquids depending on the formulation or mixture of Asphalt used

llanand			HA	ZARD DA	ТА	
Hazard	Rating	Firefighting			Reactivity	
3 - Health 1 - Fire 0 - Reacti DOT#: U ERG Guid Hazard C	vity N 1999 de #: 130	FirefightingUse dry chemical, CO2, or foam as extinguishing agents.DO NOT use straight water streams. Water spray and foam must be applied carefully to avoid frothing.POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Oxides, Hydrogen Sulfide and Formaldehyde.Use water spray to keep fire-exposed containers cool.DO NOT direct water directly into any container, vessel or tank containing HOT Asphalt as violent eruptions may occur.			 Asphalt, Oxidized is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). HOT Asphalt, Oxidized may ignite flammables on contact. Significant concentrations of <i>Hydrogen Sulfide</i> can occur and accumulate in storage tanks and bulk transport containers. Use only non-sparking tools and equipment, especially when opening and closing containers of Asphalt, Oxidized. 	
	SPIL	L/LEAKS			PHYSICAL PROPERTIES	
Isolation Distance:Spills: 50 meters (150 feet)Fire: 800 meters (1/2 mile)Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.Hot product can harm plant life.This chemical does not accumulate in the food chain or environment.			Odor Thresho Flash Point: LEL: UEL: Autoignition Temperature: Vapor Pressu Specific Grav Water Solubil Boiling Point Melting Point	>400°F (204°C) 0.9% 7% 905°F (485°C) irre: 3 mm Hg at 68°F (20°C) rity: 0.95 to 1.1 (water = 1) lity: Insoluble : 700°F (371°C)		
	EXPOS	URE LIMITS			PROTECTIVE EQUIPMENT	
NIOSH: ACGIH: IDLH:	Asphalt fun 0.5 mg/m ³ , 8 1 ppm, 8-hr <i>Hydrogen</i> 8	8-hr TWA (as <i>Asphalt_fume)</i> r TWA; 5 ppm STEL (as		Gloves: Coveralls: Boots: Respirator:	Insulated Rubber DuPont Tychem® F, Responder® and CPF 2, CPF 3, CPF 4; ONESuit® TEC; and Kappler Zytron® 300 and 500 Insulated Rubber >0.5 mg/m ³ (as <i>Asphalt fume</i>) or >1 ppm <i>Hydrogen</i> <i>Sulfide gas</i> - Supplied air	
HEALTH EFFECTS			FIRS	T AID AND DECONTAMINATION		
Eyes: Skin: Acute: Chronic:	pigment c Nose, thro coughing, breath Headache vomiting	severe burns, dermatitis and hange bat and lung irritation with wheezing and/or shortness of e, dizziness, nausea and kin) in animals.	of Immediately minutes, lift while flushin Quickly rem skin with lar Begin rescu stopped and		e person from exposure. Iy flush with large amounts of water for at least 15 fting upper and lower lids. Remove contact lenses, if worn, ing. move contaminated clothing. Immediately wash contaminated arge amounts of soap and water. Seek medical attention. the breathing (using universal precautions) if breathing has and CPR if heart action has stopped. romptly to a medical facility.	



Common Name: ATRAZINE

Synonyms: AAtrex®, Gesaprim®, Vectal CAS No: 1912-24-9 Molecular Formula: $C_8H_{14}CIN_5$ RTK Substance No: 0171 Description: White, crystalline solid which is often mixed with a liquid (carrier).

		HAZARD DATA				
Hazard Rating	Firefighting			Re	activity	
3 - Health 0 - Fire 1 – Reactivity DOT#: UN 2763 (Solid) UN 2998 (Liquid) ERG Guide #: 151 Hazard Class: 6.1 (Poison)	 Atrazine is a noncombustible solid. However, it may be mixed with flammable or combustible "carrier" liquids. Use dry chemical, CO₂, water spray or a foaming agent. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Nitrogen Oxides</i>. CONTAINERS MAY EXPLODE IN FIRE 			y - In F S	compatible with STRONG ACIDS (such as IYDROCHLORIC, SULFURIC and NITRIC) and STRONG BASES (such as SODIUM HYDROXIDE nd POTASSIUM HYDROXIDE).	
SPIL	LS/LEAKS			PH	YSICAL PROPERTIES	
solation Distance: 5	0 meters for liquids (150 feet)	Odo	or Thresho	ld:	No information	
2	5 meters for solids (75 feet)	Flas	h Point:		Noncombustible	
	vith water before collection.	LEL	:		No information	
	niculite, dry sand, earth, or a deposit in sealed containers.	UEL	.:		No information	
- DO NOT wash into se	ewer.	Vap	or Density	:	No information	
 Hazardo us to pla nts organisms. 	s, soil orga nisms an d aquatic	Vap	or Pressu	re:	0.0000003 mm Hg at 68°F (20°C)	
		Wat	er Solubili	ty:	Slightly soluble	
		Boil	ing Point:		Decomposes	
		Ioni	zation Pot	ential:	No information	
EXPOS	URE LIMITS			PRO	TECTIVE EQUIPMENT	
OSHA: N/A		Glov	ves:	No info	ormation	
NIOSH: 5 mg	/m ³ 10-hr TWA	Cov	erall:	No info	ormation	
ACGIH: 5 mg	/m ³ 8-hr TWA	Воо	t:	No info	ormation	
IDLH LEVEL: N/A		Res	pirator:	Supplie	ed air	
HEALT	H EFFECTS		FIRS		O AND DECONTAMINATION	
Eyes: Irritant		- Flu	- Flush eyes with large amounts of water for at least 15 minutes.		amounts of water for at least 15 minutes.	
Skin: Irritant		 Remove contact lenses, if worn, while rinsing. Remove contaminated clothing. Wash contaminated skin with soat and water. 				
Acute: Skin and	eye irritation				a ciolining. Wash contaminated skin with soap	
	ested (Not Classifiable). Skin ay affect the nervous system.	- Re		oerson f medical	rom exposure. I facility	



Common Name: BARIUM

Synonyms: None CAS No: 7440-39-3 Molecular Formula: Ba RTK Substance No: 0180 Description: Silver to white, metallic, powder or solid

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	Barium is a FLAMMABLE SOLID that may ignite spontaneously in AIR or on contact with WATER.	Barium reacts violently with WATER and MOIST AIR to generate flammable and explosive <i>Hydrogen gas</i> .		
3 - Fire	Use dry chemicals appropriate for extinguishing	Mixtures of finely divided Barium and HALOGENATED		
2-W - Reactivity	metal fires.	HYDROCARBONS (such as TRICHLOROETHYLENE and CARBON TETRACHLORIDE) are explosive. Barium is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,		
DOT#: UN 1400	DO NOT USE WATER, CO2 or FOAM. POISONOUS GASES ARE PRODUCED IN FIRE.			
ERG Guide #: 138	CONTAINERS MAY EXPLODE IN FIRE.			
Hazard Class: 4 (Flammable Solid)	CONTAINERS MAT EXPLODE IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and		
(Flammable Solid)		NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMMONIA; and OXYGEN.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Cover with dry sand or earth to prevent ignition and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

ACGIH: 0.5 mg/m³, 8-hr TWA IDLH: 50 mg/m³ The Protective Action Criteria values are: PAC-1 = 1.5 mg/m³ PAC-2 = 180 mg/m³

 $PAC-3 = 1,100 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Nausea, vomiting, irregular heartbeat, muscle weakness, tremors, paralysis and even death

PHYSICAL PROPERTIES		
Flash Point:	Flammable solid	
Vapor Pressure:	10 mm Hg at 1,920°F (1,049°C)	
Specific Gravity:	3.5 (water = 1)	
Water Solubility:	Reactive	
Boiling Point:	2,084° to 2,979°F (1,140° to 1,637°C)	
Melting Point:	1,310°F (710°C)	
Molecular Weight:	137.34	

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®

Respirator:

>0.5 mg/m3 - full facepiece APR with High efficiency filters
 >5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BARIUM NITRATE

Synonyms: Barium Dinitrate; Nitric Acid, Barium Salt CAS No: 10022-31-8 Molecular Formula: BaN₂O₆ RTK Substance No: 0186 Description: Colorless to white, odorless, crystalline powder

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
2 - Health	Barium Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Barium Nitrate may react with COMBUSTIBLES; CHEMICALLY ACTIVE METALS (such as ALUMINUM,		
0 - Fire 0 - Reactivity	combustion of other substances. Use water only. DO NOT USE CO_2 as an	MAGNESIUM and ZINC); and METAL POWDERS to cause a fire or explosion.		
DOT#: UN 1446	extinguishing agent. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Barium Oxides</i> . Use water spray to keep fire-exposed containers	Barium Nitrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and		
ERG Guide #: 141 Hazard Class: 5.1				
(Oxidizer)	cool. Barium Nitrate may ignite combustibles (wood, paper and oil).	NITRIC).		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Barium Nitrate is a marine pollutant and may bioaccumulate.

EXPOSURE LIMITS

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Nausea, vomiting, irregular heartbeat, muscle weakness, tremors, paralysis and death

PHYSICAL PROPERTIES

Odor Threshold:	Odorless	
Flash Point:	Noncombustible	
Specific Gravity:	3.24 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	Decomposes	
Melting Point:	1,098°F (610°C)	
Molecular Weight:	261.35	

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber	
Coveralls:	Tyvek®	
Respirator:	>0.5 mg/m ³ - Full facepiece APR with P100 filters	
	>50 mg/m ³ - SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Right to Know Hazardous Substance Fact Sheet

Common Name: BENDIOCARB

N. Health

Synonyms: Carbamic Acid, Methyl-, 2,3-(Dimethylenedioxy)Phenyl Ester; Ficam CAS No: 22781-23-3 Molecular Formula: $C_{11}H_{13}NO_4$ RTK Substance No: 0191 Description: Colorless to white, odorless powder

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
2 - Health	Although Bendiocarb does not burn, it is often dissolved in a liquid carrier that may be	Bendiocarb is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
1 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,		
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and		
DOT#: UN 2757	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and REDUCING AGENTS (such as LITHIUM, SODIUM,		
ERG Guide #: 151				
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool.	ALUMINUM and their HYDRIDES).		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Bendiocarb is toxic to birds and is a regulated marine pollutant.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Bendiocarb**.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless	
Vapor Pressure:	3.45 x 10 ⁻⁵ mm Hg at 77°F (25°C)	
Specific Gravity:	1.25 (water = 1)	
Water Solubility:	Insoluble	
Melting Point:	265°F (129°C)	
Molecular Weight:	223.2	

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Neoprene
Coveralls:	Tyvek®
Respirator:	Spill: full facepiece APR with <i>P100 High efficiency filter</i> cartridges
	Fire: SCBA

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation:	Mild irritation Mild irritation (skin absorbable) Headache, dizziness, blurred vision, tightness in the chest, sweating, muscle twitching and loss of coordination, convulsions, coma and death (<i>Carbamate poisoning</i>)	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Shampoo hair immediately if contaminated. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. Use Atropine if symptoms develop.



Common Name: BENZ(a)ANTHRACENE

Synonyms: Naphthanthracene; Tetraphene CAS No: 56-55-3 Molecular Formula: C₁₈H₁₂ **RTK Substance No: 0193** Description: Odorless, colorless to yellow brown flake, plate or powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Benz(a)Anthracene may burn, but does not readily ignite.	Benz(a)Anthracene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	Use dry chemical, CO ₂ , water spray or foam as	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	extinguishing agents.	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	
ERG Guide #: 171		
Hazard Class: 9 (Environmentally hazardous substance)		

SPILL/LEAKS

Isolation Distance:

Small Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit in sealed containers.

Bioaccumulation may occur in seafood.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	May burn
Vapor Pressure:	2 mm Hg at 68°F (20
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	820°F (438°C)
Melting Point:	324°F (162°C)
Molecular Weight:	228.3

20°C)

EXP	OSUR	S

OSHA:	0.2 mg/m ³ , 8-hr TWA (as Coal Tar Pitch Volatiles, Benzene soluble fraction)
NIOSH:	0.1 mg/m ³ , 10-hr TWA (as <i>Coal Tar Pitch Volatiles, Cyclohexane-extractable fraction</i>)
ACGIH:	Lowest level possible
IDLH:	80 mg/m ³ (as Coal Tar Pitch Volatiles)
PAC LEVELS:	PAC-1 = 0.6 mg/m ³ ; PAC-2 = 120 mg/m ³ ; PAC-3 = 700 mg/m ³

HEALTH EFFECTS

No information available
No information available
No information available
Cancer (liver and lung) in animals

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ - Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Transfer to a medical facility.



Common Name: BENZ(a)ANTHRACENE, 7,12-DIMETHYL-

Synonyms: 7,12 DMBA; 9,10-Dimethyl-1,2-Benzanthracene CAS No: 57-97-6 Molecular Formula: C₂₀H₁₆ RTK Substance No: 0194 Description: Yellow to greenish-yellow, crystalline solid or yellow powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 2 - Fire	COMBUSTIBLE SOLID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Benz(a)Anthracene, 7,12-Dimethyl- is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
0 - Reactivity DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Sulfur Oxides</i> .	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC,
ERG Guide #: 171	Use water spray to keep fire-exposed containers cool.	SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
Hazard Class: 9 (Environmentally Hazardous Material)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 0.2 mg/m³, 8-hr TWA

NIOSH: 0.1 mg/m³, 10-hr TWA

- ACGIH: Lowest level possible
- IDLH: 80 mg/m³

(All the above are for Coal Tar Pitch Volatiles)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Chronic:	Cancer (skin, lung, mammary) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	187°F (86°C)
Water Solubility:	Insoluble
Melting Point:	252° to 253°F (122° to 123°C)
Molecular Weight:	256.4

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol, Silver Shield®/4H® and Viton
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ (as Coal Tar Pitch Volatiles) - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: BENZENE

Synonyms: Benzin; Benzol; Phenyl Hydride CAS No: 71-43-2 Molecular Formula: C_6H_6 RTK Substance No: 0197 Description: Clear, colorless liquid with a sweet *Petroleum*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 3 - Fire	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Benzene reacts violently or explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use water as fog, as spray may be ineffective and may scatter and spread fire.	CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
DOT#: UN 1114 ERG Guide #: 130	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.	Benzene ignites on contact with CHROMIC ANHYDRIDE. Benzene is not compatible with LIQUID OXYGEN.
Hazard Class: 3	Use water spray to reduce vapors and keep containers cool.	HYDROGEN, and RANEY NICKEL.
(Flammable)	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)
Large Spill: 60 meters (200 feet)
Fire: 800 meters (1/2 mile)
Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
Keep Benzene out of confined spaces, such as sewers, because of the possibility of an explosion.
DO NOT wash into sewer.
Benzene is very toxic to aquatic organisms.

EXPOSURE LIMITS

 OSHA:
 1 ppm, 8-hr TWA; 5 ppm, 15-min STEL

 NIOSH:
 0.1 ppm, 10-hr TWA; 1 ppm, 15-min STEL

 ACGIH:
 0.5 ppm, 8-hr TWA; 2.5 ppm, 15-min STEL

 IDLH:
 500 ppm

 ERPG-1: 50 ppm; ERPG-2: 150 ppm

 ERPG-3:
 1,000 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, convulsions and coma
Chronic:	Cancer (leukemia) in humans

PHYSICAL PROPERTIES

Odor Threshold:	12 ppm
Flash Point:	12°F (-11°C)
LEL:	1%
UEL:	8%
Auto Ignition Temp:	928° to 1,076°F (498° to 580°C)
Vapor Density:	2.7 (air = 1)
Vapor Pressure:	75 mm Hg at 68°F (20°C)
Specific Gravity:	0.88 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	176°F (80°C)
Freezing Point:	42°F (6°C)
Ionization Potential:	9.24 eV
Molecular Weight:	78.1

	PROTECTIVE EQUIPMENT
Gloves:	Polyvinyl Alcohol, Silver Shield $\mathbb{B}/4H\mathbb{B}$, Viton and Fluoroelastomer (>8-hr breakthrough)
Coveralls:	Tychem® CPF 3, F, BR, LV, Responder®, and TK; Zytron® 300; and ONESuit® TEC (>8-hr breakthrough for <i>Hydrocarbons</i> ,
Respirator:	Aromatic) >0.5 ppm - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BENZIDINE

Synonyms: 4,4'-Bianiline; Diphenylenediamine CAS No: 92-87-5 Molecular Formula: $C_{12}H_{12}N_2$ RTK Substance No: 0204

Description: White to grayish-yellow or reddish powder, darkens on exposure to light or air.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 1 - Fire 0 - Reactivity DOT ID #: UN 1885 ERG Guide #: 153 Hazard Class: 6.1 (Poisonous Material)	 Benzidine may burn, but does not readily ignite. Use dry chemical, CO₂, water spray, an alcoholresistant foam or other foaming agent. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. Use water spray to keep fire-exposed containers cool. 	Benzidine may react violently with NITRIC ACID and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Benzidine is not compatible with HEAT and SUNLIGHT.

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet)

Use a vacuum with a HEPA filter or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.

Toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA:	Lowest feasible level
NIOSH:	Lowest feasible level
ACGIH:	Eliminate exposure if possible
IDLH LEVEL:	No Information

HEALTH EFFECTS

Eyes:	Irritation	
Skin:	Irritation	
Acute:	Nose and throat irritation	
Chronic:	Cancer (bladder) in humans	
	Skin allergy with itching and rash	

PHYSICAL PROPERTIES		
Odor Threshold:	No Information	
Flash Point:	No Information	
LEL:	N/A	
UEL:	N/A	
Relative Density:	1.25 (water = 1)	
Relative Vapor Density:	6.36 (air = 1)	
Water Solubility:	Soluble in hot water	
Boiling Point:	752 [°] F (400 [°] C)	
Melting Point:	239 [°] F (115 [°] C)	

	PROTECTIVE EQUIPMENT
Gloves:	Rubber, Nitrile
Coverall:	DuPont Tychem® fabrics (for Benzidine in 25% <i>Methanol</i>)
Boot:	Rubber
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes.

Remove contact lenses if worn.

Remove contaminated clothing. Wash contaminated skin with soap and water.

Transfer promptly to a medical facility.



Common Name: BENZIMIDAZOLE, 4,5-DICHLORO-2-TRIFLUOROMETHYL)-

Synonyms: Chloroflurazole CAS No: 3615-21-2 Molecular Formula: $C_8H_3Cl_2F_3N_2$ RTK Substance No: 2908 Description: White, crystalline solid or the commercial product may be brownish

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Benzimidazole, 4,5-Dichloro-2- (Trifluoromethyl)- may burn, but does not readily	Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)- may
1 - Fire	ignite.	not be compatible with ISOCYANATES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE,	AGENTS (such as LITHIUM, SODIUM, ALUMINUM and
ERG Guide #: 151	including Nitrogen Oxides, Chlorine and Fluorine.	their HYDRIDES); HALOGENATED ORGANICS (such as
Hazard Class: 9 (Environmentally Hazardous Material)		METHYLENE CHLORIDE); EPOXIDES; PHENOLS; and ACID HALIDES (such as ACETYL CHLORIDE).

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Benzimidazole**, **4,5-Dichloro-2-**(**Trifluoromethyl**)-.

The Protective Action Criteria values are:

PAC-1 = 7.5 mg/m^3 PAC-2 = 13 mg/m^3

PAC-3 = 13 mg/m^3

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation.

PHYSICAL PROPERTIES

Flash Point:	May burn
Vapor Pressure:	4 x 10 ⁻⁵ mm Hg at 72.5°F (22.5°C)
Water Solubility:	Very slightly soluble
Melting Point:	415° to 417°F (213° to 214°C)
Molecular Weight:	255

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with <i>High efficiency filters</i> >7.5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: BENZOIC ACID

Synonyms: Benzenecarboxylic Acid; Benzoate; Carboxybenzene CAS No: 65-85-0Molecular Formula: $C_7H_6O_2$ RTK Substance No: 0209 Description: White, crystalline powder with a faint, pleasant odor

HAZARD DATA **Hazard Rating** Firefighting Reactivity Benzoic Acid may burn, but does not readily Benzoic Acid is not compatible with OXIDIZING 1 - Health ignite. AGENTS (such as PERCHLORATES, PEROXIDES, 1 - Fire PERMANGANATES, CHLORATES, NITRATES, Use dry chemical, CO₂, water spray or foam as CHLORINE, BROMINE and FLUORINE) and STRONG extinguishing agents. 0 - Reactivity BASES (such as SODIUM HYDROXIDE and Water or foam my cause frothing. DOT#: UN 3077 POTASSIUM HYDROXIDE). POISONOUS GASES ARE PRODUCED IN FIRE, Water solutions of Benzoic Acid can react with METALS including Phenol and Benzene. ERG Guide #: 171 to form flammable and explosive Hydrogen gas. Use water spray to keep fire-exposed containers Hazard Class: 9 cool. (Miscellaneous Vapor from molten Benzoic Acid may form Hazardous Materials) explosive mixtures.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Benzoic Acid may damage the environment.

EXPOSURE LIMITS

The Protective Action Criteria values are: PAC-1 = 12.5 mg/m^3 PAC-2 = 75 mg/m^3

- $PAC-2 = 75 \text{ mg/m}^3$ PAC-3 = 400 mg/m³

HEALTH EFFECTS

Eyes:	Irritation and possible damage
Skin:	Irritation, rash, redness and burning feeling on contact
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Faint, pleasant odor
Flash Point:	250°F (121°C)
Auto Ignition Temp:	1,058°F (570°C)
Vapor Density:	4.2 (air = 1)
Vapor Pressure:	1 mm Hg at 205°F (96°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	482°F (250°C)
Melting Point:	252°F (122°C)
Molecular Weight:	122.1

Gloves:	Butyl and Neoprene
Coveralls:	Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Acids, Carboxylic</i>)
Respirator:	>12.5 mg/m ³ - SCBA

DDOTECTIVE FOUNDMENT

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: BENZO(a)PYRENE

Synonyms: 3,4-Benzopyrene; B[a]P CAS No: 50-32-8 Molecular Formula: C_{20} H₁₂ RTK Substance No: 0207 Description: Pale yellow, crystalline solid or powder

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 3077 ERG Guide #: 171 Hazard Class: 9 (Miscellaneous Hazardous Materials)	 Benzo(a)pyrene may burn, but does not readily ignite. Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. 	Benzo(a)pyrene reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires and explosions.

SPILL/LEAKS

Isolation Distance: 50 meters (150 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA:	0.2 mg/m ³ , 8-hr TWA
NIOSH:	0.1 mg/m ³ , 10-hr TWA
ACGIH:	lowest level possible
IDLH LEVEL:	80 mg/m ³ (as Coal Tar Pitch
	Volatiles)

HEALTH EFFECTS

-	
Eyes:	Irritation and burns
Skin:	Irritation, rash and burning feeling
Chronic:	Cancer (stomach, skin, lung, blood, spleen, pancreas, and mammary) in animals.
	May affect the developing fetus
	Thickening and darkening of the skin and warts

PHYSICAL PROPERTIES

Odor Threshold:	Faint aromatic odor
Flash Point:	No information
Specific Gravity:	1.35
Vapor Density:	8.7 (air = 1)
Vapor Pressure:	5.49 X 10 ⁹ mm Hg at 77°F (25°C)
Water Solubility:	Insoluble
Boiling Point:	590° - 594°F (310° - 312°C)
Melting Point:	347° - 354 F (175° - 179°C)

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	No information DuPont Tychem®, CPF-2, SL, CPF-4, Responder® (all >8-hr permeation time)
Boots: Respirator:	No information >0.1 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Transfer to a medical facility.



Common Name: BENZOYL CHLORIDE

Synonyms: Benzene Carbonyl Chloride; alpha-Chlorobenzaldehyde CAS No: 98-88-4 Molecular Formula: C7H5OCI RTK Substance No: 0214 Description: Clear, colorless, fuming liquid with a pungent odor

HAZARD DATA			
Hazard Rating Firefight	ing	Reactivi	ity
3 - HealthCOMBUST2 - FireUse dry cheDO NOT UDO NOT U2-W - ReactivityPOISONOUDOT#: UN 1736including FERG Guide #: 137Use water st	Firefighting COMBUSTIBLE AND REACTIVE LIQUID Use dry chemical or CO ₂ as extinguishing agents. DO NOT USE WATER or FOAM. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Phosgene</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray only to keep fire-exposed containers cool.		Chloride reacts violently with WATER and b produce toxic <i>Hydrogen Chloride gas</i> . Chloride reacts with and/or decomposes on ith ALCOHOLS; STRONG BASES (such as HYDROXIDE and POTASSIUM HYDROXIDE); /L SULFOXIDE; mixtures of ALUMINUM DE and NAPHTHALENE; OXIDIZING AGENTS PERCHLORATES, PEROXIDES, GANATES, CHLORATES, NITRATES, IE, BROMINE and FLUORINE); ALKALI (such as LITHIUM, SODIUM and IUM); and AMINES. Chloride will react with METALS (in the of MOISTURE or WATER) to form flammable usive <i>Hydrogen gas</i> .
SPILL/LEAK	(S	PHYS	ICAL PROPERTIES
Isolation Distance: Small Spill: 150 meters (500 feet) Large Spill: 1,000 meters (3,000 fe Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sa similar material and deposit in seal DO NOT USE WATER OR WET M DO NOT Wash into sewer. Harmful to aquatic life at low conce	nd, earth, or a vapor De vapor De vapor De vapor Pried containers. ETHOD. Water So Boiling Financial Melting Financial Ionizatio	int: 1 finit: 1 finit: 4 finit: 4 finit: 4 finit: 1 finit: 3 foint: 4 foint: 4	Pungent 62°F (72°C) .2% .9% .9 (air = 1) .4 mm Hg at 68°F (20°C) .2 (water = 1) Reactive/Decomposes 87°F (197°C) 0°F (-1°C) .53 +/- 1 40.6
EXPOSURE LI	МІТЅ	PROTE	ECTIVE EQUIPMENT
OSHA: None NIOSH: None ACGIH: 0.5 ppm, Ceiling IDLH: None	Gloves: Coverall	: DuPont Ty and TK; K Suit® TEC <i>Carboxylic</i>	,
HEALTH EFFE	CTS F		- Supplied air
Eyes:Severe irritation andSkin:Severe irritation andInhalation:Nose, throat and lung coughing, wheezing a shortness of breath (Chronic:alpha-Chlorinated To Chlorides cause cause humans	burns Flush ey oritation with and severe pulmonary edema) duenes and Benzoyl cer (lung) in Transfer	enses if worn. Se emove contamin ounts of soap an ificial respiration promptly to a me	ounts of water for at least 30 minutes. Remove eek medical attention immediately. ated clothing and wash contaminated skin with d water. Seek medical attention immediately. if breathing has stopped and CPR if necessary.



Common Name: BENZOYL PEROXIDE

Synonyms: Benoxyl; Benzoperoxide; Dibenzoyl Peroxide CAS No: 94-36-0 Molecular Formula: $C_{14}H_{10}O_4$ RTK Substance No: 0215 Description: White, granular or crystalline solid with a faint odor, which is often diluted with an unreactive

rganic solvent, such as Phtha				
	HAZ	ARD DAT	4	
Firefighting		Rea	activity	
Use water or water spray. DC HALOGENATED AGENTS. POISONOUS GASES ARE P FIRE, including <i>Benzoic Acid</i> . CONTAINERS MAY EXPLOE Use water spray to keep fire-e containers cool. 2 Benzoyl Peroxide may ignite	Use water or water spray. DO NOT USE HALOGENATED AGENTS. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Benzoic Acid</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Benzoyl Peroxide may ignite combustibles		Benzoyl Peroxide is a STRONG OXIDIZER which can react violently with COMBUSTIBLES (such as WOOD, OIL and PAPER); LITHIUM; ALUMINUM HYDRIDE; DIMETHYL ANILINE; AMINES; METALLIC NAPHTHENATES; ALCOHOLS; INORGANIC and ORGANIC ACIDS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ETHERS, OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and REDUCING AGENTS. Containers of Benzoyl Peroxide must be protected from HEAT, IMPACT, BLOWS, SHOCKS, FRICTION or STATIC DISCHARGE since explosions may occur. Benzoyl Peroxide is not compatible with METALS, DIRECT SUNLIGHT, RUBBER, and COATINGS.	
SPILL/LEAKS		<u> </u>	PHYSICAL PROPERTIES	
150 feet for liquids 25 meters or 75 feet for solids al with water or wetted vermiculite		Flash Point: Auto ignition Temperature Specific Grav Vapor Press Water Solubi Melting Poin	104°F (40°C) 176°F (80°C) vity: 1.334 ure: Less than 1 mm Hg at 68°F (20°C) ility: Slightly soluble	
POSURE LIMITS			PROTECTIVE EQUIPMENT	
OSHA: 5 mg/m^3 , 8-hr TWANIOSH: 5 mg/m^3 , 10-hr TWAACGIH: 5 mg/m^3 , 8-hr TWAIDLH LEVEL: $1,500 \text{ mg/m}^3$ The Protective Action Criteria values are:PAC-1 = 15 mg/m^3PAC-2 = 1,200 mg/m^3PAC-3 = 7,000 mg/m^3		Gloves: Coveralls: Boots: Respirator:	Neoprene <i>DuPont Tychem</i> ® <i>Polycoat</i> , <i>QC</i> , <i>CPF1</i> , <i>SL</i> and <i>CPF2</i> for solid Benzoyl Peroxide Neoprene > 5 mg/m ³ APR with High Efficiency filters > 50 mg/m ³ SA, > 1500 mg/m ³ SCBA	
ALTH EFFECTS		FIRS	T AID AND DECONTAMINATION	
on and throat irritation with coughing /heezing allergy with itching and skin rash. na-like allergy with shortness of		Flush eyes wi Remove cont Remove conta and water. Begin artificia	person from exposure. th large amounts of water for at least 15 minutes. act lenses if worn. Seek medical attention. aminated clothing. Wash contaminated skin with soap I respiration if breathing has stopped and CPR if	
	 Firefighting Use water or water spray. DO HALOGENATED AGENTS. POISONOUS GASES ARE P FIRE, including <i>Benzoic Acid.</i> CONTAINERS MAY EXPLODE Use water spray to keep fire-econtainers cool. Benzoyl Peroxide may ignite (wood, paper and oil). SPILL/LEAKS e: 50 meters or 150 feet for liquids 25 meters or 75 feet for solids al with water or wetted vermiculite olyethylene-lined or plastic POSURE LIMITS 5 mg/m ³ , 8-hr TWA 5 mg/m ³ , 10-hr TWA 5 mg/m ³ , 8-hr TWA 5,00 mg/m ³ tion Criteria values are: mg/m ³ PAC-2 = 1,200 mg/m ³	HAZ Firefighting Use water or water spray. DO NOT USI HALOGENATED AGENTS. POISONOUS GASES ARE PRODUCED FIRE, including <i>Benzoic Acid</i> . CONTAINERS MAY EXPLODE IN FIRE Use water spray to keep fire-exposed containers cool. Benzoyl Peroxide may ignite combustit (wood, paper and oil). SPILL/LEAKS e: 50 meters or 150 feet for liquids 25 meters or 75 feet for solids al with water or wetted vermiculite olyethylene-lined or plastic POSURE LIMITS 5 mg/m³, 8-hr TWA 5 mg/m³, 10-hr TWA 5 mg/m³, 8-hr TWA 5 mg/m³ PAC-2 = 1,200 mg/m³ tion Criteria values are: mg/m³ PAC-2 = 1,200 mg/m³ ALTH EFFECTS ion ion and throat irritation with coughing wheezing allergy with itching and skin rash. na-like allergy with shortness of	HAZARD DAT/ Firefighting Read Use water or water spray. DO NOT USE Ben HALOGENATED AGENTS. viol POISONOUS GASES ARE PRODUCED IN PAF FIRE, including Benzoic Acid. ALC Use water spray to keep fire-exposed ALC Use water spray to keep fire-exposed HAL Containers cool. Benzoyl Peroxide may ignite combustibles (wood, paper and oil). Chi SPILL/LEAKS Odor Thresh e: 50 meters or 150 feet for liquids 25 meters or 75 feet for solids al with water or wetted vermiculite Odor Thresh olyethylene-lined or plastic Odor Thresh Posoure LIMITS Gloves: 50 mg/m³, 8-hr TWA Gloves: 50 mg/m³, 10-hr TWA Gloves: 50 mg/m³, 8-hr TWA Soots: 50 mg/m³, 8-hr TWA Soots: 50 mg/m³, 8-hr TWA Soots: 6 mg/m³, PAC-2 = 1,200 mg/m³ HIRS ion and throat irritation with coughing wheezing HIRS allergy with itching and skin rash. and water. <td< td=""></td<>	



Common Name: BENZYL CHLORIDE

Synonyms: Chloromethyl Benzene; alpha-Chlorotoluene CAS No: 100-44-7 Molecular Formula: C₆H₅CH₂Cl RTK Substance No: 0217

Description: Colorless liquid with a strong, irritating odor that causes tearing of the eyes

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as	Benzyl Chloride reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
2 - Fire	extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> .	Benzyl Chloride polymerizes and releases heat and Hydrogen Chloride
DOT#: UN 1738	CONTAINERS MAY EXPLODE IN FIRE.	when in contact with most COMMON METALS (such as ALUMINUM, COPPER, IRON, TIN and ZINC). This reaction DOES NOT occur with
ERG Guide #: 156	Use water spray to keep fire-exposed containers cool.	Nickel and Lead. Sodium Carbonate, Triethylamine or Propylene Oxide can be used to
Hazard Class: 6.1 (Toxic)	Unstabilized Benzyl Chloride may violently decompose, especially in the presence of METALS.	stabilize Benzyl Chloride.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Place into nonmetallic containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Benzyl Chloride**.

DO NOT wash into sewer.

For water spills apply activated carbon at 10 times the spilled amount.

Benzyl Chloride is toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA:1 ppm, 8-hr TWANIOSH:1 ppm, 15-min CeilingACGIH:1 ppm, 8-hr TWAIDLH:10 ppmThe Protective Action Criteria values are:PAC-1 = 1 ppmPAC-2 = 10 ppmPAC-3 = 50 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and burns (skin absorbtion possible)
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, weakness and irritability
Chronic:	Cancer (thyroid) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.041 ppm
Flash Point:	153°F (67°C)
LEL:	1.1%
UEL:	14%
Auto Ignition Temp:	977° to 1,161°F (525° to 627°C)
Vapor Density:	4.4 (water = 1)
Vapor Pressure:	11.8 mm Hg at 77°F (25°C)
Specific Gravity:	1.1 (air = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	354°F (178.9°C)
Freezing Point:	-45° to -54°F (-43° to -48°C)
Ionization Potential:	<10.6 (can be detected by a PID)
Molecular Weight:	126.58

PROTECTIVE EQUIPMENT

Gloves:	SilverShield®/4H® (>8-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)
Dessiveters	

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: BERYLLIUM SULFATE

Synonyms: Beryllium Sulphate CAS No: 13510-49-1 Molecular Formula: BeSO₄ RTK Substance No: 3084 Description: Odorless, colorless, crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Beryllium Sulfate itself does not	Beryllium Sulfate reacts violently with CARBON DUST; and FINELY DIVIDED ALUMINUM,
0 - Fire	burn.	MAGNESIUM and POTASSIUM.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Beryllium Oxide</i> , <i>Sulfur Oxides</i> , and	Beryllium Sulfate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
DOT#: UN 1566	Sulfuric Acid.	NITRIC); STRONG BASES (such as SODIUM
ERG Guide #: 154	Use water spray to keep fire-exposed containers	HYDROXIDE and POTASSIUM HYDROXIDE); OXIDIZING AGENTS (such as PERCHLORATES,
Hazard Class: 6.1 (Poison)	cool.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); MOLTEN LITHIUM; and CHLORINATED HYDROCARBONS.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Beryllium Sulfate is very toxic to the aquatic environment.

EXPOSURE LIMITS

OSHA:	0.002 mg/m ³ , 8-hr TWA; 0.005 mg/m ³ , 30-min Ceiling; 0.025 mg/m ³ , Peak
NIOSH:	0.0005 mg/m ³ , Ceiling
ACGIH:	0.00005 mg/m ³ , 8-hr TWA; 0.0002 mg/m ³ , STEL
IDLH:	4 mg/m ³
	(All of the above are for <i>BervIlium</i>)

HEALTH EFFECTS

Eyes:	Irritation, redness, itching and burning
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with nasal discharge, tightness in the chest, cough, shortness of breath, and fever
Chronic:	<i>Beryllium</i> and <i>Beryllium compounds</i> cause lung cancer in humans and animals

PHYSICAL PROPERTIES

Odor Threshold:OdFlash Point:NoSpecific Gravity:2.4Water Solubility:SoMelting Point:1,0Molecular Weight:10

Odorless Nonflammable 2.4 (water = 1) Soluble 1,004°F to 1,022°F (540° to 550°C) 105

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention

Quickly remove contaminated clothing, and wash contaminated skin with large amounts of water.



Common Name: BIPHENTHRIN

Synonyms: Bifenthrin; Scorpion®; Talstar® CAS No: 82657-04-3 Molecular Formula: $C_{23}H_{22}CIF_3O_2$ RTK Substance No: 3194

Description: Off-white to tan, waxy solid with a faint, slightly sweet odor, often found in a thick, brown, oily solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE SOLID or LIQUID Use dry chemical, CO ₂ , alcohol-resistant foam or	Biphenthrin may react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
2 - Fire	other foam extinguishing agents, as water may not	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	be effective in fighting fires.	CHLORINE, BROMINE and FLUORINE) to cause a fire or explosion.
DOT#: UN 3349	POISONOUS GASES ARE PRODUCED IN FIRE, including Chlorine, Fluorine, Hydrogen Chloride	Biphenthrin is not compatible with STRONG ACIDS
ERG Guide #: 151	and Hydrogen Fluoride.	(such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool.	POTASSIUM HYDROXIDE); LIME; and OXYGEN.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids with clay, dry sand or soil.

Wash area with a solution of caustic or soda ash and an alcohol (such as *Methanol* or *Isopropanol*). Then wash area with soap and water.

DO NOT wash into sewer.

Biphenthrin is highly toxic to fish and aquatic life.

EXPOSURE LIMITS

OSHA:5 mg/m³, 8-hr TWANIOSH:5 mg/m³, 10-hr TWAACGIH:5 mg/m³, 8-hr TWAIDLH:5,000 mg/m³
(All of the above are for Pyrethrum)

HEALTH EFFECTS

Eyes:	Irritation, burning and itching
Skin:	Rash, redness, burning feeling, tingling and itching
Inhalation:	Nose and throat irritation with sneezing, coughing and wheezing Headache, nausea and vomiting,
	dizziness and convulsions

PHYSICAL PROPERTIES

Odor Threshold:	Slightly sweet odor
Flash Point:	165°F (74°C) (Technical grade)
Vapor Pressure:	1.8 x 10 ⁻⁷ mm Hg at 77°F (25°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Insoluble (disperses)
Melting Point:	135° to 158°F (57° to 70°C)
Molecular Weight:	422.9
pH:	6.7

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile, Neoprene, Natural Rubber and Polyvinyl Chloride
Coveralls:	Tyvek®
Respirator:	> 5 mg/m ³ - Full facepiece APR with Organic vapor cartridge and particulate prefilters
	>50 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BIS(2-CHLOROETHYL) ETHER

Synonyms: DCEE; 2,2-Dichlorodiethyl Ether; Diethylene Glycol Dichloride CAS No: 111-44-4 Molecular Formula: C₄H₈Cl₂O RTK Substance No: 0232 Description: Clear, colorless liquid with a strong odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as	Uninhibited Bis(2-Chloroethyl) Ether can form explosive <i>Peroxides</i> on exposure to AIR and LIGHT.
2 - Fire 1 - Reactivity	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE.	Bis(2-Chloroethyl) Ether reacts violently with CHLOROSULFONIC ACID and OLEUM.
DOT#: UN 1916 ERG Guide #: 152	including <i>Hydrogen Chloride</i> . Use water spray to keep fire-exposed containers cool.	Bis(2-Chloroethyl) Ether decomposes with exposure to WATER, MOISTURE or STEAM to form toxic and corrosive <i>Hydrogen Chloride gas</i> .
Hazard Class: 6.1 (Poison)	Bis(2-Chloroethyl) Ether may form an ignitable vapor/air mixture in closed tanks or containers at temperatures above 131°F (55°C).	Bis(2-Chloroethyl) Ether is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
		METALS; and METAL POWDERS.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer.

Bis(2-Chloroethyl) Ether is a marine pollutant.

PHYSICAL PROPERTIES		
Odor Threshold:	0.049 ppm	
Flash Point:	131°F (55°C)	
LEL:	2.7%	
UEL:	Not determined	
Auto Ignition Temp:	696°F (367°C)	
Vapor Density:	4.9 (air = 1)	
Vapor Pressure:	0.7 mm Hg at 68°F (20°C)	
Specific Gravity:	1.22 (water = 1)	
Water Solubility:	Very slightly soluble/Reactive	
Boiling Point:	352°F (178°C)	
Freezing Point:	-62°F (-52°C)	
Molecular Weight:	143	

EXPOSURE LIMITS			PROTECTIVE EQUIPMENT
	i ppm, 8-hr TWA ppm, 10-hr TWA; 10 ppm, STEL	Gloves:	SilverShield®/4H® and Barrier (>8-hr breakthrough for <i>Ethers</i> , <i>aliphatic</i>)
	ppm, 8-hr TWA; 10 ppm, STEL 0 ppm	Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
The Protective Action Criteria values are: PAC-1 = 10 ppm PAC-2 = 25.7 ppm PAC-3 = 100 ppm		Respirator:	SCBA
HEALTH EFFECTS		FIRS	ST AID AND DECONTAMINATION
Eyes: Skin:	Irritation and burns	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed. 	
Inhalation:	Irritation and burns Nose, throat and lung irritation, with coughing, and severe shortness of	Quickly remov	s if worn. Seek medical attention. ve contaminated clothing and wash contaminated skin v



Common Name: BIS(CHLOROMETHYL) ETHER

Synonyms: BCME; 1,1'-Dichlorodimethyl Ether CAS No: 542-88-1 Molecular Formula: (CH₂Cl)₂O RTK Substance No: 0234 Description: Colorless liquid with an irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 3 - Fire 1 - Reactivity DOT#: UN 2249 ERG Guide #: 131 Hazard Class: 6.1 (Poison)	 FLAMMABLE LIQUID Use dry chemical, CO₂, water spray or foam as extinguishing agents. Water spray may cause foam or frothing. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrochloric Acid</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Bis(Chloromethyl) Ether may form an ignitable vapor/air mixture in closed tanks or containers. 	Bis(Chloromethyl) Ether reacts with WATER or MOIST AIR to form <i>Formaldehyde</i> and <i>Hydrogen</i> <i>Chloride gas.</i> Bis(Chloromethyl) Ether is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand or earth.

Keep **Bis(Chloromethyl) Ether** out of confined spaces, such as sewers, because of the possibility of an explosion.

Use only non-sparking tools and equipment, especially when opening and closing containers of

Bis(Chloromethyl) Ether.

DO NOT wash into sewer.

Bis(Chloromethyl) Ether is a marine pollutant.

EXPOSURE LIMITS

- NIOSH: Lowest feasible concentration
- **ACGIH:** 0.001 ppm (8-hr TWA)

The Protective Action Criteria values are: PAC-1 = 0.006 ppm PAC-2 = 0.044 ppm PAC-3 = 0.18 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Acute:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
Chronic:	Cancer (lung) in humans

PHYSICAL PROPERTIES

Odor Threshold:	Irritating odor
Flash Point:	66°F (19°C)
Vapor Density:	4 (air = 1)
Vapor Pressure:	30 mm Hg at 72°F (22°C)
Relative Density:	1.3 (water = 1)
Water Solubility:	Decomposes
Boiling Point:	219°F (104°C)
Freezing Point:	-43°F (-42°C)

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H® and Barrier® (>8-hr breakthrough for <i>Ethers, aliphatic</i>)
Coveralls:	Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Ethers, aliphatic</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: BIS(2-ETHYLHEXYL) PHTHALATE

Synonyms: Di(2-Ethylhexyl) Phthalate; Dioctyl Phthalate; DOP CAS No: 117-81-7 Molecular Formula: $C_{24}H_{38}O_4$ RTK Substance No: 0238

Description: Colorless to light colored, thick liquid with a slight odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire 0 - Reactivity DOT#: None	COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing agents. Water or foam may cause frothing.	Bis(2-Ethylhexyl) Phthalate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as
ERG Guide #: None Hazard Class: None	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).

SPILL/LEAKS

Isolation Distance:

Small Spills: 60 meters (200 feet)

Large Spills: 330 meters (1,100 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Bioaccumulation of this chemical may occur in seafood.

PHYSICAL PROPERTIES

Flash Point:	420°F (215°C)
LEL:	0.3% at 474°F (245°C)
Auto Ignition Temp:	662°F (350°C)
Vapor Density:	16 (air = 1)
Vapor Pressure:	<1 mm Hg at 68°F (20°C)
Specific Gravity:	0.99 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	725°F (385°C)
Melting Point:	-58°F (-50°C)
Molecular Weight:	391

EXPOSURE LIMITS			PROTECTIVE EQUIPMENT	
OSHA:	5 mg/m ³ , 8-hr TWA	Gloves:	Neoprene and Laminate Film	
NIOSH:	5 mg/m ³ , 10-hr TWA; 10 mg/m ³ , STEL	Coveralls:	DuPont Tychem® BR, LV, TK, CSM and Responder® (>8-hr breakthrough)	
ACGIH:	5 mg/m ³ , 8-hr TWA	Respirator:	>5 mg/m ³ - Supplied air	
IDLH LEVEL:	5,000 mg/m ³			

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose and throat irritation
Chronic:	Cancer (liver) in animals

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: BISPHENOL A

Synonyms: Diphenylolpropane; 4,4'-Isopropylidenediphenyl CAS No: 80-05-7 Molecular Formula: $C_{15}H_{16}O_2$ RTK Substance No: 2388 Description: White to light brown flake or powder with a medicine or *Phenol*-like odor

HAZARD DATA

2		
Hazard Rating	Firefighting	Reactivity
2 - Health	<i>Finely divided</i> Bisphenol A is a significant dust explosion hazard.	Bisphenol A reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	Bisphenol A may burn, but does not readily ignite.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use dry chemical, CO ₂ or foam as extinguishing	CHLORINE, BROMINE and FLUORINE). Bisphenol A is not compatible with STRONG BASES
DOT#: None	agents.	(such as SODIUM HYDROXIDE and POTASSIUM
ERG Guide #: None	POISONOUS GASES ARE PRODUCED IN FIRE.	HYDROXIDE); ACID CHLORIDES; and ACID
Hazard Class: None	Use water spray to keep fire-exposed containers cool.	ANHYRIDES.
	Static electricity can cause a dust explosion hazard.	

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Wash contaminated area with 60 to 70% *Ethanol* followed by soap and water.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 15 \text{ mg/m}^{3}$
- $PAC-2 = 100 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing.
	Headache, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Phenol-like odor
Flash Point:	175° to 415°F (79° to 213°C)
Auto Ignition Temp:	1,112°F (600°C)
Vapor Pressure:	0.2 mm Hg at 338°F (170°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	428°F (220°C)
Melting Point:	302° to 311°F (150° to 155°C)
Molecular Weight:	228.3

	PROTECTIVE EQUIPMENT
Gloves:	Butyl and Viton (>8-hr breakthrough for <i>Hydroxylic compounds</i>)
Coveralls:	Tyvek®
Respirator:	<15 mg/m ³ - Full facepiece APR with High efficiency filter >15 mg/m ³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BORATE COMPOUNDS, INORGANIC

Synonyms: None CAS No: None Molecular Formula: Varies RTK Substance No: 0241 Description: White to gray powders

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
2 - Health	Borate Compounds, Inorganic are not combustible, but may be STRONG OXIDIZERS	Borate Compounds, Inorganic are not compatible	
0 - Fire	that enhance the combustion of other substances.	with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).	
0 - Reactivity	Extinguish fire using an agent suitable for type of surrounding fire.		
DOT#: None	POISONOUS GASES ARE PRODUCED IN FIRE,		
ERG Guide #: None	including Boron Oxides.		
Hazard Class: None	Borate Compounds, Inorganic may ignite combustibles (wood, paper and oil).		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Borate Compounds, Inorganic may be dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

NIOSH: 1 mg/m³, 10-hr TWA (*Anhydrous* and *Pentahydrate*)

5 mg/m³, 10-hr TWA (*Decahydrate*)

ACGIH: 2 mg/m³, 8-hr TWA; 6 mg/m³, STEL (*inhalable fraction*)

The Protective Action Criteria values for *Sodium Borate* are:

PAC-1 = 1.5 mg/m^3 PAC-2 = 12.5 mg/m^3 PAC-3 = 60 mg/m^3

HEA	LTH	EFF	ECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, tremors, and lightheadedness

PHYSICAL PROPERTIES

Flash Point:	Noncombustible
Vapor Pressure:	<0 mm Hg at 68°F (20°C)
Specific Gravity:	1.4 to 2.3 (water = 1)
Water Solubility:	Slightly soluble to Soluble
Boiling Point:	Varies
Melting Point:	Varies
Molecular Weight:	Varies

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>1 mg/m ³ - Full facepiece APR with High efficiency filter >10 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: BORON OXIDE

Synonyms: Boric Anhydride; Diboron Trioxide CAS No: 1303-86-2 Molecular Formula: B_2O_3 RTK Substance No: 0243

Description: Odorless, colorless or white lump, crystal or granular solid

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Boron Oxide itself does not	Boron Oxide reacts with WATER and MOISTURE to form <i>Boric Acid</i> .		
0 - Fire	burn. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	Boron Oxide is not compatible with CALCIUM OXIDE; CALCIUM CHLORIDE; and BROMINE		
1 - Reactivity		PENTAFLUORIDE.		
DOT#: None		Boron Oxide is corrosive to METALS in the presence of		
ERG Guide #: None		Moist Air and Oxygen.		
Hazard Class: None				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA:	15 mg/m ³ , 8-hr TWA	
NIOSH:	10 mg/m ³ , 10-hr TWA	
ACGIH:	10 mg/m ³ , 8-hr TWA	
IDLH:	2,000 mg/m ³	
The Protective Action Criteria values are:		

PAC-1 = 30 mg/m³ PAC-3 = 500 mg/m³ PAC-2 = 300 mg/m³

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	0 mm Hg at 68°F (20°C) (approximate)
Specific Gravity:	2.46 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	3,380°F (1,860°C)
Melting Point:	842°F (450°C)
Ionization Potential:	13.5 eV
Molecular Weight:	69.64

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>10 mg/m ³ - Full facepiece APR with High efficiency filters >30 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: BORON TRIBROMIDE

Synonyms: Tribromoborane; Boron Bromide CAS No: 10294-33-4 Molecular Formula: BBr₃ RTK Substance No: 0244 Description: Colorless, fuming liquid with a strong odor

			HA	ZARD	DATA	
Hazard Rati	ing	Firefighting			Reactivity	
3 - Health 0 - Fire 2-\	ty 2692 157	Firefighting Use dry chemical or CO ₂ . DO NOT USE WATER. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Bromide</i> and <i>Boron Oxide</i> . Use water to cool intact containers only.		Boron Tribrom WATER or ST ALCOHOLS, p Mixtures of Bon can explode on Boron Tribrom (such as PERC CHLORATES, FLUORINE); S SULFURIC an BASES (such a HYDROXIDE);	nide reacts violently and explosively with EAM, and decomposes on contact with producing <i>Hydrogen Bromide gas</i> . ron Tribromide and POTASSIUM or SODIUM impact. nide is not compatible with OXIDIZING AGENTS CHLORATES, PEROXIDES, PERMANGANATES NITRATES, CHLORINE, BROMINE and STRONG ACIDS (such as HYDROCHLORIC, d NITRIC); ETHERS; PHOSPHORUS; STRONG as SODIUM HYDROXIDE and POTASSIUM ; AMMONIA; and ALKALI METALS. HOCK, HEAT and LIGHT.	
	SPIL	L/LEAKS			PHY	SICAL PROPERTIES
Absorb spill wit Do not use wat Before entering Tribromide m that an explos Use the explos (LEL: 4%, UE	solation Distance: 50 to 100 meters (160 to 330 feet) Absorb spill with inert material. Do not use water. Before entering a confined space where Boron Tribromide may be present, check to make sure that an explosive concentration does not exist. Use the explosive limits for <i>Hydrogen gas</i> (LEL: 4%, UEL: 75%)			Flash P Relative Relative Vapor P Water S Boiling	e Vapor Density e Density: Pressure: Solubility: Point: on Potential: Point:	2.7 (water =1) 40 mm Hg at 57 [°] F (14 [°] C) Reacts/Decomposes 196 [°] F (91 [°] C) 9.7 eV -51 [°] F (-46 [°] C)
EX	(POS	URE LIMITS			PROT	ECTIVE EQUIPMENT
OSHA: NIOSH: ACGIH:	1 ppn	n Ceiling n Ceiling		Gloves Covera Boot: Respira	II: DuPont and Che No inforr >1 ppm >10 ppm	Tychem® BR, LV, Responder®, TK, Reflector®, mFab Challenger® 5200 mation fullface APR with Acid gas cartridges n Supplied Air
HEALTH EFFECTS			L	-	AND DECONTAMINATION	
Skin: Irr Acute: Co ed Chronic: Br	dema ronchitis		 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Remove contaminated clothing. Wash contaminated skin with soap and water. Begin artificia I respir ation i f breathi ng h as stopp ed and CPR if necessary. Transfer to a medical facility. 			
				Observ	ation is recomm	ended as symptoms may be delayed. July 2007



Common Name: BORON TRIFLUORIDE

Synonyms: Borane, Trifluoro-: Boron Fluoride: Trifluoroborane CAS No: 7637-07-2 Molecular Formula: BF₃ RTK Substance No: 0246

Description: Colorless gas with a strong odor that forms dense, white fumes in moist air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
4 - Health	CORROSIVE Extinguish fire using an agent suitable for type of	Boron Trifluoride reacts with WATER to form toxic <i>Hydrogen Fluoride gas</i> .		
0 - Fire	surrounding fire. Boron Trifluoride itself does not burn.	Boron Trifluoride reacts violently with ALKALI		
1 - Reactivity	Stop flow of gas and use water spray to disperse vapors.	METALS (such as LITHIUM, SODIUM and		
DOT#: UN 1008	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Fluoride</i> and <i>Boric Acid</i> .	POTASSIUM); ALKYL NITRATES (such as AMYL NITRATE, BUTYL NITRATE and		
ERG Guide #: 125	CONTAINERS MAY EXPLODE IN FIRE.	NITROCELLULOSE); CALCIUM OXIDE; and LIME (CALCIUM HYDROXIDE).		
Hazard Class: 2.3	Use water spray to keep fire-exposed containers cool.	Boron Trifluoride attacks many METALS in the		
(Poisonous gas)	Boron Trifluoride may be shipped or stored in complexes with flammable solvents (such as <i>Ethyl Ether</i>). These complexes may be a fire risk.	presence of WATER.		

SPILL/LEAKS

Isolation Distance:

Small spill: 30 meters (100 feet)

Large spill: 150 meters (500 feet)

Fire: 1,600 meters (1 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Boron Trifluoride may be hazardous to the environment, especially to aquatic organisms.

EXPOSURE LIMITS

OSHA:	1 ppm, Ceiling
NIOSH:	1 ppm, Ceiling

ACGIH: 1 ppm, Ceiling

IDLH: 25 ppm

The Protective Action Criteria values are:

PAC-1 = 1 ppm PAC-2 = 1 ppm PAC-3 = 1 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns, contact with liquid causes frostbite (skin absorbable)
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	1.6 ppm	
Flash Point:	Nonflammable	
Vapor Density:	2.4 (air = 1)	
Vapor Pressure:	760 mm Hg at -149°F (-100.6°C)	
Specific Gravity:	2.9 (water = 1)	
Water Solubility:	Soluble/Reacts	
Boiling Point:	-148°F (-100°C)	
Freezing Point:	-197°F (-127°C)	
Critical Temp:	10°F (-12.2°C)	
Ionization Potential:	15.5	
Molecular Weight:	67.8	

PROTECTIVE EQUIPMENT

Insulated Viton/Butyl (>8-hr breakthrough) Gloves:

Coveralls: Tychem® BR, CSM and TK (>8-hr breakthrough)

Respirator: >1 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses. Seek medical attention.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.
- In case of contact with *liquid* Boron Trifluoride, immerse affected part in warm water. Seek medical attention.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: BROMACIL

Synonyms: 5-Bromo-3-sec-Butyl-6-Methyluracil; HyvarX CAS No: 314-40-9 Molecular Formula: $C_9H_{13}BrN_2O_2$ RTK Substance No: 0251 Description: White, crystalline solid which may be in a solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Bromacil itself does not burn.	Contact with AMINES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and	
0 - Fire		OXIDIZING AGENTS (such as PERCHLORATES,	
0 - Reactivity	Bromacil may be dissolved in a flammable carrier. POISONOUS GASES ARE PRODUCED IN FIRE,	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) will	
DOT#: N/A	including Hydrogen Bromide and Nitrogen Oxides.	cause Bromacil to decompose.	
ERG Guide #: N/A			
Hazard Class: N/A			

SPILL/LEAKS

Isolation Distance: No information

Dampen dry spill with water to prevent dust.

For liquid solutions, absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Toxic to aquatic organisms and wildlife.

EXPOSURE LIMITS

OSHA:	N/A
NIOSH:	10 mg/m ³ (10-hr TWA)
ACGIH:	10 mg/m ³ (8-hr TWA)
IDLH LEVEL:	No Information

HEALTH EFFECTS				
Eyes:	Irritation			
Skin:	Irritation			
Acute:	Nose and throat irritation, coughing and wheezing			
Chronic:	Lung irritation with coughing, wheezing and shortness of breath			

Odor Threshold: Odorless

Odor Threshold:	Odoness
Flash Point:	Noncombustible
Vapor Density:	1.55 (air = 1)
Vapor Pressure:	0.0008 mm Hg at 212°F (100°C)
Water Solubility:	Soluble
Melting Point:	317°F (158°C)
Specific Gravity:	1.55

PROTECTIVE EQUIPMENT

Gloves:	Rubber
Coveralls:	DuPont Tyvek® (pesticide dust)
Boots:	Rubber
Respirator:	>10 mg/m ³ - APR with High efficiency filters >100 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: BROMINE

Synonyms: None CAS No: 7726-95-6 Molecular Formula: Br₂ RTK Substance No: 0252 Description: Dark, reddish-brown, corrosive, fuming liquid or vapor

	HAZARD DATA					
Hazard Ratir	ng	Firefighting			Reactivit	у
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1744 ERG Guide #: Hazard Class: (Corros	4 154 8	Bromine is not combustible but it is a STRONG OXIDIZER which will enhance the burning of other materials. Extinguish fire using an agent suitable for type of surrounding fire. POISONOUS GASES ARE PRODUCED IN FIRE Use water spray to keep fire-exposed containers cool.		ReactivityBromine will react violently with ALUMINUM and AQUEOUS AMMONIA.Bromine is not compatible with REDUCING AGENTS (such as LITHIUM, SODIUM, and their HYDRIDES); MERCURY; PHOSPHORUS; TITANIUM; POTASSIUM; SODIUM; HALOCARBONS; METAL CARBIDES; METAL SALTS; AMINES; and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).Contact with COMBUSTIBLE and ORGANIC MATERIALS (such as FUELS, WOOD and OILS) may cause a fire.Bromine will attack METALS (such as IRON, STEEL, STAINLESS STEEL and COPPER).		
	SPI	LL/LEAKS			-	SICAL PROPERTIES
Isolation Distance: Small Spills: 60 meters (200 feet) Large Spills: 330 meters (1,100 feet) Cover with dry lime, sand or soda ash, and place in covered containers for disposal.		Odor Thr Flash Po Vapor De Vapor Pr Specific Water So Boiling P Melting F Ionization Molecula		int: nsity: essure: Gravity: lubility: oint: oint: n Potential:	0.051 - 3.5 ppm Not Combustible 5.5 (air = 1) 175 mm Hg at 68°F (20°C) 3.12 (water = 1) Very slightly soluble 138°F (58.8°C) 19.4°F (-7.25°C) 10.55 eV 159.8	
EX	(POS	SURE LIMITS		PROTECTIVE EQUIPMENT		TECTIVE EQUIPMENT
OSHA:0.1 ppm, 8-hr TWANIOSH:0.1 ppm, 10-hr TWA; 0.3 ppm STELACGIH:0.1 ppm, 8-hr TWA; 0.2 ppm STELIDLH LEVEL:3 ppm			Gloves: Coveralls Boots: Respirato	water) DuPont Neopre or: >0.1 pp	ene and Nitrile (>8-hr breakthrough for <i>Bromine</i> t Tychem® TK (>8-hr breakthrough) ene om - full facepiece APR with OV/AG cartridges n - Supplied air	
HE	EAL	TH EFFECTS		FI	RST AID	AND DECONTAMINATION
Skin: Irrita hea Acute: Irrita Chronic: Cou	aling ule ation o ughing ughing	ourns, discoloration and slowly		 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. 		



Common Name: BROMINE PENTAFLUORIDE

Synonyms: None CAS No: 7789-30-2 Molecular Formula: BrF₅ RTK Substance No: 0254

Description: A colorless to pale yellow liquid which becomes a gas at temperatures above 104°F (40°C)

HAZARD DATA Hazard Rating Firefighting Reactivity Bromine Pentafluoride is not combustible but it is Bromine Pentafluoride reacts violently or explosively 4 - Health a STRONG OXIDIZER which enhances the with WATER; STEAM; ORGANIC COMPOUNDS (such 0 - Fire combustion of other substances. as FUELS); and HYDROGEN CONTAINING MATERIALS (such as AMMONIA and ACETIC ACID). Use dry chemical, CO₂, or dry sand as 3-W - Reactivity Bromine Pentafluoride reacts with STRONG ACIDS extinguishing agents. DOT#: UN 1745 (such as HYDROCHLORIC, SULFURIC and NITRIC) DO NOT USE WATER or FOAM as Bromine and ACID FUMES releasing highly toxic Hydrogen ERG Guide #: 144 Pentafluoride reacts violently with WATER. Bromide and Hydrogen Fluoride gas. POISONOUS GASES ARE PRODUCED IN FIRE Hazard Class: 5.1 Bromine Pentafluoride is not compatible with including Hydrogen Bromide and Hydrogen (Oxidizer) HALOGENS: SALTS: METALS: METAL OXIDES: Fluoride. SELENIUM: SULFUR: and GLASS. CONTAINERS MAY EXPLODE IN FIRE Reacts with all chemicals EXCEPT OXYGEN, NITROGEN and RARE GASES (such as HELIUM and Use water spray to keep fire-exposed containers ARGON). cool. SPILL/LEAKS PHYSICAL PROPERTIES **Odor Threshold: Isolation Distance:** Pungent Flash Point: Noncombustible Small Spills: 30 meters (100 feet) **Relative Vapor** Large Spills: 215 meters (700 feet) Density: 6.05 (air = 1) Cover spilled material with dry sand, dry earth, Vapor Pressure: 328 mm Hg at 68°F (20°C) vermiculite or similar inert material and deposit in **Specific Gravity:** 2.46 (water = 1) sealed containers. Water Solubility: Decomposes/Reacts DO NOT GET WATER ON SPILLED MATERIAL. **Boiling Point:** 106°F (41°C) DO NOT ABSORB IN COMBUSTIBLE **Molecular Weight:** 174.9 ABSORBANTS. **EXPOSURE LIMITS** PROTECTIVE EQUIPMENT OSHA: None Gloves: No information Coveralls: NIOSH: DuPont Tychem® Responder®, CSM, and TK for toxic 0.1 ppm, 10-hr TWA and corrosive vapors and gases ACGIH: 0.1 ppm, 8-hr TWA Boots: No information IDLH LEVEL: No information **Respirator:** >0.1 ppm - Supplied air HEALTH EFFECTS FIRST AID AND DECONTAMINATION **Remove** the person from exposure. Eves: Irritation, burns, watery eyes Flush eyes with large amounts of water for at least 30 minutes. Remove Skin: Irritation, burns, discoloration and slow contact lenses if worn. Seek medical attention immediately. healing ulcers Quickly remove contaminated clothing and wash contaminated skin with Acute: Irritation of the nose, throat and lungs large amounts of soap and water. Seek medical attention immediately. with coughing and shortness of breath Begin artificial respiration if breathing has stopped and CPR if Coughing, phlegm and shortness of Chronic: necessary. breath, headache and dizziness Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. November 2007



Common Name: BROMOBENZENE

Synonyms: Phenyl Bromide CAS No: 108-86-1 Molecular Formula: C_6H_5Br RTK Substance No: 0258 Description: Clear, colorless liquid with a pleasant (aromatic) odor

HAZARD DATA					
Hazard Rating	Firefighting			Reactivity	
1 - Health 2 - Fire 0 - Reactivity DOT#: UN 2514 ERG Guide #: 130 Hazard Class: 3 (Flammable)	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. Use water spray to reduce vapors. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Bromide</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.			Bromobenzene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM); METALLIC SALTS; BROMOBUTANE; and SODIUM.	
SPI	LL/LEAKS		PH	IYSICAL PROPERTIES	
Isolation Distance: Spills: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer. Use only non-sparking tools and equipment, especially when opening and closing containers of Bromobenzene. Bromobenzene is toxic to aquatic organisms.			Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Ionization Potential: Molecular Weight:	5.4 (air = 1) 5 mm Hg at 82°F (28°C) 1.5 (water = 1) Insoluble 313°F (156°C) -24°F (-31°C)	
EXPO	SURE LIMITS		PRO	DTECTIVE EQUIPMENT	
The Protective Action Criteria values are: PAC-1 = 2.5 ppm PAC-2 = 20 ppm PAC-3 = 350 ppm			Coveralls: Tyche ONES break	inyl Alcohol and Viton (>8-hr breakthrough for gen compounds, Aromatics) em® BR, LV, Responder®, and TK; Zytron® 500; Suit®TEC; and Trellchem® HPS and VPS (>8-hr through for Halogen compounds, Aromatics).	
HEAL	TH EFFECTS		· · · ·	opm - Supplied air or SCBA D AND DECONTAMINATION	
Eyes: Irritation Skin: Irritation Inhalation: Nose ar and whe Headac	nd throat irritation with coughing		Remove the person f Flush eyes with large contact lenses if worn Remove contaminate and water.	rom exposure. e amounts of water for at least 15 minutes. Remove n. ed clothing and wash contaminated skin with soap ation if breathing has stopped and CPR if necessary.	



Common Name: BROMOFORM

Synonyms: Methyl Tribromide; Tribromomethane CAS No: 75-25-2 Molecular Formula: CHBr₃ RTK Substance No: 0262 Description: Colorless liquid with a sweet, *Chloroform*-like odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Bromoform itself	Mixtures of Bromoform with POTASSIUM, LITHIUM, MAGNESIUM or SODIUM are shock sensitive and can explode on impact.		
0 - Fire	does not burn.	Bromoform reacts violently with ACETONE; OXIDIZING AGENTS (such		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Bromide.	as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);		
DOT#: UN 2515	Use water spray to keep fire-exposed	STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM		
ERG Guide #: 159	containers cool.	HYDROXIDE); and POWDERED METALS (such as ALUMINUM an ZINC).		
Hazard Class: 6.1		Bromoform is corrosive to most METALS and attacks some PLASTICS,		
(Poison)		RUBBER and COATINGS.		
		Protect from AIR, LIGHT and excess HEAT as Bromoform will decompose.		

Isolation	Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

SPILL/LEAKS

DO NOT wash into sewer.

Bromoform is hazardous to the environment, especially to marine life.

EXPOSURE LIMITS

 OSHA:
 0.5 ppm, 8-hr TWA

 NIOSH:
 0.5 ppm, 10-hr TWA

 ACGIH:
 0.5 ppm, 8-hr TWA

 IDLH:
 850 ppm

The Protective Action Criteria values are:

PAC-1 = 5 ppm PAC-2 = 35 ppm PAC-3 = 850 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose, throat and lungs Irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, tremors, convulsions, and passing out
Chronic:	Cancer (large intestines) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.19 to 15 ppm
Flash Point:	Noncombustible
Vapor Density:	8.7 (air = 1)
Vapor Pressure:	5 mm Hg at 68°F (20°C)
Specific Gravity:	2.8 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	301°F (149°C)
Melting Point:	48°F (8.7°C)
Ionization Potential:	10.48 eV
Molecular Weight:	252.75

	PROTECTIVE EQUIPMENT
Gloves:	Viton (>8-hr breakthrough)
Coveralls:	Tychem® SL, BR, Responder® and TK (>8-hr breakthrough for <i>Methyl Bromide</i>)
Respirator:	>0.5 ppm - full facepiece APR with <i>Organic Vapor</i> <i>cartridges</i> >5 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 1-BROMOPROPANE

Synonyms: Propyl Bromide CAS No: 106-94-5 Molecular Formula: C₃H₇Br RTK Substance No: 4198 Description: Clear, colorless, liquid with a sweet odor

			HA	ZARD DATA	
Hazard Rating 2 - Health 3 - Fire 1 - Reactivity DOT#: UN 2344 ERG Guide #: 1 Hazard Class: 3 (Flamma	29	Firefighting 1-Bromopropane is a FLAMMABLE Use dry chemical, CO ₂ , water spray of resistant foam as extinguishing ager POISONOUS GASES ARE PRODUC including <i>Hydrogen Bromide</i> . CONTAINERS MAY EXPLODE IN FI Use water spray to keep fire-exposed Vapors may travel to a source of igni		or alcohol- nts. CED IN FIRE, IRE. d containers cool. tion and flash back. avel a distance the source.	Reactivity 1-Bromopropane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). 1-Bromopropane may accumulate static electricity when being filled into properly grounded containers. Grounding and bonding may not be sufficient to remove static electricity.
	SPII	L/LEAKS		Pł	IYSICAL PROPERTIES
similar material a Keep 1-Bromopr	neters meters (1/2 m vermin and de ropan iuse of	s (900 feet) le) culite, dry sand, earth, or a posit in sealed containers. e out of confined spaces, such the possibility of an explosion. ver.		Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight:	Sweet odor 72°F (21°C) 4.6% 7.8% : 914°F (490°C) 4.3 (air = 1) 143 mm Hg at 77°F (25°C) 1.35 (water = 1) Slightly soluble 160°F (71°C) -166°F (-110°C) 123
EX	POS	URE LIMITS			
ACGIH: 10 ppm, The Protective Ac PAC-1 = 0.3 p PAC-2 = 120 p PAC-3 = 700 p	ction C opm ppm	TWA Criteria values are:		Coveralls: DuPo Zytro Aliph Respirator: >10	r Shield®/4H® and Viton ont Tychem® LV, Responder® and TK; Kappler® on® 500; and Saint-Gobain ONESuit® TEC for <i>natic Halogen compounds</i> ppm - Supplied air ppm - SCBA
HE	AL1	H EFFECTS		FIRST A	ID AND DECONTAMINATION
Skin: Irrit red Inhalation: No cou bre He	dness ose, thr ughing eath eadach	drying and cracking with oat and lung irritation with , wheezing and shortness of e, dizziness and edness		contact lenses if wor Remove contaminate and water.	e amounts of water for at least 15 minutes. Remove rn. ed clothing and wash contaminated skin with soap ration if breathing has stopped and CPR if necessary.



Common Name: 2-BROMOPROPANE

Synonyms: Isopropyl Bromide; sec-Propyl Bromide CAS No: 75-26-3 Molecular Formula: C₃H₇Br RTK Substance No: 0267 Description: Colorless liquid

HAZARD	ΠΔΤΔ
IIALAND	

Hazard Rating	Firefighting	Reactivity	
2 - Health	2-Bromopropane is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , water spray or foam as	2-Bromopropane is not compatible with OXIDIZING	
3 - Fire	extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,	
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Bromide.	CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE	
DOT#: UN 2344	CONTAINERS MAY EXPLODE IN FIRE.	and POTASSIUM HYDROXIDE).	
ERG Guide #: 129	Use water spray to keep fire-exposed containers cool.	Explosive compounds may form after prolonged	
Hazard Class: 3 (Flammable)	Vapors may travel to a source of ignition and flash back.	contact with AZIDES.	
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		

Gloves:

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile)

.

breath.

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep 2-Bromopropane out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. May bioaccumulate.

PHYSICAL PROPERTIES

Odor Threshold:	Unknown
Flash Point:	<57°F (14°C)
Vapor Density:	4.3 (air = 1)
Vapor Pressure:	216 mm Hg at 77°F (25°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	138°F (59°C)
Melting Point:	-128°F (-89°C)
Molecular Weight:	123

EXPOSURE LIMITS		
OSHA:	None	
NIOSH:	None	
ACGIH:	10 ppm, 8-hr TWA (as <i>1-Bromopropane</i>)	
IDLH:	None	

	HEALTH EFFECTS
Eyes:	Irritation with redness
Skin:	Irritation with redness
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of

PROTECTIVE EQUIPMENT

Silver Shield®/4H® and Viton

Coveralls:	DuPont Tychem® LV, Responder® and TK; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Aliphatic Halogen compounds</i>)
Respirator:	>10 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Chemical Name: 1,3-BUTADIENE

Synonyms: Biethylene; Divinyl; Vinylethylene CAS No: 106-99-0 Molecular Formula: CH₂CHCHCH₂ RTK Substance No: 0272 Description: Colorless gas, liquefied or compressed gas below 31°F (-1°C), with a gasoline-like odor.

		DO	ſ/NFPA DA	ТА
Hazard Rating 2 - Health 4 - Fire 2 - Reactivity DOT ID #: UN 1010 ERG Guide #: 116 P Hazard Class: 2.1 (Flammable gas)	DOT/NFPA DA Firefighting Stop flow of gas. Gas/Air mixtures are explosive. Cylinders may explode in fire. May autopolymerize. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		gnition and flash travel a distance	Reactivity 1,3-Butadiene reacts with PHENOL; CROTONALDEHYDE; CHLORINE DIOXIDE; HALOGENS; OXYGEN; NITROGEN OXIDES; ALUMINUM TETRAHYDROBORATE; RUST; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). 1,3-Butadiene forms shock-sensitive compounds with COPPER and COPPER ALLOYS.
	L/LEAKS	1		PHYSICAL PROPERTIES
Isolation Distance: Small Spills: 30 meters Large Spills: 60 meters Move cylinder to a safe p unless flow of gas can b	(200 feet) blace and allow to vent		Odor Thresho Flash Point: LEL: UEL: Vapor Density Vapor Pressu Water Solubili Boiling Point: Ionization Pot	-105°F (-76°C) 2% 11.5% 1.9 (air = 1) re: 1,824 mm Hg at 68°F (20°C) ty: Insoluble 24°F (-4.4°C)
EXPOSU		1		PROTECTIVE EQUIPMENT
NIOSH: Lowest ACGIH: 2 ppm, IDLH LEVEL: 2,000 p PAC LEVEL: PAC-1 PAC-2	8-hr TWA, 5 ppm STEL feasible concentration 8-hr TWA ppm = 670 ppm; = 5,300 ppm; = 22,000 ppm		Gloves: Coverall: Boot: Respirator:	Butyl, Viton® DuPont Tychem® CPF2, SL, CPF3, CPF4, TK, and Responder®, Kappler Zytron® 300 and 500 Butyl < 5 ppm APR with Organic Vapor cartrdige < 50 ppm full facepiece APR with Organic Vapor cartridge < 1000 ppm Supplied Air
HEALTH	I EFFECTS		FIRS	T AID AND DECONTAMINATION
and passing out Chronic: Cancer (lymp) May damage	zing, headache, dizziness,		Flush eyes with Remove conta	erson from exposure. In large amounts of water for at least 15 minutes. Et lenses if worn. ed part in warm water. Inedical facility.



Common Name: BUTANE

Synonyms: n-Butane; Butyl Hydride; Diethyl CAS No: 106-97-8 Molecular Formula: C₄H₁₀ RTK Substance No: 0273 Description: Colorless gas with a *Natural gas* odor

HAZARD	DATA

<i>t</i>		
Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE GAS Stop flow of gas or let fire burn itself out.	Butane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
4 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	CONTAINERS MAY EXPLODE IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and
DOT#: UN 1011	Use water spray to disperse gas, keep fire-exposed cylinders cool, and protect individuals attempting	POTASSIUM HYDROXIDE); and mixtures of NICKEL CARBONYL and OXYGEN.
ERG Guide #: 115	to stop leak.	CARBONYL and OXYGEN.
Hazard Class: 2.1 (Flammable gas)	Vapors may travel to a source of ignition and flash back.	
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spills: 30 meters (100 feet)

Large Spills: 60 meters (200 feet)

Use water spray to keep cylinders or tanks cool.

Keep **Butane** out of confined spaces, such as sewers, because of the possibility of an explosion. Before entering a confined space where **Butane** is present, check to make sure sufficient *Oxygen* (19.5%) exists.

Will not affect aquatic environments.

EXPOSURE LIMITS

OSHA:	None
NIOSH:	800 ppm, 10-hr TWA
ACGIH:	1,000 ppm, 8-hr TWA (as Aliphatic
	hydrocarbon gases)

HEALTH EFFECTS

drowsiness and passing out

Eyes:	Contact with liquid causes frostbite
Skin:	Contact with liquid causes frostbite
Inhalation:	Headache, lightheadedness,

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.Immerse affected part in warm water. Seek medical attention.Transfer to a medical facility.

PHYSICAL PROPERTIES

Odor Threshold:	50,000 ppm
Flash Point:	-76° to -117° F (-60 $^{\circ}$ to -83° C)
LEL:	1.6%
UEL:	8.4%
Vapor Density:	2.1 (air = 1)
Vapor Pressure:	760 mm Hg at 77°F (25°C)
Specific Gravity:	0.6 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	31°F (-0.5°C)
,	

	PROTECTIVE EQUIPMENT
Gloves:	Insulated Neoprene or Rubber
Coveralls:	Clothes designed to prevent freezing of body tissues
Respirator:	>800 ppm - Supplied air



Common Name: 2-BUTOXY ETHANOL

Synonyms: Butyl Cellosolve; Ethylene Glycol Monobutyl Ether; EGBE CAS No: 111-76-2 Molecular Formula: $C_6H_{14}O_2$ RTK Substance No: 0275 Description: Colorless liquid with a mild odor

		HA	ZARD DA	ГА		
Hazard Rating Firefighting				Reactivity		
3 - Health 2 - Fire 0 - Reactivity DOT#: UN 2369 ERG Guide #: 152 Hazard Class: 6.1 (Poison)	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water sp resistant foam as extinguishing POISONOUS GASES ARE PRC CONTAINERS MAY EXPLODE Use water spray to keep fire-exp cool.	nts. CED IN FIRE. IRE.	AGEN PERM CHLO BASES POTAS	EXAMPLE 1 Is not compatible with OXIDIZING TS (such as PERCHLORATES, PEROXIDES, IANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE) and STRONG S (such as SODIUM HYDROXIDE and SSIUM HYDROXIDE). IXY Ethanol forms <i>Peroxides</i> on exposure to AIR GHT.		
SP	ILL/LEAKS			PH	YSICAL PROPERTIES	
Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit into sealed containers. DO NOT wash into sewer.		Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point: Melting Point: Ionization Pot Molecular We		Temp: /: re: ity: ity: ity:	0.1 ppm 140° to $160^{\circ}F (60^{\circ}$ to $71^{\circ}C)$ 1.1% 10% $472^{\circ}F (244^{\circ}C)$ 4.1 (air = 1) $0.8 \text{ mm Hg at } 68^{\circ}F (20^{\circ}C)$ 0.9 (water = 1) Miscible $340^{\circ}F (171^{\circ}C)$ $-94^{\circ}F (-70^{\circ}C)$ 10 eV 118.2	
EXPO	SURE LIMITS			PROTECTIVE EQUIPMENT		
OSHA: 50 ppm, 8- NIOSH: 5 ppm, 10- ACGIH: 20 ppm, 8- IDLH: 700 ppm	hr TWA		Gloves: Coveralls: Respirator:	(>8-hr l DuPon Zytron breakth >5 ppm	Nitrile, Neoprene, Silver Shield®/4H® and Viton breakthrough) t Tychem® SL and Responder®; Kappler® ® 500; and Saint-Gobain ONESuit® TEC (>8-hr nrough for <i>Glycol Ethers</i>) n - Full facepiece APR with Organic vapor filter	
HEALTH EFFECTS			FIRS		m - Supplied air D AND DECONTAMINATION	
Eyes: Irritation with possible eye damage Skin: Irritation Inhalation: Nose and throat irritation with coughing and wheezing Nausea, vomiting, headache, dizziness, confusion and passing out Chronic: Cancer (liver) in animals		 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promtly to a medical facility. 				



Common Name: BUTOXYL

Synonyms: 3-Methoxybutyl Acetate; Methyl-1,3-Butylene Glycol Acetate CAS No: 4435-53-4 Molecular Formula: $C_7H_{14}O_3$ RTK Substance No: 0276 Description: Clear, colorless liquid with a slight, irritating odor

HAZARD DATA

Hazard Rating Firefighting F		Reactivity			
1 - Health	COMBUSTIBLE Use dry chemical, CO ₂ , water spray or alcohol-	ButoxyI may form explosive <i>Peroxides</i> with prolonged storage or contact with AIR, LIGHT or			
2 - Fire	resistant foam as extinguishing agents.	when stored above room temperature.			
1 - Reactivity	Use water in flooding quantities as fog, as solid streams of water may be ineffective.	Butoxyl is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,			
DOT#: UN 2708	POISONOUS GASES ARE PRODUCED IN FIRE.	PERMANGANATES, CHLORATES, NITRATES,			
ERG Guide #: 127	CONTAINERS MAY EXPLODE IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and			
Hazard Class: 3	Use water spray to keep fire-exposed containers cool.	NITRIC); ALUMINUM; LEAD; and CHROMIUM			
(Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	TRIOXIDE.			
	Flow or agitation may generate electrostatic charges.				

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids with fly ash, cement powder or commercial sorbents and place in sealed containers for disposal.

DO NOT wash into sewer.

Butoxyl may accumulate static electricity.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Butoxyl**.

HEALTH EFFECTS

Irritation
Irritation
Nose and throat irritation with coughing and wheezing
Headache, dizziness and lightheadedness

PHYSICAL PROPERTIES

Odor Threshold:	Slightly irritating odor
Flash Point:	145° to 171°F (63° to 77°C)
LEL:	0.8 to 2.3%
UEL:	4.7 to 15%
Auto Ignition Temp:	770°F (410°C)
Vapor Density:	5 (air = 1)
Specific Gravity:	0.96 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	275° to 343°F (135° to 173°C)
Freezing Point:	-112°F (-80°C)
Molecular Weight:	146.21

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H® and Barrier® (>8-hr breakthrough for <i>Esters Carboxylic, Acetates</i>)
Coveralls:	Tychem® BR, Responder® and TK; Trellchem® HPS and

VPS (>8-hr breakthrough for Esters Carboxylic, Acetates)

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: n-BUTYL ACETATE

Synonyms: 1-Acetoxybutane; Butyl Ethanoate; Acetic Acid, Butyl Ester CAS No: 123-86-4 Molecular Formula: $C_6H_{12}O_2$ RTK Substance No: 1329 Description: Clear, colorless liquid with a fruity odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity				
2 - Health	FLAMMABLE LIQUID	n-Butyl Acetate may react with OXIDIZING AGENTS				
3 - Fire	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and POTASSIUM tert-BUTYLATE to cause fires and				
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.					
DOT#: UN 1123	CONTAINERS MAY EXPLODE IN FIRE.					
ERG Guide #: 129	Use water spray to keep fire-exposed containers cool and to dilute and disperse vapors.					
Hazard Class: 3	Vapor is heavier than air and may travel a distance	explosions.				
(Flammable)	to cause a fire or explosion far from the source.	n-Butyl Acetate may attack many PLASTICS and RUBBER.				

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **n-Butyl Acetate**.

Keep **n-Butyl Acetate** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 150 ppm, 8-hr TWA NIOSH: 150 ppm, 10-hr TWA; 200 ppm, STEL ACGIH: 150 ppm, 8-hr TWA; 200 ppm, STEL IDLH: 1,700 ppm The Protective Action Criteria values are: PAC-1 = 5 ppm PAC-2 = 200 ppm PAC-3 = 3,000 ppm

	HEALTH EFFECTS
Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, confusion, lightheadedness, and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.63 to 7.4 ppm
Flash Point:	72°F (22°C)
LEL:	1.2%
UEL:	7.6%
Auto Ignition Temp:	760°F (404°C)
Vapor Density:	4 (air = 1)
Vapor Pressure:	10 mm Hg at 68°F (20°C)
Specific Gravity:	0.88 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	260°F (127°C)
Melting Point:	-107°F (-77°C)
Ionization Potential:	10 eV
Molecular Weight:	116

PROTECTIVE EQUIPM	IENT
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Gloves:	Silver Shield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough)
Respirator:	At levels >10% of the LEL use turn out gear or flash protection >150 ppm - full facepiece APR with <i>Organic vapor</i> <i>cartridge</i>
	>1,500 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



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Common Name: BUTYL ACRYLATE

Synonyms: Acrylic Acid Butyl Ester CAS No: 141-32-2 Molecular Formula: $C_7H_{12}O_2$ RTK Substance No: 0278 Description: Clear, colorless liquid with a fruity, strong odor

			HA	ZARD DA	ТА	
Hazard Rating Firefighting					Reactiv	vitv
3 - Health		Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.		or foam as	Butyl Acrylate is REACTIVE and can easily polymerize with HEAT, LIGHT, or by catalytic reaction with METALS.	
3 - Fire 2 - Reactivity		POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.			Butyl Ac (such as PERMA	crylate reacts violently with OXIDIZING AGENTS S PERCHLORATES, PEROXIDES, NGANATES, CHLORATES, NITRATES, INE, BROMINE and FLUORINE) to cause fires and
DOT#: UN 23	48	Use water spray to keep fire-e cool.	exposed	d containers	explosio	
ERG Guide #: Hazard Class (Flamm		Vapors may travel to a source flash back. Vapor is heavier than air and r distance to cause a fire or exp source.	may tra	ivel a	Butyl Acrylate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; and HYDROGEN COMPOUNDS.	
	SPIL	.L/LEAKS			PH	YSICAL PROPERTIES
Isolation Distance: Small Spill - 60 meters (200 feet) Large Spill - 270 meters (900 feet) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Toxic to aquatic organisms.		Odor Thr Flash Poi LEL: UEL: Relative I Vapor De Vapor Pro Water So Boiling P Molecula		nsity: ity: sure: pility: nt:	0.035 ppm 97.7°F (36.5°C) 1.1% 9.9% 0.9 (water = 1) 4.42 (air = 1) 4 mm Hg at 68°F (20°C) Slightly soluble 293° to 300°F (145° to 149°C) 128.2	
E>	KPOS	URE LIMITS	J		PRO	TECTIVE EQUIPMENT
OSHA: NIOSH: ACGIH: IDLH LEVEL:	2 ppn	m, 10-hr TWA n, 8-hr TWA formation		Gloves: Coveralls: Boots: Respirator:	DuPor breakt No info >2 ppr cartride	Silver Shield® (>8-hr breakthrough) ht Tychem® Responder and TK (>8-hr hrough) ormation n - full facepiece APR with Organic Vapor ges opm - Supplied Air
Н	EALT	H EFFECTS		FIR		O AND DECONTAMINATION
Skin: In Acute: In co	ritation a ritation o	nd burns nd burns f nose, throat and lungs with wheezing, and/or shortness		Flush eyes v contact lens Quickly rem large amour	vith large a es if worn. ove contai ts of soap	om exposure. amounts of water for at least 15 minutes. Remove . Seek medical attention. minated clothing and wash contaminated skin with o and water. Seek medical attention.
		, dizziness and vomiting gy with itching, redness and	Begin artificial resp Transfer to a media			ion if breathing has stopped and CPR if necessary. facility.



Common Name: n-BUTYL ALCOHOL

Synonyms: 1-Butanol, Propyl Carbinol CAS No: 71-36-3 Molecular Formula: C₄H₁₀O RTK Substance No: 1330 Description: Colorless liquid with a strong, sweet alcohol odor

HAZARD DATA					
Hazard Rating 2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1120 ERG Guide #: 129 Hazard Class: 3 (Flammable)	Firefighting n-Butyl Alcohol is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		(such as PI PERMANG CHLORINE METALS (s POTASSIL BERYLLIU flammable n-Butyl Alc (such as H REDUCING ALUMINUM	Cy Sohol will react with OXIDIZING AGENTS ERCHLORATES, PEROXIDES, GANATES, CHLORATES, NITRATES, E, BROMINE and FLUORINE); ALKALI such as LITHIUM, SODIUM and JM); and ALKALINE EARTH METALS (such as M, MAGNESIUM and CALCIUM) to form and explosive <i>Hydrogen gas</i> . Sohol is not compatible with STRONG ACIDS YDROCHLORIC, SULFURIC and NITRIC); G AGENTS (such as LITHIUM, SODIUM, M and their HYDRIDES); ALIPHATIC AMINES; ATES; ACETALDEHYDE; and ETHYLENE OXIDE.	
SP	ILL/LEAKS			PH	YSICAL PROPERTIES
Isolation Distance: Spill: 50 to 100 meters (160 to 330 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Use only non-sparking tools and equipment, especially when opening and closing containers. Keep n-Butyl Alcohol out of confined spaces, such as sewers, because of the possibility of an			Odor Thr Flash Poi LEL: UEL: Ignition T Vapor De Vapor Pro Specific O Water So	emp: nsity: essure: Gravity: lubility:	1 to 15 ppm 98°F (37°C) 1.4% 11.2% 650°F (343°C) 2.6 (air = 1) 6 mm Hg at 68°F (20°C) 0.81 (water = 1) Soluble
explosion. n-Butyl Alcohol is readily biodegradable.				n Potential:	243°F (117°C) 10.04 eV
EXPOSURE LIMITS		1	Molecula	-	74.1 TECTIVE EQUIPMENT
OSHA: 100 NIOSH: 50 r ACGIH: 20 r	ppm, 8-hr TWA ppm, Ceiling ppm, Ceiling 00 ppm		Gloves: Coveralls Respirato	Butyl, N E DuPon Respor ONESu or: >20 pp cartridg	Nitrile, Neoprene and Viton (>8-hr breakthrough) t Tychem® CPF 2, SL, CPF 3, BR, LV, nder® and TK; Kappler Zytron® 300; Saint-Gobain uit®TEC or equivalent (>8-hr breakthrough) m - full-facepiece APR with Organic Vapor
HEAL	TH EFFECTS		FI	RST AID	O AND DECONTAMINATION
Skin: Irritatio crackir Inhalation: Nose, coughi breath Heada	on, burns, tearing, eye damage on, burns, redness, drying and ng of the skin throat and lung irritation with ng, wheezing and/or shortness of che, dizziness, lightheadedness issing out		Flush eye contact le Quickly re large amo Begin art necessar	es with large a enses if worn. emove contar punts of wate ficial respirat	ion if breathing has stopped and CPR if
·	-	J			January 2008



Common Name: sec-BUTYL ALCOHOL

Synonyms: Methyl Ethyl Carbinol; Butylene Hydrate; 1-Methyl Propanol CAS No: 78-92-2 Molecular Formula: $C_4H_{10}O$ RTK Substance No: 1645 Description: Colorless liquid with a strong, pleasant odor

	HAZARD DATA				
Hazard Rating	Firefighting		Reactivity		
Hazard Rating2 - Health3 - Fire0 - ReactivityDOT#: UN 1120ERG Guide #: 129Hazard Class: 3 (Flammable)	Firefighting sec-Butyl Alcohol is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		Reactivity sec-Butyl Alcohol can form explosive <i>Peroxides</i> . sec-Butyl Alcohol reacts with CHROMIUM TRIOXIDE and other OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM); and ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM) to form flammable and explosive <i>Hydrogen gas</i> . sec-Butyl Alcohol is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; ISOCYANATES; PERCHLORIC ACID; and ALUMINUM (when heated).		
SP	ILL/LEAKS		PHYSICAL PROPERTIES		
material and deposit Before entering a com Alcohol may be pres explosive concentrati DO NOT wash into se EXPO	ers (900 feet) mile) niculite, dry sand, earth, or a similar in sealed containers. fined space where sec-Butyl ent, check to make sure that an on does not exist.	Odor Thres Flash Point LEL: UEL: Vapor Dens Vapor Pres Specific Gr Water Solut Boiling Poin Ionization F Molecular V	: 75°F (24°C) 1.7% 9.8% sity: 2.6 (air = 1) sure: 12 mm Hg at 68°F (20°C) avity: 0.8 (water = 1) bility: Soluble nt: 201°F (94°C) Potential: 10.1 eV Veight: 74.1 PROTECTIVE EQUIPMENT Butyl, Nitrile, Neoprene, Silver Shield®/4H® and Viton		
150 ACGIH: 100	ppm, 10-hr TWA ppm, 15 min STEL ppm, 8-hr TWA 0 ppm	Coveralls: Respirator:	 (>8-hr breakthrough) DuPont Tychem® CPF 4, Responder® and TK; Kappler Zytron® 300; and Saint-Gobain ONESuit®TEC or equivalent (>8-hr breakthrough) >100 ppm - full facepiece APR with Organic vapor cartridges >1,000 ppm - Supplied air 		
HEAL	TH EFFECTS	FIR	ST AID AND DECONTAMINATION		
Skin: Irritation the skin Inhalation: Nose an Headac	n and burns n, burns, drying and cracking of nd throat irritation he, dizziness, lightheadedness ssing out	Flush eyes contact lens Quickly rem large amou Begin artific necessary.	e person from exposure. with large amounts of water for at least 15 minutes. Remove ses if worn. hove contaminated clothing. Wash contaminated skin with nts of water. ial respiration if breathing has stopped and CPR if a medical facility.		



Common Name: tert-BUTYL ALCOHOL

Synonyms: t-Butanol; Trimethyl Carbinol CAS No: 75-65-0 Molecular Formula: C₄H₁₀O RTK Substance No: 1787 Description: Colorless liquid or crystalline solid with a mothball-like odor

HAZARD DATA				
Hazard Rating	Firefighting		Reactivity	
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1120 ERG Guide #: 129 Hazard Class: 3 (Flammable liquids)	Fireighting tert-Butyl Alcohol is a FLAMMABLE LIQUID or SOLID. Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Isobutylene</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		tert-Butyl Alcohol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM) and ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM) to produce flammable and explosive <i>Hydrogen gas</i> . tert-Butyl Alcohol is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALIPHATIC AMINES; ISOCYANATES; ACETALDEHYDE; and some ZINC, CHROMIUM and ALUMINUM COMPOUNDS. tert-Butyl Alcohol will decompose on contact with STRONG MINERAL ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to produce flammable <i>Isobutylene gas</i> .	
similar material and d Keep tert-Butyl Alco l	rs (900 feet) mile) niculite, dry sand, earth, or a leposit in sealed containers. hol out of confined spaces, such of the possibility of an explosion.	Odor Threshol Flash Point: LEL: UEL: Vapor Density Vapor Pressur Specific Gravi Water Solubili Boiling Point: Melting Point: Ionization Pote Molecular Wei	52°F (11°C) 2.4% 8.0% 2.55 (air = 1) e: 40 mm Hg at 77°F (25°C) ty: 0.78 (water = 1) ty: Soluble 180°F (82.4°C) 78°F (25.7°C) ential: 9.7 eV	
EXPOSURE LIMITS			PROTECTIVE EQUIPMENT	
NIOSH: 100 ACGIH: 100) ppm, 8-hr TWA) ppm, 10-hr TWA; 150 ppm, STEL) ppm, 8-hr TWA 00 ppm	Gloves: Coveralls: Respirator:	Butyl, Nitrile, Neoprene, Silver Shield® and Viton DuPont Tychem® CSM, Responder® and TK; Kappler Zytron® 300; and Saint-Gobain ONESuit®TEC for <i>toxic</i> <i>liquids</i> >100 ppm - Full facepiece APR with Organic vapor filter >1,000 ppm - Supplied air	
HEA	LTH EFFECTS	FIRS	T AID AND DECONTAMINATION	
Inhalation: Nose ar wheezir	n, drying, cracking and redness nd throat irritation with coughing and ng and shortness of breath he, dizziness, confusion and	Flush eyes with contact lenses Quickly remov- large amounts	e contaminated clothing and wash contaminated skin with of water. respiration if breathing has stopped and CPR if	



Common Name: BUTYLAMINE

Synonyms: 1-Butanamine; n-Butylamine CAS No: 109-73-9 Molecular Formula: C₄H₁₁N RTK Substance No: 0280 Description: Clear, colorless liquid with an Ammonia or fish-like odor.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray, or alcohol-	Contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire	resistant foam.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	CHLORINE, BROMINE and FLUORINE) and PERCHLORYL FLUORIDE may cause fires and
DOT#: UN 1125	including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE.	explosions.
ERG Guide #: 132	Use water spray to keep fire-exposed containers cool.	Butylamine is not compatible with STRONG ACIDS
Hazard Class: 3	Vapors may travel to a source of ignition and flash	(such as HYDROCHLORIC, SULFURIC and NITRIC); COPPER; COPPER ALLOYS; ALUMINUM; ZINC;
(Flammable liquids)	back.	ISOCYANATES; ACROLEIN; PHENOLS; KETONES;
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	ETHERS; GLYCOLS; ORGANIC HALOGENS; EPICHLOROHYDRIN; and ALCOHOLS.

SPILL/LEAKS

Isolation Distance: 800 meters or 1/2 mile

Absorb liquid in sand or other inert absorbent. DO NOT let this chemical enter the environment.

EXPOSURE LIMITS

OSHA:	5 ppm, Ceiling
NIOSH:	5 ppm, Ceiling
ACGIH:	5 ppm, Ceiling
IDLH LEVEL:	300 ppm

HEALTH EFFECTS	S
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Eyes:	Irritation and burns
Skin:	Irritation, burns and blisters
Acute:	Nose, throat and lung irritation with coughing, and shortness of breath (pulmonary edema)
Chronic:	Bronchitis with coughing, phlegm and/or shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	0.12 ppm
Flash Point:	10 [°] F (-12.2 [°] C)
LEL:	1.7%
UEL:	9.8%
Vapor Density:	2.5 (air = 1)
Vapor Pressure:	82 mm Hg at 68 [°] F (20 [°] C)
Water Solubility:	Miscible
Boiling Point:	172 [°] F (78 [°] C)
Ionization Potential:	8.71 eV

Gloves: Butyl Rubber	
Batyr Rabber	
Coveralls: DuPont Tychem® CPF3, BR, LV, Respon	der® and TK
Boots: No information	
Respirator: >5 ppm APR with cartridge specific for Bu >50 ppm Supplied Air >300 ppm SCBA	tylamine

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: tert-BUTYL CHROMATE

Synonyms: t-Butyl Chromate; Bis(tert-butyl) Chromate CAS No: 1189-85-1 Molecular Formula: $C_8H_{18}CrO_4$ RTK Substance No: 1788 Description: Clear, colorless liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	tert-Butyl Chromate may burn, but does not readily ignite.	tert-Butyl Chromate is a STRONG OXIDIZER and will react violently with REDUCING AGENTS (such as
1 - Fire	Use dry chemical, CO ₂ , water spray, alcohol-	LITHIUM, SODIUM, ALUMINUM and their HYDRIDES)
1 - Reactivity	resistant foam or other foam as extinguishing	and COMBUSTIBLES.
DOT#: UN 3082	agents. POISONOUS GASES ARE PRODUCED IN FIRE,	Water solutions of tert-Butyl Chromate react violently with STRONG BASES (such as SODIUM HYDROXIDE
ERG Guide #: 171	including Chromium Oxide fumes.	and POTASSIUM HYDROXIDE).
Hazard Class: 9 (Environmentally	Use water spray to keep fire-exposed containers cool.	tert-Butyl Chromate is incompatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ALCOHOLS; and HYDRAZINE.
Hazardous Material)	tert-Butyl Chromate may ignite combustibles (wood, paper and oil).	

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer. May be harmful to aquatic life.

EXPOSURE LIMITS

OSHA:	0.1 mg/m ³ , Ceiling
NIOSH:	0.001 mg/m ³ , 10-hr TWA
ACGIH:	0.1 mg/m ³ , Ceiling
IDLH:	15 mg/m ³
	(All of the above are for <i>hexavalent Chromium</i>)

HEALTH EFFECTS

Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, nausea and vomiting	
Chronic:	Hexavalent Chromium or Chromium VI compounds cause lung cancer in humans	

PHYSICAL PROPERTIES

Odor Threshold:	None	
Flash Point:	May burn	
Vapor Density:	7.9 (air = 1)	
Water Solubility:	Insoluble	
Melting Point:	41°F (5°C)	
Freezing Point:	23°F (-5°C)	
Molecular Weight:	230.3	

PROTECTIVE EQUIPMENT

Gloves: Silver Shield®/4H®

Coveralls: DuPont Tychem® CSM, Responder®, and TK (for *known carcinogens*)

Respirator: >0.001 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately.



Common Name: 1,2-BUTYLENE OXIDE

Synonyms: 1,2-Epoxybutane; Ethyloxirane CAS No: 106-88-7 Molecular Formula: C_4H_8O RTK Substance No: 0287 Description: Clear, colorless liquid with a sweet, disagreeable odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 3 - Fire 2W - Reactivity DOT#: UN 3022P ERG Guide #: 127 Hazard Class: 3	 FLAMMABLE AND REACTIVE Use dry chemical, CO₂, or alcohol-resistant foam as extinguishing agents. Water may not be effective in fighting fires and 1,2-Butylene Oxide may react violently with WATER to give off heat. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Vapor is heavier than air and may travel a distance to 	 1,2-Butylene Oxide may polymerize on contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); CHARCOAL; TIN CHLORIDES; ALUMINUM CHLORIDE; and IRON CHLORIDE, to cause fires and explosions. 1,2-Butylene Oxide reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
(Flammable)	 cause a fire or explosion far from the source. Flow or agitation may generate electrostatic charges. 1,2-Butylene Oxide may form an ignitable vapor/air mixture in closed tanks or containers. 	1,2-Butylene Oxide may react violently with WATER to release heat.Protect from LIGHT and COMBUSTIBLES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. Use only non-sparking tools and equipment.

Metal containers involving the transfer of **1,2-Butylene Oxide** should be grounded and bonded.

Keep **1,2-Butylene Oxide** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

AIHA: 2 ppm, 8-hr TWA

The Protective Action Criteria values are: PAC-1 = 72 ppm PAC-2 = 140 ppm PAC-3 = 330 ppm

HEALTH EFFECTS

I		
	Eyes: Skin:	Irritation and burns Irritation and burns
	Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
		Headache, dizziness, lightheadedness, and passing out
	Chronic:	Cancer (nose) in animals

PHYSICAL PROPERTIES

Flash Point:	-7°F (-22°C)
LEL:	1.5%
UEL:	19%
Auto Ignition Temp:	822°F (439°C)
Vapor Density:	2.2 (air = 1)
Vapor Pressure:	180 mm Hg at 77°F (25°C)
Specific Gravity:	0.826 (water = 1)
Water Solubility:	Soluble/Reactive
Boiling Point:	145°F (63°C)
Freezing Point:	<-58°F (<-50°C)
Molecular Weight:	72

PROTECTIVE EQUIPMENT

Gloves:	Butyl (<1-hr breakthrough)
Coveralls:	Tychem® CSM (>4-hr breakthrough)

Respirator: >2 ppm - full facepiece APR with *Organic vapor filters* >20 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: BUTYL PROPIONATE

Synonyms: Butyl Propanoate CAS No: 590-01-2 Molecular Formula: $C_7H_{14}O_2$ RTK Substance No: 0295 Description: Colorless liquid with a fruity odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID	Butyl Propionate will react with ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM) to
3 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents.	produce flammable and explosive Hydrogen gas.
0 - Reactivity	Solid streams of water may be ineffective.	Butyl Propionate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 1914	POISONOUS GASES ARE PRODUCED IN FIRE.	PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 130	Use water spray to keep fire-exposed containers cool.	CHLORINE, BROMINE and FLUORINE). Butyl Propionate will react with STRONG ACIDS
Hazard Class: 3 (Flammable)	Vapors may travel to a source of ignition and flash back.	(such as HYDROCHLORIC, SULFURIC and NITRIC) to release heat.
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **Butyl Propionate** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

PAC-1 = 94 ppm

PAC-2 = 94 ppm

PAC-3 = 94 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation

PHYSICAL PROPERTIES			
Flash Point:	90°F (32°C)		
Auto Ignition Temp:	799°F (426°C)		
Vapor Density:	4.5 (air = 1)		
Vapor Pressure:	2.8 mm Hg at 68°F (20°C)		
Specific Gravity:	0.9 (water = 1)		
Water Solubility:	Insoluble		
Boiling Point:	295°F (146°C)		
Melting Point:	-128°F (-90°C)		
Molecular Weight:	130.2		

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Barrier® (>8-hr breakthrough for <i>Esters</i> , <i>aliphatic</i>)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>8-hr breakthrough for <i>Esters</i> , <i>aliphatic</i>)
Respirator:	>94 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: BUTYRIC ACID

Synonyms: Ethylacetic Acid; 1-Propanecarboxylic Acid CAS No: 107-92-6 Molecular Formula: $C_4H_8O_2$ RTK Substance No: 0300 Description: Colorless, oily liquid with a strong characteristic odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Butyric Acid is a COMBUSTIBLE LIQUID.	Butyric Acid reacts with OXIDIZING AGENTS (such
2 - Fire	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and
DOT#: UN 2820	CONTAINERS MAY EXPLODE IN FIRE.	POTASSIUM HYDROXIDE); REDUCING AGENTS;
ERG Guide #: 153	Use water spray to keep fire-exposed containers cool.	and CHROMIUM TRIOXIDES.
Hazard Class: 8	Vapors may travel to a source of ignition and flash back.	Contact with ALUMINUM and other METALS may release flammable and explosive <i>Hydrogen gas</i> .
(Corrosive)		

SPILL/LEAKS

Isolation Distance:

Eyes:

Skin:

Small Spills: 60 meters (200 feet)

Large Spills: 330 meters (1,100 feet)

Cover with dry lime, sand or soda ash, and place in covered containers for disposal.

DO NOT let this chemical enter the environment.

EXPOSURE LIMITS

No occupational exposure limits have been established.

HEALTHE	EFFECTS
Irritation and b	urns
Irritation and b	urns

Acute:	Irritation of nose, throat and lungs with coughing, wheezing, and/or shortness of breath
O I	.

Chronic: Cough, phlegm and shortness of breath

PHYSICAL PROPERTIES		
Odor Threshold:	Strong odor	
Flash Point:	161°F (72°C)	
LEL:	2%	
UEL:	10%	
Relative Vapor		
Density:	3 (air = 1)	
Vapor Pressure:	0.43 mm Hg at 68°F (20°C)	
Relative Density:	0.96 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	327°F (164°C)	
Melting Point:	17°F (-8°C)	

	PROTECTIVE EQUIPMENT
Gloves:	Viton® or Butyl (>8-hr breakthrough)
Coveralls:	DuPont Tychem® Responder® and CSM (>8-hr breakthrough)
Boots:	Butyl
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CACODYLIC ACID

Synonyms: Hydroxydimethylarsine Oxide CAS No: 75-60-5 Molecular Formula: C₂H₇AsO₂ RTK Substance No: 0304 Description: Colorless to white, odorless, crystalline solid

HAZARD DATA					
Hazard Rating	Firefighting			Reac	tivity
4 - Health 0 - Fire 0 - Reactivity DOT#: UN 1572 ERG Guide #: 151 Hazard Class: 6.1 (Poison)	 Extinguish fire using an agent suitable for type of surrounding fire. Cacodylic Acid itself does not burn. POISONOUS GASES ARE PRODUCED IN FIR including Arsenic Oxides. Use water spray to keep fire-exposed containers cool. 		CED IN FIRE,	Cacod AGEN PERM CHLC AGEN their H HYDF CHEM MAGN	dylic Acid is not compatible with OXIDIZING NTS (such as PERCHLORATES, PEROXIDES, MANGANATES, CHLORATES, NITRATES, DRINE, BROMINE and FLUORINE); REDUCING NTS (such as LITHIUM, SODIUM, ALUMINUM and HYDRIDES); STRONG ACIDS (such as ROCHLORIC, SULFURIC and NITRIC); MICALLY ACTIVE METALS (such as POTASSIUM, NESIUM and ZINC); and SODIUM DHYDRIDE.
SPI	LL/LEAKS			PH	YSICAL PROPERTIES
Isolation Distance:Spill: 25 meters (75 feet)Fire: 800 meters (1/2 mile)Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit in sealed containers.DO NOT wash into sewer.Harmful to aquatic life.			Odor Thresho Flash Point: Specific Grav Water Solubil Boiling Point: Melting Point Molecular We pH:	ity: ity:	Odorless Nonflammable >1.2 (water = 1) Soluble $392^{\circ}F (200^{\circ}C)$ $383^{\circ} to 392^{\circ}F (195^{\circ} to 200^{\circ}C)$ 138 Acidic
EXPO	SURE LIMITS	1		PRO	TECTIVE EQUIPMENT
OSHA: 0.5 mg/m ³ , NIOSH: None ACGIH: None IDLH: None	8-hr TWA (as <i>Arsenic</i>)		Gloves: Coveralls: Respirator:	DuPor <0.5 m	and Natural Rubber ht Tyvek® ng/m ³ - Full facepiece APR with High efficiency filter ng/m ³ - Supplied air
HEAL	TH EFFECTS	1	FIRS	T AII	D AND DECONTAMINATION
Skin: Irritation pigment Inhalation: Nose ar wheezir Weakne and mu Chronic: Arsenic	a, burns, red and watery eyes a, burns, itching, rash and loss of the difference of the thread irritation with coughing, and hoarseness ess, nausea, vomiting, headache scle cramps and <i>Arsenic compounds</i> cause , lung, and skin cancer in		contact lenses Quickly removing large amount Begin artificial	h large if worn ve conta s of wate respirat	amounts of water for at least 15 minutes. Remove Seek medical attention. minated clothing and wash contaminated skin with



Common Name: CADMIUM

Synonyms: None CAS No: 7440-43-9 Molecular Formula: Cd RTK Substance No: 0305 Description: Soft, blue-white solid, gray-black metal, or gray or white powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Use dry chemicals appropriate for extinguishing metal fires.	Cadmium reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form
3 - Fire	DO NOT USE water, foam, CO ₂ or Halons.	flammable and explosive Hydrogen gas.
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN	Cadmium dust or powder reacts with OXIDIZING
DOT#: UN 2570	FIRE. CONTAINERS MAY EXPLODE IN FIRE	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 154	Use water spray to keep fire-exposed containers	
Hazard Class: 6.1	cool.	AZIDE; AMMONIUM NITRATE; AMMONIA; POTASSIUM; ZINC; SULFUR; SELENIUM; and
(Poison)	Cadmium <i>powder</i> may ignite combustibles (wood, paper and oil).	TELLURIUM to cause fires and explosions.

SPILL/LEAKS

Isolation Distance: 25 meters (75 feet)

Moisten powdered spilled material first or use a HEPAfilter vacuum for clean-up.

Collect solid material in the most convenient and safe manner and deposit in sealed containers.

DO NOT wash into sewer.

PHYSICAL PROPERTIES

Odor Threshold:	None
Flash Point:	Non-combustible solid, flammable powder/dust
Vapor Pressure:	0 mm at Hg 68°F (20°C)
Specific Gravity:	8.65
Water Solubility:	Insoluble
Melting Point:	610°F (321°C)
Boiling Point:	1,409°F (765°C)
Molecular Weight:	112.4

E	XPOSURE LIMITS		PROTECTIVE EQUIPMENT
OSHA: NIOSH: ACGIH: IDLH LEVEL:	0.005 mg/m ³ , 8-hr TWA Lowest feasible concentration 0.01 mg/m ³ , 8-hr TWA (total particulates) 0.002 mg/m ³ , 8-hr TWA (respirable fraction) 9 mg/m ³ (dust or fume)	Gloves: Coveralls: Respirator:	Nitrile or Neoprene DuPont Tyvek® >0.005 mg/m ³ - APR with High efficiency filters >5 mg/m ³ - Supplied air

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Lung irritation with coughing and/or shortness of breath
Chronic:	Nausea, vomiting, Headache, fever and chills, aches and chest tightness Carcinogen (lung and prostate) in humans Teratogen in humans

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.

Medical observation is recommended as symptoms may be delayed.

December 2007



Common Name: CADMIUM ACETATE

Synonyms: Bis(Acetoxy)Cadmium; Cadmium Diacetate CAS No: 543-90-8 Molecular Formula: $C_4H_6CdO_4$ RTK Substance No: 0306 Description: White to colorless, crystalline material

	HAZARD DATA			
Hazard Ratir	ng Firefighting	Reactivity		
4 - Health 0 - Fire 0 - Reactivity DOT#: UN 2570 ERG Guide #: Hazard Class:	Extinguish fire using an agent surrounding fire. Cadmium A not burn. POISONOUS GASES ARE PF including <i>Cadmium Oxide</i> . Use water spray to keep fire-e: 154 Cadmium Acetate may ignite	Suitable for type of Acetate itself doesCadmium Acetate is not compatible with SULFUR; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SELENIUM; TELLURIUM; or STRON- ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and POTASSILIM		
	SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distar	nce:	Odor Threshold: Slightly vinegar odor		
Small Spills: 25	meters (75 feet)	Flash Point: Nonflammable		
Fire: 800 meter	rs (1/2 mile)	Specific Gravity: 2.34 (water =1)		
Moisten spilled i vacuum for clea	material first or use a HEPA-filter	Water Solubility: Soluble		
Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT wash into sewer.		Boiling Point: Decomposes		
		Freezing Point: 493°F (256°C)		
Cadmium Acet	ate is a marine pollutant.	Molecular Weight: 230.5		
EX	POSURE LIMITS	PROTECTIVE EQUIPMENT		
NIOSH: Lowe ACGIH: 0.01 0.002 IDLH: 9 mg.	5 mg/m ³ , 8-hr TWA est feasible concentration mg/m ³ , 8-hr TWA (total particulate) 2 mg/m ³ , 8-hr TWA (respirable fraction) /m ³ f the above are for <i>Cadmium</i>)	Gloves: Nitrile and Neoprene Coveralls: DuPont Tyvek® Respirator: >0.005 mg/m³ - APR with High efficiency filters >0.05 mg/m³ - Supplied air		
HI	EALTH EFFECTS	FIRST AID AND DECONTAMINATION		
Skin: In Inhalation: N cc N Chronic: C ca	ritation ritation ose, throat and lung irritation with bughing and shortness of breath ausea, vomiting, headache, fever and nills, aches, and chest tightness radmium and Cadmium compounds ause lung and prostate cancer in umans	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. 		



Common Name: CADMIUM BROMIDE

Synonyms: Cadmium Dibromide CAS No: 7789-42-6 Molecular Formula: CdBr₂ RTK Substance No: 0307 Description: White to yellowish, odorless, crystalline solid which changes to a powder on exposure to dry air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Cadmium Bromide itself does	A mixture of Cadmium Bromide and POTASSIUM may explode on impact.		
0 - Fire	not burn.	Cadmium Bromide reacts with SULFIDES, and will form		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	Acids in WATER.		
DOT#: UN 2570	including <i>Cadmium Oxide</i> and <i>Hydrogen Bromide</i> . Use water spray to keep fire-exposed containers	Cadmium Bromide is not compatible with SULFURIC		
ERG Guide #: 154	cool.	ACID; ALKALI; AMMONIA; AMINES; AMIDES; EPICHLOROHYDRIN; ISOCYANATES;		
Hazard Class: 6.1	Cadmium Bromide may ignite combustibles	NITROMETHANE; and VINYL ACETATE.		
(Poison)	(wood, paper and oil).			

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 yards) Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

DO NOT wash into sewer.

Toxic to aquatic organisms. Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

OSHA:	0.005 mg/m ³ , 8-hr TWA
NIOSH:	Lowest feasible concentration
ACGIH:	0.01 mg/m ³ , 8-hr TWA (total particulate)
	0.002 mg/m ³ , 8-hr TWA (respirable fraction)
IDLH:	9 mg/m ³
	(All of the above are for Cadmium)

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and shortness of breath
	Nausea, vomiting, headache, fever and chills, aches, and chest tightness
Chronic:	Cadmium and Cadmium compounds cause lung and prostate cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable; dust may be explosive
Specific Gravity:	5.2 (water = 1)
Water Solubility:	Soluble
Boiling Point:	1,585°F (863°C) (decomposes)
Freezing Point:	1,053°F (567°C)
Molecular Weight:	272.22

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene		
Coveralls:	DuPont Tyvek®		
Respirator:	>0.005 mg/m ³ - APR with High efficiency filters >0.05 mg/m ³ - Supplied air		

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CADMIUM CARBONATE

Synonyms: Cadmium Monocarbonate; Otavite; Kalcit CAS No: 513-78-0 Molecular Formula: CdCO₃ RTK Substance No: 4090 Description: White, odorless crystal or powder

			HAZ	ZARD DATA	
Hazard Ra	ating	Firefighting Extinguish fire using an agent suitable for type of surrounding fire. Cadmium Carbonate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Cadmium Oxide. Use water spray to keep fire-exposed containers cool. Cadmium Carbonate may ignite combustibles (wood, paper and oil).			Reactivity Cadmium Carbonate reacts violently with POTASSIUM. Cadmium Carbonate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Cadmium dust may be a fire or explosion hazard when exposed to HEAT; FLAME; SULFUR; SELENIUM; TELLURIUM; AMMONIA; and METALS (such as ZINC and MAGNESIUM).
4 - Health 0 - Fire 0 - Reactivity DOT#: UN 2 ERG Guide # Hazard Clas	2570 #: 154				
	SPIL	L/LEAKS		Р	HYSICAL PROPERTIES
Isolation Distance: Small Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT wash into sewer. May be harmful to the environment.			Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Melting Point: Molecular Weight:	Odorless Nonflammable; dust may explode 4.26 (water =1) Insoluble Decomposes 172.4	
E	EXPOS	URE LIMITS		PR	
NIOSH: L ACGIH: C IDLH: fi PAC (LEVELS: F	Lowest feas 0.01 mg/m ³ 0.002 mg/m fraction) 9 mg/m ³ (di (All of the a	 ³, 8-hr TWA sible concentration ⁵, 8-hr TWA (total particulate) ³, 8-hr TWA (respirable ust or fume) bove are for <i>Cadmium</i>) 15 mg/m³; PAC-2 = 1.2 mg/m³; 		Coveralls: Dul Respirator: >0.	ile and Neoprene Pont Tyvek® 005 mg/m³ - APR with High efficiency filters 05 mg/m³ - Supplied air
	HEALT	'H EFFECTS		FIRST A	ID AND DECONTAMINATION
Eyes:	Irritation		T	Remove the perso	n from exposure.

Remove

and water.

necessary.

contact lenses if worn.

Transfer to a medical facility.

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose, throat and lung irritation with coughing and/or shortness of breath
	Nausea, vomiting, headache, fever and chills, aches, and chest tightness
Chronic:	<i>Cadmium</i> and <i>Cadmium compounds</i> cause lung and prostate cancer in humans

Flush eyes with large amounts of water for at least 15 minutes.

Begin artificial respiration if breathing has stopped and CPR if

Remove contaminated clothing and wash contaminated skin with soap



Common Name: CADMIUM CHLORIDE

Synonyms: Cadmium Dichloride; Caddy CAS No: 10108-64-2 Molecular Formula: CdCl₂ RTK Substance No: 0308

Description: An odorless, colorless, crystalline powder

		F	IAZ	ARD DAT	ΓΑ
Hazard Rat	ting	Firefighting			Reactivity
4 - Health 0 - Fire 0 - Reactivity DOT#: UN 25 ERG Guide # Hazard Class (P	570 : 154	 Extinguish fire using an agent suitable for type of surrounding fire. Cadmium Chloride itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Cadmium Oxide. Use water spray to keep fire-exposed containers cool. Cadmium Chloride may ignite combustibles (wood, paper and oil). 		self does not D IN FIRE, ontainers	Cadmium Chloride reacts violently with BROMIDE TRIFLUORIDE and POTASSIUM. Cadmium Chloride reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SELENIUM; TELLURIUM; SULFUR; and ZINC. Contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and ACID FUMES forms toxic Chlorine gas.
	SPI	LL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Small Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT wash into sewer. Toxic to aquatic organisms and persists in the environment.		V V S M B M	dor Threshold apor Pressure apor Density: pecific Gravit /ater Solubilit oiling Point: elting Point: H: lolecular Weig	re: 10 mm Hg at 1,211°F (656°C) r: 6.3 (air = 1) ity: 3.3 (water =1) ity: Soluble 1,760°F (960°C) 1,054°F (568°C) 3.5 to 5	
E	XPOS			I	PROTECTIVE EQUIPMENT
ACGIH: 0.01 0.002 IDLH: 9 mg/ (All of The Protective	est feasibl mg/m ³ , 8 2 mg/m ³ , /m ³ f the abov e Action (= 0.16 m	8-hr TWA le concentration -hr TWA (total particulate) 8-hr TWA (respirable fraction) we are for <i>Cadmium</i>) Criteria values are: g/m ³ PAC-2 = 1.2 mg/m ³ -3 = 7.6 mg/m ³	С	overalls: espirator:	Nitrile and Neoprene DuPont Tyvek® >0.005 mg/m ³ - APR with High efficiency filters >0.05 mg/m ³ - Supplied air
ŀ	IEAL	TH EFFECTS		FIRST	T AID AND DECONTAMINATION
Skin: Inhalation:	coughing Nausea,	oat and lung irritation with and/or shortness of breath vomiting, headache, fever and hes, and chest tightness n and <i>Cadmium compounds</i> cause	Fi c R B n	ush eyes with l ontact lenses if emove contam	ninated clothing and wash contaminated skin with water. respiration if breathing has stopped and CPR if



Common Name: CADMIUM HYDROXIDE

Synonyms: Cadmium Hydrate CAS No: 21041-95-2 Molecular Formula: CdH₂O₂ RTK Substance No: 4089 Description: White powder

		HAZARD DAT	Ά
Hazard Ra	ating Firefighting		Reactivity
4 - Health 0 - Fire 0 - Reactivity DOT#: UN 2 ERG Guide a Hazard Clas	 Extinguish fire using surrounding fire. C not burn. POISONOUS GASE including Cadmium 2570 Use water spray to Cadmium Hydroxie (wood nappr and c 	keep fire-exposed containers coo de may ignite combustibles	Cadmium dust may be a fire or explosion hazard when exposed to HEAT; FLAME; SULFUR; OXIDIZING AGENTS (such as PERCHLORATES PEROXIDES, PERMANGANATES, CHLORATES NITRATES, CHLORINE, BROMINE and
	SPILL/LEAKS		PHYSICAL PROPERTIES
Fire: 800 me Moisten spille vacuum for o Collect powd and safe ma DO NOT was Severe marir OSHA: (0 NIOSH: L ACGIH: (0 IDLH: S	25 meters (75 feet) eters (1/2 mile) ed material first or use a HEPA-f clean-up. ered material in the most conver inner and deposit in sealed conta sh into sewer.	mient ainers. Boiling Point Freezing Point Molecular We Gloves: Coveralls: Respirator: m)	Nonflammable rity: 4.8 (water =1) lity: Insoluble : No information nt: No information
-	HEALTH EFFECTS	FIRS	T AID AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose, throat and lung irritatio coughing and/or shortness of Nausea, vomiting, headache, chills, aches, and chest tightr Carcinogen - <i>Cadmium</i> and <i>C</i> <i>compounds</i> cause lung and p cancer in humans.	n with breath fever and ess Cadmium prostate	person from exposure. th large amounts of water for at least 15 minutes. s if worn. aminated clothing and wash contaminated skin with soap I respiration if breathing has stopped and CPR if medical facility. rvation is recommended as symptoms may be delayed.



Common Name: CADMIUM NITRATE

Synonyms: Cadmium Dinitrate CAS No: 10325-94-7 Molecular Formula: Cd(NO₃)₂ RTK Substance No: 4088 Description: White, odorless crystal that absorbs moisture from the air

ting Firefighting Extinguish fire using an as surrounding fire. POISONOUS GASES AR including Cadmium Oxide 570 Value water spray to keep for Cadmium Nitrate may ig (wood, paper and oil). 571 SPILL/LEAKS	gent suitat E PRODL and <i>Nitro</i> ire-expose	JCED IN FIRE, ogen Oxides. ed containers cool. ustibles	Reactivity Cadmium Nitrate is highly reactive with COMBUSTIBLES; ORGANIC MATERIALS; and REDUCING AGENTS. Cadmium Nitrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SELENIUM; TELLURIUM; HYDROGEN AZIDE; and HYDRIDES.
Extinguish fire using an ag surrounding fire. POISONOUS GASES AR including <i>Cadmium Oxide</i> Use water spray to keep f Cadmium Nitrate may ig (wood, paper and oil). SPILL/LEAKS	E PRODU and <i>Nitro</i> re-expose	JCED IN FIRE, ogen Oxides. ed containers cool. ustibles	Cadmium Nitrate is highly reactive with COMBUSTIBLES; ORGANIC MATERIALS; and REDUCING AGENTS. Cadmium Nitrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SELENIUM; TELLURIUM; HYDROGEN AZIDE; and HYDRIDES.
Extinguish fire using an ag surrounding fire. POISONOUS GASES AR including <i>Cadmium Oxide</i> Use water spray to keep f Cadmium Nitrate may ig (wood, paper and oil). SPILL/LEAKS	E PRODU and <i>Nitro</i> re-expose	JCED IN FIRE, ogen Oxides. ed containers cool. ustibles	Cadmium Nitrate is highly reactive with COMBUSTIBLES; ORGANIC MATERIALS; and REDUCING AGENTS. Cadmium Nitrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SELENIUM; TELLURIUM; HYDROGEN AZIDE; and HYDRIDES.
		P	
tance:			HYSICAL PROPERTIES
h into sewer. trate may bioaccumulate and is toxic EXPOSURE LIMITS .005 mg/m ³ , 8-hr TWA owest feasible concentration .01 mg/m ³ , 8-hr TWA (total particulate .002 mg/m ³ , 8-hr TWA (respirable framg/m ³ (dust or fume) All of the above are for <i>Cadmium</i>)	to) ction)	Gloves: Nitu Coveralls: Du Respirator: >0.	Odorless Nonflammable Soluble 270°F (132°C) 140°F (59.5°C) :: 236.4 COTECTIVE EQUIPMENT rile and Neoprene Pont Tyvek® .005 mg/m³ - APR with High efficiency filters .05 mg/m³ - Supplied air
AC-3 = 9.9 mg/m ³	· · · · ·	FIRST A	
Irritation Irritation Nose, throat and lung irritation with coughing and/or shortness of breat Nausea, vomiting, headache, fever chills, aches, and chest tightness	and	Remove the perso Flush eyes with lar Remove contact lenses if w Remove contamina and water. Begin artificial resp necessary. Transfer to a medi	on from exposure. rge amounts of water for at least 15 minutes. vorn. ated clothing and wash contaminated skin with soap piration if breathing has stopped and CPR if
	d material first or use a HEPA-filter lean-up. pred material in the most convenient iner and deposit in sealed containers. into sewer. rate may bioaccumulate and is toxic t EXPOSURE LIMITS .005 mg/m ³ , 8-hr TWA owest feasible concentration .01 mg/m ³ , 8-hr TWA (total particulate .002 mg/m ³ , 8-hr TWA (total particulate .002 mg/m ³ , 8-hr TWA (respirable frac mg/m ³ (dust or fume) All of the above are for <i>Cadmium</i>) AC-1 = 0.21 mg/m ³ ; PAC-2 = 1.6 mg/m AC-3 = 9.9 mg/m ³ HEALTH EFFECTS Irritation Irritation Irritation Nose, throat and lung irritation with coughing and/or shortness of breath Nausea, vomiting, headache, fever chills, aches, and chest tightness <i>Cadmium</i> and <i>Cadmium compound</i> cause lung and prostate cancer in	d material first or use a HEPA-filter lean-up. pred material in the most convenient inner and deposit in sealed containers. in into sewer. rate may bioaccumulate and is toxic to EXPOSURE LIMITS 005 mg/m ³ , 8-hr TWA owest feasible concentration 01 mg/m ³ , 8-hr TWA (total particulate) 002 mg/m ³ , 8-hr TWA (total particulate) 002 mg/m ³ , 8-hr TWA (respirable fraction) mg/m ³ (dust or fume) All of the above are for <i>Cadmium</i>) AC-1 = 0.21 mg/m ³ ; PAC-2 = 1.6 mg/m ³ ; AC-3 = 9.9 mg/m ³ HEALTH EFFECTS Irritation Irritation Nose, throat and lung irritation with coughing and/or shortness of breath Nausea, vomiting, headache, fever and chills, aches, and chest tightness <i>Cadmium</i> and <i>Cadmium compounds</i> cause lung and prostate cancer in	d material first or use a HEPA-filter lean-up.Water Solubility: Boiling Point: Melting Point: Melting Point: Molecular Weightered material in the most convenient iner and deposit in sealed containers. in into sewer. rate may bioaccumulate and is toxic toMelting Point: Melting Point: Molecular WeightEXPOSURE LIMITS 005 mg/m³, 8-hr TWA owest feasible concentration 0.002 mg/m³, 8-hr TWA (total particulate) 0.002 mg/m³, 8-hr TWA (total particulate) 0.002 mg/m³, 8-hr TWA (respirable fraction) mg/m³ (dust or fume) MI of the above are for Cadmium) AC-1 = 0.21 mg/m³; PAC-2 = 1.6 mg/m³; AC-3 = 9.9 mg/m³FIRST AIrritation Irritation Irritation Nose, throat and lung irritation with coughing and/or shortness of breath Nausea, vomiting, headache, fever and chills, aches, and chest tightness Cadmium and Cadmium compounds cause lung and prostate cancer in bummansFirst on media



Common Name: CADMIUM OXIDE

Synonyms: Cadmium Monoxide CAS No: 1306-19-0 Molecular Formula: CdO RTK Substance No: 2200 Description: Odorless, white powder or a red or brown crystal

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Cadmium Oxide itself does	Cadmium Oxide reacts violently with MAGNESIUM, ALUMINUM, and AMMONIUM PERCHLORATE, when
0 - Fire	not burn.	heated, to cause fires and explosions.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Cadmium</i> .	Cadmium Oxide explodes or ignites on contact with HYDRAZINIUM NITRATE; HYDROGEN PEROXIDE;
DOT#: UN 2570	Use water spray to keep fire-exposed containers	HYDROGEN SULFIDES; and LITHIUM.
ERG Guide #: 154	cool. Cadmium Oxide may ignite combustibles	Cadmium Oxide is not compatible with PHOSPHORUS; SULFUR; SULFUR OXIDES; SELENIUM; and ZINC.
Hazard Class: 6.1 (Poison)	(wood, paper and oil).	Contact with ACIDS releases flammable and explosive Hydrogen gas.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

DO NOT wash into sewer.

Bioaccumulation may occur in plants and seafood.

Severe marine pollutant.

Eyes:

EXPOSURE LIMITS

OSHA:	0.005 mg/m³, 8-hr TWA
NIOSH:	Lowest feasible concentration
ACGIH:	0.01 mg/m ³ , 8-hr TWA (total particulate)
	0.002 mg/m ³ , 8-hr TWA (respirable fraction)
IDLH:	9 mg/m ³ (dust or fume)
	(All of the above are for Cadmium)
PAC LEVELS:	PAC-1 = 0.11 mg/m ³ ; PAC-2 = 0.87 mg/m ³ ; PAC-3 = 5.4 mg/m ³

HEALTH	EFFECTS
Irritation	
Invitation	

Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and shortness of breath
	Nausea, vomiting, headache, fever and chills, aches and chest tightness
Chronic:	Cadmium and Cadmium compounds cause lung and prostate cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	1 mm Hg at 1,832°F (1,000°C)
Specific Gravity:	8.15 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	2,838°F (1,559°C)
Melting Point:	1,652° to 1,832°F (900° to 1,000°C)
Molecular Weight:	128.4

PROTECTIVE EQUIPMENT

Gloves:	Neoprene or Nitrile
Coveralls:	DuPont Tyvek®
Respirator:	>0.005 mg/m ³ - APR with High efficiency filters >0.05 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

 $\ensuremath{\textit{Remove}}$ contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CADMIUM STEARATE

Synonyms: Alaixol 11; Cadmium Distearate CAS No: 2223-93-0 Molecular Formula: $C_{26}H_{72}CdO_4$ RTK Substance No: 2201 Description: White powder with a slight fatty odor

		HAZARD DATA	
Hazard R	ating Firefighting		Reactivity
4 - Health 0 - Fire 0 - Reactivi DOT#: UN ERG Guide Hazard Cla	ty POISONOUS GASI including <i>Cadmium</i> 2570 Use water spray to #: 154 (wood paper and c	keep fire-exposed containers cool. may ignite combustibles	<i>Cadmium dust</i> may be a fire or explosion hazard when exposed to HEAT; FLAME; SULFUR; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES NITRATES, CHLORINE, BROMINE and FLUORINE); SELENIUM, TELLURIUM, AMMONI/ and METALS (such as ZINC, POTASIUM and MAGNESIUM).
	SPILL/LEAKS		PHYSICAL PROPERTIES
Fire: 800 m Moisten spil vacuum for Collect pow and safe m DO NOT wa	: 25 meters (75 feet) eters (1/2 mile) led material first or use a HEPA-1	nient ainers. Boiling Point: Freezing Point: Molecular Weigl Gloves: Coveralls: Respirator: >	Nonflammable : 1.21 (water =1) : Insoluble 1,413°F (767°C) 22.3°F (106°C)
	HEALTH EFFECTS	FIRST	AID AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose, throat and lung irritatio coughing and/or shortness of Nausea, vomiting, headache, chills, aches, and chest tightr <i>Cadmium</i> and <i>Cadmium com</i> cause lung and prostate cano humans	Image: height with breath fever and essFlush eyes with I Remove contact lenses if Remove contami and water. Begin artificial re necessary. Transfer to a me	inated clothing and wash contaminated skin with soap spiration if breathing has stopped and CPR if



Common Name: CADMIUM SULFATE

Synonyms: Cadmium Monosulfate CAS No: 10124-36-4 Molecular Formula: CdSO₄ RTK Substance No: 3073 Description: White or colorless, odorless, crystalline solid

	HAZARD DATA					
Hazard Rating	Firefighting	Reactivity				
4 - Health	Extinguish fire using an agent suitable for type of	Cadmium Sulfate reacts violently with finely divided ALUMINUM; MAGNESIUM; CARBON DUST; and				
0 - Fire surrounding fire. Cadmium Sulfate itself does r burn.		POTASSIUM.				
		Cadmium Sulfate is not compatible with SULFUR;				
DOT#: UN 2570	including <i>Cadmium Oxide</i> and <i>Sulfur Oxides</i> . Use water spray to keep fire-exposed containers	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); TELLURIUM; SELENIUM; and ZINC.				
ERG Guide #: 154	cool.					
Hazard Class: 6.1 (Poison)	Cadmium Sulfate may ignite combustibles (wood, paper and oil).					

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)
Fire: 800 meters (1/2 mile)
Moisten spilled material first or use a HEPA filter vacuum for clean up.
Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
DO NOT wash into sewer.
May be toxic to aquatic organisms

Hazardous and persists in the environment.

EXPOSURE LIMITS

OSHA:	0.005 mg/m³, 8-hr TWA
NIOSH:	Lowest feasible concentration
ACGIH:	0.01 mg/m ³ , 8-hr TWA (total particulate)
	0.002 mg/m ³ , 8-hr TWA (respirable fraction)
IDLH:	9 mg/m ³
	(All of the above are for Cadmium)
PAC	PAC-1 = 0.19 mg/m ³ ; PAC-2 = 1.4 mg/m ³ ;
LEVELS:	PAC-3 = 8.7 mg/m ³

НΕΛ	і ты	EEE	ECTS
пеа		EFF	ECIJ

	Eyes:	Irritation
	Skin:	Irritation
Inhalation:		Nose, throat and lung irritation with coughing and shortness of breath
		Nausea, vomiting, headache, fever and chills, aches, and chest tightness
	Chronic:	Cadmium and Cadmium compounds cause lung and prostate cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless		
Flash Point:	Nonflammable		
Vapor Density:	3.08 (air = 1)		
Vapor Pressure:	1 mm Hg at 741°F (394°C)		
Specific Gravity:	4.69		
Water Solubility:	Soluble		
Boiling Point:	Decomposes		
Melting Point:	1,832°F (1,000°C)		
Molecular Weight:	208.5		

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene
Coveralls:	DuPont Tyvek®
Respirator:	>0.005 mg/m ³ - APR with High efficiency filters >0.05 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Right to Know Hazardous Substance Fact Sheet

Common Name: CADMIUM SULFIDE

Synonyms: Cadmium Monosulfide; Cadmium Yellow; Orange Cadmium CAS No: 1306-23-6 Molecular Formula: CdS RTK Substance No: 3081 Description: Odorless, lemon yellow to orange crystal or yellow to brown powder

		НА	ZARD DATA	
Hazard R	ating	Firefighting		Reactivity Cadmium Sulfide reacts with WATER; MOISTURE
4 - Health 1 - Fire 0 - Reactivi DOT#: UN ERG Guide Hazard Cla	2570 #: 154	Use dry chemical, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Cadmium Oxide</i> and <i>Sulfur Oxides</i> . Use water spray to keep fire-exposed containers cool.		STEAM or STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to produce toxic and flammable <i>Hydrogen Sulfide gas</i> Cadmium Sulfide reacts violently or explosively with IODINE MONOCHLORIDE and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
	SPII	LL/LEAKS	P	HYSICAL PROPERTIES
SPILL/LEAKS Isolation Distance: Small Spills: 25 meters (75 feet) Collect powdered material in the most convenient and safe manner and deposit in sealed containers. Hazardous to the environment and persists in the environment. Marine pollutant. EXPOSURE LIMITS OSHA: 0.005 mg/m³, 8-hr TWA NIOSH: Lowest feasible concentration ACGIH: 0.01 mg/m³, 8-hr TWA (total particulate) 0.002 mg/m³, 8-hr TWA (total particulate) 0.002 mg/m³, 8-hr TWA (total particulate) 0.002 mg/m³, 8-hr TWA (total particulate) 0.101 mg/m³, 8-hr TWA (respirable fraction) IDLH: 9 mg/m³ PAC-1 = 0.13 mg/m³; PAC-2 = 0.98 mg/m³;		 ial in the most convenient and sit in sealed containers. comment and persists in the CURE LIMITS n³, 8-hr TWA sible concentration ³, 8-hr TWA (total particulate) n³, 8-hr TWA (respirable fraction) above are for <i>Cadmium</i>) 	Gloves: Nit Coveralls: Du Respirator: >0	Odorless Nonflammable 4.5 to 4.8 (water = 1) Insoluble 1,796°F (980°C) T 145 COTECTIVE EQUIPMENT rile and Neoprene Pont Tyvek® .005 mg/m ³ - APR with High efficiency filters .05 mg/m ³ - Supplied air
	HEALT	TH EFFECTS	FIRST A	AID AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	coughin Nausea chills, ao <i>Cadmiu</i>	nroat and lung irritation with g and/or shortness of breath , vomiting, headache, fever and ches, and chest tightness <i>m</i> and <i>Cadmium compounds</i> ung and prostate cancer in	Remove contact lenses if w Remove contamin and water. Begin artificial res necessary. Transfer to a med	rge amounts of water for at least 15 minutes. worn. ated clothing and wash contaminated skin with soap piration if breathing has stopped and CPR if



Common Name: CALCIUM

Synonyms: Atomic Calcium; Elemental Calcium CAS No: 7440-70-2 Molecular Formula: Ca RTK Substance No: 0309 Description: Odorless, soft, silvery-white, metallic solid

HAZARD D				ΔΤΑ	
Hazard Rating	Firefighting		Reactivi	ty	
3 - Health 1* - Fire 2-W - Reactivity DOT#: UN 1401 ERG Guide #: 138 Hazard Class: 4.3 (Water Reactive)	 *Calcium in bulk form is not flammable, but <i>finely divided</i> Calcium is FLAMMABLE and REACTIVE with AIR, MOIST AIR and WATER. Use dry chemical, soda ash, lime, or sand as extinguishing agents. DO NOT USE WATER, CO₂ OR FOAM. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool. DO NOT GET WATER INSIDE CONTAINERS. <i>Finely divided</i> Calcium may form an ignitable vapor/air mixture in closed tanks or containers. 		MOISTUR HYDROCI flammable Finely divid HALOGEN Contact wit HYDROXI AGENTS HYDRIDE ASH) may Calcium is PERCHLO CHLORAT MERCUR	an react violently with WATER, STEAM, RE and STRONG ACIDS (such as HLORIC, SULFURIC and NITRIC) to form and explosive <i>Hydrogen gas.</i> <i>ded</i> Calcium can ignite in AIR or in the presence of NS (such as CHLORINE and FLUORINE). th STRONG BASES (such as SODIUM IDE and POTASSIUM HYDROXIDE); REDUCING (such as LITHIUM, SODIUM, ALUMINUM and their S); and CARBONATES (such as LIME and SODA result in explosions. a not compatible with OXIDIZING AGENTS (such as DRATES, PEROXIDES, PERMANGANATES, FES, NITRATES); METALS (such as LEAD and Y); METAL OXIDES; METAL SALTS; DINITROGEN KIDE; SILICON; and AMMONIA.	
SPI	LL/LEAKS			PH	YSICAL PROPERTIES
 Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Cover with dry sand, earth, or a similar material and place into dry, sealed containers for disposal. DO NOT wash into sewer. Calcium is dangerous to aquatic life at high concentrations. 		a 1	Odor Three Flash Poin Auto Igniti Vapor Pres Specific G Water Solu Boiling Po Melting Po Molecular	t: on Temp: ssure: ravity: ibility: int: int:	Odorless Flammable (when <i>finely divided</i>) 1,454 <u>+</u> 18°F (790 <u>+</u> -8°C) 10 mm Hg at 1,801°F (983°C) 1.54 (water = 1) Reacts 2,703°F (1,484°C) 1,548°F (842°C) 40.1
EXPO	SURE LIMITS			PRO	TECTIVE EQUIPMENT

Gloves:

Coveralls:

No occupational exposure limits have been established for Calcium.

The Protective Action Criteria values are: PAC-1 = 30 mg/m^3 $PAC-2 = 50 \text{ mg/m}^{3}$ $PAC-3 = 250 \text{ mg/m}^3$

HEALTH EFFECTS

- Eyes: Irritation and burns Skin: Irritation and burns
- Inhalation: Nose and throat irritation with coughing and wheezing

Respirator: Full facepiece APR with P95 filters >30 mg/m³ - SCBA

Nitrile and Natural Rubber

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Tyvek®

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: CALCIUM ARSENATE

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Calcium Arsenate itself does	Calcium Arsenate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	not burn.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 1573	including <i>Arsenic Oxides</i> . Use water spray to keep fire-exposed containers cool.	HYDROGEN gas and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) can react with <i>inorganic Arsenic</i> to form highly toxic <i>Arsine gas</i> .
ERG Guide #: 151		
Hazard Class: 6.1 (Poison)		Water solutions of Calcium Arsenate in contact with ACTIVE METALS (such as IRON, ALUMINUM and ZINC) may release highly toxic <i>Arsenic fumes</i> and
		Arsine gas.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit in sealed containers.

DO NOT wash into sewer.

Hazardous to the environment, especially to water organisms.

EXPOSURE LIMITS

OSHA:	0.01 mg/m ³ , 8-hr TWA
NIOSH:	0.002 mg/m ³ , 15-min Ceiling
ACGIH:	0.01 mg/m ³ , 8-hr TWA
IDLH:	5 mg/m ³
	(All of the above are for <i>inorganic Arsenic</i>)

HEALTH EFFECTS

Eyes:	Irritation, burns, red and watery eyes	
Skin:	Irritation, burns, itching, rash and loss of pigment	
Inhalation:	Nose and throat irritation with coughing, wheezing, and hoarseness	
	Weakness, nausea, vomiting, headache and muscle cramps	
Chronic:	Arsenic compounds cause skin, lung and liver cancer in humans	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	3.62 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	Decomposes
Melting Point:	2,651°F (1,455°C)
Molecular Weight:	398.1

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	<0.1 mg/m ³ - Full facepiece APR with High efficiency filter <0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: CALCIUM CARBIDE

Synonyms: Acetylenogen; Calcium Acetylide CAS No: 75-20-7 Molecular Formula: CaC₂ RTK Substance No: 0312

Description: Grayish-black lump or crystalline powder with a garlic-like odor

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
3 - Health 3 - Fire	FLAMMABLE AND WATER REACTIVE When Calcium Carbide is exposed to WATER or MOISTURE it forms	Calcium Carbide reacts with WATER and MOISTURE to produce flammable <i>Acetylene gas</i> and <i>Lime</i> . The heat of the reaction may ignite the <i>Acetylene</i> .		
2-W - Reactivity	flammable Acetylene gas. Use approved Class D extinguishers or	Calcium Carbide reacts with COPPER, SILVER, MERCURY and BRASS to form explosive compounds such as METAL ACETYLIDES.		
ERG Guide #: 138 Hazard Class: 4.3 (Water Reactive/ Dangerous When Wet)	 smother with dry sand, dry clay or dry ground limestone. DO NOT USE WATER, CO₂ or FOAM as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Calcium Oxides</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray only to keep fire-exposed containers cool. 	Calcium Carbide is not compatible with METHANOL; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID FUMES; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and METAL SALTS and METAL OXIDES (such as IRON CHLORIDE and IRON OXIDE).		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Cover with dry lime, sand or soda ash and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Calcium Carbide**. DO NOT USE WATER OR WET METHOD.

DO NOT USE WATER OR WET METHOD.

Keep **Calcium Carbide** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

Calcium Carbide is harmful to aquatic life at low concentrations.

EXPOSURE LIMITS

No occupational exposure limits have been established for Calcium Carbide.

The Protective Action Criteria values are: PAC-1 = 120 mg/m^3 PAC-2 = $1,300 \text{ mg/m}^3$ PAC-3 = $7,900 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation, rash and burning feelingInhalation:Mouth, nose, throat and lung irritation
with coughing and severe shortness of
breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Garlic-like odor
Flash Point:	Flammable solid
LEL:	2.5% (for Acetylene gas)
UEL:	82% (for Acetylene gas)
Auto Ignition Temp:	617°F (325°C)
Specific Gravity:	2.22 (water = 1)
Water Solubility:	Reacts
Melting Point:	4,172°F (2,300°C)
Molecular Weight:	64.1

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber	
Coveralls:	DuPont Tyvek®	
Respirator:	>30 mg/m ³ - SCBA	
	Use SCBA at any level if Acetylene gas may be present	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility. Medical observation is recommended as symptoms may be delayed.



Common Name: CALCIUM CARBONATE

Synonyms: Calcium Salt of Carbonic Acid, Chalk, Limestone CAS No: 1317-65-3 Molecular Formula: CaCO₃ RTK Substance No: 4001 Description: White to tan odorless powder or colorless crystals

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
1 - Health	Calcium Carbonate is non-combustible,	Calcium Carbonate ignites on contact with FLUORINE.	
0 - Fire	but when heated, decomposes to emit an acrid smoke and irritating vapors.	Calcium Carbonate when heated with mixture of magnesium and hydrogen causes violent explosion.	
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Calcium Carbonate is not compatible with ACIDS, ALUMINUM, AMMONIUM SALTS, FLUORINE and MAGNESIUM and HYDROGEN.	

SPILL/LEAKS	P	HYSICAL PROPERTIES
Isolation Distance:	Vapor Pressure:	0 mm Hg
Spill: 25 meters (75 feet)	Specific Gravity:	2.7% - 2.9%
Fire: 800 meters (1/2 mile)	Water Solubility:	0.001%
Line down wethodo to control duct. Toot for troop	Boiling Point:	Decomposes
Use damp methods to control dust. Test for trace levels of radioactivity after clean-up.	Melting Point:	1,517°F – 2,442°F (Decomposes)
Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal. DO NOT wash into sewer.	Molecular Weight:	100.1

EXPOSURE LIMITS

OSHA: 15 mg/m³ (total particulate) 5 mg/m³ (respirable fraction) averaged over an 8-hour workshift

NIOSH: 10 mg/m³ (total particulate) 5 mg/m³ (respirable fraction) averaged over a 10-hour workshift

The Protective Action Criteria values are:

 $PAC-1 = 45 \text{ mg/m}^3$

- $PAC-2 = 500 \text{ mg/m}^3$
- PAC-3 = 3,000 mg/m³

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation Inhalation: Cough speezing rbinorrhea (dischare)

Inhalation: Cough, sneezing, rhinorrhea (discharge of nasal mucus)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile
Coveralls:	DuPont Tyvek®
Respirator:	> 5 mg/m ³ - N95 or higher
	>45 mg/m ³ – Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

INFORMATION FOR EMERGENCY RESPONDERS

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Common Name: CALCIUM CHROMATE

Synonyms: C.I. Pigment Yellow 33; Calcium Chrome Yellow CAS No: 13765-19-0 Molecular Formula: CaCrO RTK Substance No: 0315 Description: Odorless yellow, crystalline powder

HAZARD DATA		
Firefighting	Reactivity	
 Extinguish fire using an agent suitable for type of surrounding fire. Calcium Chromate itself does not burn. Calcium Chromate is not combustible but it is a STRONG OXIDIZER which enhances the combustion of other substances. POISONOUS GASES ARE PRODUCED IN FIRE, including Chromium fumes. Use water spray to keep fire-exposed containers cool. Calcium Chromate may ignite combustibles 	Calcium Chromate reacts explosively with HYDRAZINE. Calcium Chromate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ORGANIC MATTER; ALUMINUM; SULFUR; BORON; and ETHANOL. Store in tightly closed containers in a cool, well-ventilated area away from PLASTICS and COMBUSTIBLES.	
	Firefighting Extinguish fire using an agent suitable for type of surrounding fire. Calcium Chromate itself does not burn. Calcium Chromate is not combustible but it is a STRONG OXIDIZER which enhances the combustion of other substances. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chromium fumes</i> . Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

EXPOSURE LIMITS

- **OSHA:** 0.1 mg/m³, Ceiling (as *Chromates*)
- **NIOSH:** 0.001 mg/m³, 10-hr TWA (as *Chromates*)
- **ACGIH:** 0.001 mg/m³, 8-hr TWA
- **IDLH:** 15 mg/m³ (as *Chromates*)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns, itching and ulcers
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	Hexavalent Chromium or Chromium VI compounds cause lung cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Density:	2.89 (air = 1)
Vapor Pressure:	<1 mm Hg at 68°F (20°C)
Specific Gravity:	2.9 (water = 1)
Water Solubility:	Slightly soluble
Melting Point:	392°F (200°C) (dihydrate)
Molecular Weight:	156.1

	PROTECTIVE EQUIPMENT
Gloves: Coveralls:	Butyl, Nitrile, Silver Shield®/4H® and Viton
Coveraits.	Tyvek®
Respirator:	>0.001 mg/m ³ - APR with High efficiency filter >0.01 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: CALCIUM NITRATE

Synonyms: Calcium Saltpeter; Lime Nitrate; Nitrocalcite CAS No: 10124-37-5 Molecular Formula: Ca(NO₃)₂ RTK Substance No: 0324

Description: White to gray, odorless, crystalline or granular solid

HAZARD DATA

<u></u>			
Hazard Rating	Firefighting	Reactivity	
2 - Realth STRONG OXIDIZER that enhances the P 0 - Fire combustion of other substances. A		Mixtures of Calcium Nitrate with ALKYL ESTERS; PHOSPHORUS; TIN CHLORIDE; and REDUCING	
		AGENTS (such as LITHIUM, SODIUM, ALUMINUM and	
3 - Reactivity	Use water in flooding quantities or extinguish fire	their HYDRIDES) may result in fires and explosions.	
	using an agent suitable for type of surrounding fire.	Calcium Nitrate reacts with WATER to release heat.	
DOT#: UN 1454	POISONOUS GASES ARE PRODUCED IN FIRE,	Calcium Nitrate is not compatible with STRONG ACIDS	
ERG Guide #: 140	including Nitrogen Oxides.	(such as HYDROCHLORIC, SULFURIC and NITRIC); METAL SALTS; and COMBUSTIBLES.	
Hazard Class: 5.1	Use water spray to keep fire-exposed containers cool.		
(Oxidizer)	Calcium Nitrate may ignite combustibles (wood,		
	paper and oil).		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

PAC-1 = 0.91 mg/m³

 $PAC-2 = 10 \text{ mg/m}^3$

 $PAC-3 = 60 \text{ mg/m}^3$

HE	EAL	TH.	EFF	FEC1	ГS

Eyes:	Irritation and burns		
Skin:	Irritation and burns		
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath		
	Headache, dizziness, nausea and vomiting		

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	2.5 (water = 1)
Water Solubility:	Soluble
Melting Point:	1,042°F (561°C)
Molecular Weight:	164.1

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.91 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: CALCIUM SILICIDE

Synonyms: Calcium Disilicide; Calcium Silicon CAS No: 12013-56-8 Molecular Formula: CaSi₂ RTK Substance No: 0332 Description: Gray to black or brown, powder or chip with a repulsive odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
1 - Health	FLAMMABLE AND REACTIVE WATER REACTIVE	Calcium Silicide reacts violently and/or explosively with WATER, STEAM, MOIST AIR, and FLUORINE.		
3 - Fire 2 -W - Reactivity	Use sand, soda ash, lime or dry chemicals appropriate for extinguishing metal fires. DO NOT USE WATER or FOAM.	Calcium Silicide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form self-igniting and toxic <i>Silane gas</i> .		
DOT#: UN 1405 ERG Guide #: 138	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Silicon Oxides</i> and <i>Hydrogen</i> .	Calcium Silicide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
Hazard Class: 4.3 (Water Reactive)	CONTAINERS MAY EXPLODE IN FIRE. DO NOT get water into containers.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); BORON; and IODINE.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Cover with dry lime, sand or soda ash and place into sealed containers for disposal.

DO NOT USE WATER OR WET METHOD.

Keep Calcium Silicide out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

No occupational exposure limits have been established for Calcium Silicide.

PHYSICAL PROPERTIES

Odor Threshold:	Repulsive odor
Flash Point:	Flammable
Auto Ignition Temp:	1,472°F (800°C)
Specific Gravity:	2.5 (water = 1)
Water Solubility: Decomposes in hot water	
Melting Point:	1,292° to 1,715°F (700° to 935°C)
Molecular Weight:	96.25

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Polyvinyl Chloride

Coveralls: Tyvek®

Respirator: SCBA

	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes:	Irritation	Remove the person from exposure.
Skin: Inhalation:	Irritation Nose, throat and lung irritation	Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
initialation.	Nose, undat and ung initation	Remove contaminated clothing and wash contaminated skin with soap and water.
		Begin artificial respiration if breathing has stopped and CPR if necessary.
		Transfer promptly to a medical facility.



Common Name: CAPROLACTAM

breath

Nose, throat and lungs irritation with

coughing, wheezing and shortness of

Headache and convulsions (seizures)

Inhalation:

Synonyms: 1,6-Hexolactam; 2-Oxohexamethyleneimine CAS No: 105-60-2 Molecular Formula: C₆H₁₁NO RTK Substance No: 0337 Description: White flake or crystalline solid with an unpleasant odor, or when molten a colorless or milky-white liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
2 - Health	Caprolactam may burn, but does not readily ignite.	Caprolactam may react violently with a mixture of		
	Use dry chemical, CO ₂ , water spray or foam as	ACETIC ACID and DINITROEN TRIOXIDE.		
1 - Fire	extinguishing agents.	Caprolactam is not compatible with OXIDIZING AGENTS		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	(such as PERCHLORATES, PEROXIDES,		
DOT#: NA 3082	including <i>Nitrogen Oxides</i> and <i>Ammonia</i> . Use water spray to keep fire-exposed containers	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG		
ERG Guide #: 171	cool.	BASES (such as SODIUM HYDROXIDE and		
Hazard Class: 9				
(Miscellaneous		HYDROCARBONS (such as METHYLENE CHLORIDE and TRICHLOROETHYLENE); and ALKALI METALS		
Hazardous Material)		(such as LITHIUM, SODIUM and POTASSIUM).		

SPILL/LEAKS	PHYSIC	AL PROPERTIES
 Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Absorb <i>molten</i> Caprolactam with fly ash, cement powder or commercial sorbent and place into sealed containers for disposal. Moisten spilled <i>solid</i> material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. DO NOT wash into sewer. Caprolactam may be hazardous to the environment, especially to aquatic organisms. 	Flash Point:257°fLEL:1.4%UEL:8%Auto Ignition Temp:707°fVapor Density:3.9 (aVapor Pressure:0.001Specific Gravity:1.02Water Solubility:HighlBoiling Point:513°fMelting Point:156°f	F (375°C) air = 1) 1 mm Hg at 68°F (20°C) (water = 1) y soluble and hygroscopic F (267°C) F (69°C) f° F (507°C)
EXPOSURE LIMITS	PROTECT	
NIOSH: 1 mg/m ³ (<i>solid</i>), 10-hr TWA; 3 mg/m ³ STEL	Gloves: Neoprene	

NIOSH: 1 mg/m ³ (solid), 10-hr TWA; 3 mg/m ³ STEL	Gloves:	Neoprene
NIOSH: 0.22 ppm (<i>vapor</i>), 10-hr TWA; 0.66 ppm STEL	Coveralls:	Tyvek®
ACGIH: 5 mg/m ³ , 8-hr TWA		>1 mg/m ³ solid or >0.22 ppm vapor - full facepiece APR
The Protective Action Criteria values are: PAC-1 = 3 mg/m^3 PAC-2 = 20 mg/m^3		with Organic vapor cartridges and N95 prefilters
PAC-1 = 3 mg/m ³ PAC-3 = 20 mg/m ³	Respirator:	>3 mg/m ³ solid or >0.66 ppm vapor - SCBA
HEALTH EFFECTS	FIRS	ST AID AND DECONTAMINATION
Eyes: Irritation and burns	Remove the p	erson from exposure.
Skin: Irritation and burns	Flush eyes with large amounts of water for at least 15 minutes. Remove	

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: CAPTAFOL

Synonyms: None CAS No: 2425-06-1 Molecular Formula: $C_{10}H_9CI_4NO_2S$ RTK Substance No: 0338

Description: Colorless to pale yellow or tan, crystalline solid or powder with a strong odor

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
3 - Health	Captafol does not burn, however, it is often dissolved in a liquid carrier which may be	Captafol reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).	
0 - Fire	flammable or combustible.	Captafol is not compatible with STRONG ACIDS (such as	
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	HYDROCHLORIC, SULFURIC and NITRIC); ACID VAPORS; ACID CHLORIDES; ACID ANHYDRIDES; and	
DOT#: None	POISONOUS GASES ARE PRODUCED IN	OXIDIZING AGENTS (such as PERCHLORATES,	
ERG Guide #: None	FIRE, including Sulfur Oxides, Nitrogen Oxides,	PEROXIDES, PERMANGANATES, CHLORATES,	
Hazard Class: None	Hydrogen Chloride and Phosgene.	NITRATES, CHLORINE, BROMINE and FLUORINE).	

PHYSICAL PROPERTIES	
Flash Point:	Noncombustible (solid)
Vapor Density:	1.2 (air = 1)
Vapor Pressure:	8.3 x 10 ^{.9} at 68 °F (20 °C)
Boiling Point:	Decomposes
Melting Point:	321 °F (162 °C) (Decomposes)
Molecular Weight:	349.06
	Flash Point: Vapor Density: Vapor Pressure: Boiling Point: Melting Point:

EXPOSURE LIMITS	PROTECTIVE EQUIPMENT	
NIOSH: 0.1 mg/m ³ , 10-hr TWA	Gloves:	Nitrile and Neoprene
ACGIH: 0.1 mg/m ³ , 8-hr TWA	Coveralls:	Tyvek®
	Respirator:	>0.1 mg/m ³ - SCBA

HEALTH EFFECTS		FIF
Eyes: Skin: Inhalation:	Irritation Irritation, rash, dryness and redness. Nose and throat irritation with coughing and wheezing	 Remove the Flush eyes contact lens Quickly rem
Chronic:	Cancer (kidney, liver, small intestine) in animals	large amour Begin artific Transfer pro

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: CAPTAN

Synonyms: Captane; Orthocide; Vanicide CAS No: 133-06-2 Molecular Formula: C₉H₈Cl₃NO₂S RTK Substance No: 0339 Description: White, odorless, crystalline solid when pure or cream to yellow powder with a strong odor (technical grade)

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
2 - Health	Pure Captan does not burn, however it is often dissolved in a liquid carrier which may be	Captan is not compatible with STRONG ALKALIES (such as LIME); TETRAETHYL PYROPHOSPHATE; OIL	
0 - Fire	flammable or combustible.	SPRAYS; and PARATHION.	
1 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Captan may react with WATER to form <i>Hydrogen</i> Chloride gas.	
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE,	Captan is corrosive to METALS in the presence of	
ERG Guide #: 171	including Sulfur Oxides, Nitrogen Oxides,	MOISTURE.	
Hazard Class: 9	Hydrogen Chloride and Phosgene.		
(miscellaneous/ hazardous material)	Use water spray to keep fire-exposed containers cool.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. May be hazardous to aquatic and soil organisms.

EXPOSURE LIMITS

NIOSH: ACGIH: 5 mg/m³, 10-hr TWA 5 mg/m³, 8-hr TWA (as the inhalable fraction)

HEALTH EFFECTS

Eyes:IrritationSkin:Irritation, skin rash and itchingInhalation:Nose and throat irritationHeadache, dizziness, nausea and
vomiting

PHYSICAL PROPERTIES

Vapor Pressure:0 mm Hg at 68°F (20°C)Specific Gravity:1.74 (water = 1)Water Solubility:Very slightly solubleBoiling Point:DecomposesMelting Point:352°F (178°C)	Odor Threshold:	Odorless (when pure)
Water Solubility:Very slightly solubleBoiling Point:DecomposesMelting Point:352°F (178°C)	Vapor Pressure:	0 mm Hg at 68°F (20°C)
Boiling Point:DecomposesMelting Point:352°F (178°C)	Specific Gravity:	1.74 (water = 1)
Melting Point: 352°F (178°C)	Water Solubility:	Very slightly soluble
	Boiling Point:	Decomposes
	Melting Point:	352°F (178°C)
Molecular Weight: 300.6	Molecular Weight:	300.6

	PROTECTIVE EQUIPMENT
Gloves:	Rubber or Nitrile
Coveralls:	DuPont Tyvek® or equivalent
Respirator:	>5 mg/m ³ - Full facepiece APR with Organic vapor cartridge and High efficiency pre-filters
	>50 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Transfer to a medical facility.



Right to Know Hazardous Substance Fact Sheet

Common Name: CARBON BLACK

Synonyms: C.I. Pigment Black 7; Channel Black; Lamp Black, Furnace Black CAS No: 1333-86-4 Molecular Formula: Mixture RTK Substance No: 0342 Description: Black, odorless, finely divided powder

Hazard Rating	Firefighting	Reactivity
3 - Health	Carbon Black is a COMBUSTIBLE SOLID, which may contain <i>flammable Hydrocarbons</i> .	Finely dispersed particles may form explosive mixtures in air.
1 - Fire	Use dry chemical, CO ₂ , water spray or foam as	
0 - Reactivity	extinguishing agents.	Carbon Black is not compatible with OXIDIZING
DOT#: UN 1361	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 133	cool.	CHLORINE, BROMINE and FLUORINE).
Hazard Class: 4.2		
(Spontaneously		
combustible)		

SPILL/LEAKS

Isolation Distance:

Small Spills: 25 meters (75 feet) Large Spills: 100 meters (330 feet) Moisten spilled powder first or use a HEPA-filter vacuum for clean-up.

For solid **Carbon Black**, collect in the most convenient and safe manner and deposit in sealed containers.

Keep **Carbon Black** *powder* or *dust* out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA:	3.5 mg/m ³ , 8-hr TWA
NIOSH:	3.5 mg/m³, 10-hr TWA 0.1 mg PAHs/m³, 10-hr TWA
ACGIH:	3.0 mg/m³, 8-hr TWA
IDLH LEVEL:	1,750 mg/m ³
PAC LEVELS:	PAC-1 = 9 mg/m ³ ; PAC-2 = 99 mg/m ³ ; PAC-3 = 590 mg/m ³

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Irritation of the nose, throat and lungs with coughing and wheezing
Chronic:	Carcinogen (lung) in animals

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

Odorless No information 0 mm Hg at 68°F (20°C) 1.8 - 2.1(water = 1) Insoluble Sublimates approx. 6,605°F (3,652°C) Sublimates approx. 6,605°F (3,652°C) 12.01

	PROTECTIVE EQUIPMENT
Gloves:	Natural Rubber
Coveralls:	DuPont Tychem® Polycoat, QC, CPF1, SL and CPF2
Boots:	Rubber
Respirator:	>3.0 mg/m ³ - APR with High efficiency filters
	>30 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CARBON DIOXIDE

Synonyms: Carbonic Acid; Dry Ice CAS No: 124-38-9 Molecular Formula: CO₂ RTK Substance No: 0343

Description: Colorless, odorless gas commonly found as a liquid under pressure or as a solid (dry ice)

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Carbon Dioxide itself does not burn.	<i>Dusts</i> of various METALS (such as MAGNESIUM, ZIRCONIUM, TITANIUM and CHROMIUM) can ignite or explode when suspended in Carbon Dioxide .
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	Carbon Dioxide reacts with WATER to form <i>Carbonic Acid</i> . Carbon Dioxide is not compatible with OXIDIZING
DOT#: UN 1013	CONTAINERS MAY EXPLODE IN FIRE.	AGENTS (such as PERCHLORATES, PEROXIDES,
ERG Guide #: 120	Use water spray to keep fire-exposed containers cool.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING
Hazard Class: 2.2 (Nonflammable gas)	Flow or agitation may generate electrostatic charges and may ignite any explosive mixtures present.	AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); METAL CARBIDES; METAL SALTS; and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).

SPILL/LEAKS

Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Gas is heavier than air and may accumulate in low ceiling spaces and confined spaces.

EXPOSURE LIMITS

NIOSH: 5,000 ppm, 10-hr TWA; 30,000 ppm, STEL **IDLH:** 40,000 ppm

The Protective Action Criteria values are:

PAC-1 = 30,000 ppm

- PAC-2 = 40,000 ppm
- PAC-3 = 50,000 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns. Contact with liquid or solid ("dry ice") causes frostbite
Skin:	Irritation and burns. Contact with liquid or solid ("dry ice") causes frostbite
Inhalation:	Headache, dizziness, difficulty breathing, tremors, convulsions, coma and death

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflamm
Vapor Density:	1.52 (air =
Vapor Pressure:	42,940 m
Specific Gravity:	1.5 (wate
Water Solubility:	Soluble
Boiling Point:	-109ºF (-7
Freezing Point:	-70ºF (-57
Ionization Potential:	13.77 eV
Molecular Weight:	44

Odorless Nonflammable 1.52 (air = 1) 42,940 mm Hg at 68°F (20°C) 1.5 (water = 1) Soluble -109°F (-78.3°C) -70°F (-57°C)

PROTECTIVE EQUIPMENT	
Gloves:	Insulated Rubber
Coveralls:	Insulated material
Respirator:	>5,000 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Immerse affected part in warm water. Seek medical attention.

Common Name: CARBON DISULFIDE

Synonyms: Carbon Bisulfide; Carbon Sulfide; Dithiocarbonic Anhydride CAS No: 75-15-0 Molecular Formula: CS₂ RTK Substance No: 0344 Description: Clear, colorless to light yellow liquid with an unpleasant, rotten egg odor (reagent or commercial grade) and a sweet, pleasant odor when pure

Right to Know Hazardous Substance Fact Sheet

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Carbon Disulfide is a FLAMMABLE LIQUID and has a very low ignition temperature. Contact with hot steam pipes, ordinary light bulbs, sparks, friction or shock can ignite Carbon Disulfide or its	Carbon Disulfide and Carbon Disulfide <i>vapor</i> can be ignited or may explode with HEAT, SHOCK and FRICTION or on contact with HEATED SURFACES
4 - Fire 0 - Reactivity	<i>vapors.</i> Blanket fire with water to extinguish and control vapors or use dry	(such as STEAM PIPES and LIGHT BULBS). Carbon Disulfide may react violently with AZIDES;
DOT#: UN 1131	chemical or CO₂ as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur</i>	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); RUST; NITROGEN
ERG Guide #: 131	Oxides.	OXIDE; AMINES; OXIDIZING AGENTS (such as
Hazard Class: 3 (Flammable)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC).
	Flow or agitation may generate electrostatic charges. Carbon Disulfide may form an ignitable vapor/air mixture.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Metal containers involving the transfer of **Carbon Disulfide** should be grounded and bonded.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Carbon Disulfide**.

Keep **Carbon Disulfide** out of confined spaces, such as sewers, because of the possibility of an explosion.

Carbon Disulfide is harmful to aquatic life in very low concentrations.

EXPOSURE LIMITS

NIOSH: 1 ppm, 10-hr TWA; 10 ppm, 15-min Ceiling **ACGIH:** 1 ppm, 8-hr TWA

IDLH: 500 ppm

The Protective Action Criteria values are:

PAC-1 = 13 ppm PAC-2 = 160 ppm PAC-3 = 480 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Headache, nausea, vomiting, dizziness,
lightheadedness, passing out and even
death

PHYSICAL PROPERTIES

Odor Threshold:	0.1 to 0.2 ppm
Flash Point:	-22°F (-30°C)
LEL:	1%
UEL:	50%
Auto Ignition Temp:	212°F (100°C)
Vapor Density:	2.67 (air = 1)
Vapor Pressure:	297 mm Hg at 68°F (20°C)
Specific Gravity:	1.26 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	115°F (46°C)
Freezing Point:	-168°F (-111°C)
Ionization Potential:	10.8 eV
Molecular Weight:	76.13

	PROTECTIVE EQUIPMENT
Gloves:	Polyvinyl Alcohol, SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK; Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	>1 ppm - full facepiece APR with Organic vapor cartridges >10 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: CARBON MONOXIDE

Synonyms: Carbonic Oxide; Exhaust Gas; Flue Gas CAS No: 630-08-0 Molecular Formula: CO RTK Substance No: 0345 Description: Colorless, odorless gas

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Carbon Monoxide is a FLAMMABLE GAS.	Carbon Monoxide is not compatible with OXIDIZING AGENTS
4 - Fire	Stop flow of gas and use water spray to disperse vapors.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORATES, NITRATES, CHLORINE, BROMINE and
DOT#: UN 1016	Use water spray to keep fire-exposed containers cool.	FLUORINE) and ALKALI METALS (such as LITHIUM, SODIUM
ERG Guide #: 119	Vapors may travel to a source of ignition and flash back.	and POTASSIUM).
Hazard Class: 2.3	Carbon Monoxide may form an ignitable vapor/air	<i>Liquified, cold</i> Carbon Monoxide may react vigorously with
(Poisonous Gas)	mixture in closed tanks or containers.	water.

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)

Large Spill: 150 meters (500 feet)

Fire: 800 meters (1/2 mile)

- Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
- Keep **Carbon Monoxide** out of confined spaces, such as sewers, because of the possibility of an explosion.

Turn leaking cylinder with leak up to prevent escape of gas in liquid state.

Purge with *inert gas* before attempting repairs.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Carbon Monoxide**.

Carbon Monoxide is harmful to aquatic life at very low

concentrations.

EXPOSURE LIMITS

OSHA:	50 ppm, 8-hr TWA	
NIOSH:	35 ppm, 10-hr TWA; 200 ppm, 15-min Cei	ling
ACGIH:	25 ppm, 8-hr TWA	
IDLH:	1,200 ppm	
The Protective Action Criteria values are:		
PAC-1 =	= 75 ppm PAC-2 = 83 ppm PAC-3 = 330) ppm

HEALTH EFFECTS

Eyes:	No information available
Skin:	Skin contact with <i>liquid</i> Carbon Monoxide can cause frostbite
Inhalation:	Headache, dizziness, lightheadedness and fatigue, convulsions and loss of consciousness

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Flammable gas
LEL:	12%
UEL:	75%
Auto Ignition Temp:	1,125°F (607°C)
Vapor Density:	0.97 (air = 1)
Vapor Pressure:	>750 mm Hg at 68°F (20°C)
Specific Gravity:	0.79 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	-313°F (-192°C)
Melting Point:	-337°F (-205°C)
Critical Temp:	-282°F (-139°C)
Ionization Potential:	14 eV
Molecular Weight:	28

PROTECTIVE EQUIPMENT

Gloves:	Insulated work gloves (double glove for spills)
Coveralls:	Tychem® BR, Responder ® and TK (330-minute break- through) >10% LEL wear flash protection or turnout gear
Decemirator	

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

In case of contact with *liquid* Carbon Monoxide, immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: CARBON TETRACHLORIDE

Synonyms: Tetrachlorocarbon; Perchloromethane; Carbon Tet CAS No: 56-23-5 Molecular Formula: CCl₄ RTK Substance No: 0347 Description: Colorless liquid with an Ether-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Carbon Tetrachloride itself	Carbon Tetrachloride reacts with CHEMICALLY-ACTIVE METALS (such as SODIUM, POTASSIUM and
0 - Fire	does not burn.	MAGNESIUM); ZINC; ALUMINUM; POWDERED
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, or when in contact with hot surfaces, including	BERYLLIUM; FLUORINE; DIMETHYLFORMAMIDE; CALCIUM DISILICIDE; CALCIUM HYPOCHLORITE; and
DOT#: UN 1846	Phosgene and Hydrogen Chloride.	mixtures of ETHYLENE and BENZOYL PEROXIDE to
ERG Guide #: 151	Use water spray to keep fire-exposed containers	cause fires and explosions.
EKG Guide #. 151	cool.	Carbon Tetrachloride is not compatible with OXIDIZING
Hazard Class: 6.1		AGENTS (such as PERCHLORATES, PEROXIDES,
(Poisonous)		PERMANGANATES, CHLORATES, NITRATES,
		CHLORINE, BROMINE and FLUORINE).

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

Carbon Tetrachloride is harmful to aquatic organisms and is hazardous to the environment and ozone layer.

EXPOSURE LIMITS

OSHA:	10 ppm, 8-hr TWA; 25 ppm, 15-min Ceiling; and 200 ppm, as a 5-min maximum Peak in any 4-hr work period
NIOSH:	2 ppm, 60-min STEL
ACGIH:	5 ppm, 8-hr TWA; 10 ppm, 15-min STEL
IDLH:	200 ppm
PAC	PAC-1 = 1.2 ppm; PAC-2 = 13 ppm;
LEVELS:	PAC-3 = 340 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns
Skin:	Severe irritation, burns, rash with blisters
Inhalation:	Headache, nausea, vomiting, diarrhea, dizziness, lightheadedness and passing out
Chronic:	Carcinogen (liver) in animals. Limited evidence that it may damage the developing fetus and male reproductive glands (testes)

PHYSICAL PROPERTIES

Odor Threshold:	>10 ppm
Flash Point:	Non-combustible
Vapor Density:	5.3 (air = 1)
Vapor Pressure:	91 mm Hg at 68°F (20°C)
Specific Gravity:	1.59 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	169°F (76°C)
Ionization Potential:	11.47 eV
Molecular Weight:	153.8

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®, Viton, Viton/Butyl and Nitrile (>8-hr breakthrough)
Coveralls:	DuPont Tychem® BR and LV, Responder® and TK; ONESuit® TEC; and Kappler Zytron® 300, 400 and 500 (>8-hr breakthrough)
Respirator:	>2 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CARBONYL SULFIDE

Synonyms: Carbon Oxysulfide; Oxycarbon Sulfide CAS No: 463-58-1 Molecular Formula: COS RTK Substance No: 0349 Description: Colorless gas with a *Sulfide* (rotten egg) odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Carbonyl Sulfide is a FLAMMABLE GAS. Stop flow of gas or let burn if leak cannot be stopped.	Carbonyl Sulfide may react with WATER or MOIST AIR to form flammable and toxic gases.
4 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	Carbonyl Sulfide is not compatible with
1 - Reactivity	including Hydrogen Sulfide.	OXIDIZING AGENTS (such as PERCHLORATES,
DOT#: UN 2204	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and
ERG Guide #: 119	Vapors may travel to a source of ignition and flash back.	FLUORINE).
Hazard Class: 2.3	Vapor is heavier than air and may travel a distance to	
(Toxic gas)	cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 1,600 meters (1 mile)

If **Carbonyl Sulfide** is leaked, take the following steps: Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Keep **Carbonyl Sulfide** out of confined spaces, such as sewers, because of the possibility of an explosion. **Carbonyl Sulfide** may bioaccumulate.

EXPOSURE LIMITS

The Protective Action Criteria values are: PAC-1 = 30 ppm PAC-2 = 55 ppm PAC-3 = 150 ppm

	HEALTH EFFECTS
Eyes:	Irritation with possible eye damage
Skin:	Irritation and redness
	Contact with the <i>liquefied gas</i> may cause frostbite
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and severe shortness of breath (pulmonary edema) Nausea, vomiting, weakness and muscle cramps

PHYSICAL PROPERTIES

Odor Threshold:	Sulfide odor
Flash Point:	Flammable gas
LEL:	12%
UEL:	29%
Vapor Density:	2.1 (air = 1)
Vapor Pressure:	9,034 mm Hg at 69.8°F (21°C)
Water Solubility:	Soluble
Boiling Point:	-58°F (-50°C)
Freezing Point:	-218°F (-139°C)
Ionization Potential:	11.19 eV
Molecular Weight:	60.08

	PROTECTIVE EQUIPMENT
Gloves:	Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Sulfur compounds</i> , <i>Sulfides</i> and <i>Disulfides</i>)
Coveralls:	Tychem® BR, LV, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Sulfur compounds</i> , <i>Sulfides</i> and <i>Disulfides</i>)
Respirator:	>30 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.
- If exposed to *liquefied gas*, immerse affected part in warm water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: CESIUM HYDROXIDE

Synonyms: Cesium Hydrate; Cesium Hydroxide Dimer CAS No: 21351-79-1 Molecular Formula: (Cs(OH)) RTK Substance No: 0354 Description: Colorless to yellow, crystalline solid, which absorbs moisture from the air and is often in solution. It is a very strong base.

HAZARD DATA					
Hazard Rating	Firefighting			Reactivity	
3 - Health 0 - Fire 1 - Reactivity DOT#: UN 2682 (Solid) UN 2681 (Solution) ERG Guide #: 157 (Solid) 154 (Solution) Hazard Class: 8 (Corrosive)	Extinguish fire using an agent s surrounding fire. Cesium Hyd burn. POISONOUS GASES ARE PR CONTAINERS MAY EXPLODE Use water spray only to keep fi cool. DO NOT get water inside cont	droxide RODUC E IN FII ire-exp	e itself does not CED IN FIRE. RE. osed containers	Cesium Hydroxide will react with WATER or MOISTURE to generate enough heat to ignite COMBUSTIBLES. Cesium Hydroxide may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and is not compatible with CARBON DIOXIDE and OXYGEN. Cesium Hydroxide attacks many METALS (such as TIN, LEAD, ALUMINUM and ZINC) to form flammable and explosive gases.	
SPIL	L/LEAKS		I	PHYSICAL PROPERTIES	
Isolation Distance: 25 meters (75 feet) for solids 50 meters (150 feet) for liquids			Odor Threshold: Flash Point: Specific Gravity: Vapor Pressure:	No information Not combustible 3.68 g/cm ³ 0 mm Hg at 68 [°] F (20 [°] C)	

Water Solubility:

Melting Point:

Sweep up solid spills.

Absorb liquid spills with vermiculite or dry sand.

EXPOSURE LIMITS

OSHA: N/A NIOSH: 2 mg/m³, 10-hr TWA ACGIH: 2 mg/m³, 8-hr TWA IDLH LEVEL: N/A

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns		
Acute:	Nose, throat and lung irritation with coughing, and shortness of breath (pulmonary edema)		
Chronic:	Bronchitis with coughing, phlegm and shortness of breath		

PROTECTIVE EQUIPMENT

Soluble/Reactive

522°F (272°C)

Gloves:	Butyl Rubber, Nitrile, Neoprene, Natural Rubber or VITON® for <i>corrosive bases</i> in <i>solution</i>
Coveralls:	DuPont Tychem® SP, Polycoat, QC, CPF-1, SL and CPF-2 for <i>inorganic acids</i> and <i>bases</i>
Boots:	Butyl, Neoprene
Respirator:	>2 mg/m ³ APR with High Efficiency filters >20 mg/m ³ Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Chemical Name: CHLORINE

Synonym: Molecular Chlorine CAS No: 7782-50-5 Molecular Formula: Cl₂ RTK Substance No: 0367 Description: Yellow-green gas with strong irritating odor. Can be a liquid under pressure or cold temperatures.

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
4 - Health	Nonflammable Gas			Strong Oxidizer
0 - Fire	Cylinders may vent rapidly or e		e when heated.	Reacts with WATER to form <i>Acid solutions</i> .
0 - Reactivity	Remove gas with fine water sp	•		Forms explosive compounds or reacts explosively with
DOT#: UN 1017	DO NOT USE WATER DIREC	TLY O	IN THE SOURCE	ACETYLENE, ETHER, FLUORINE COMPOUNDS,
ERG Guide #: 124				TURPENTINE, ALCOHOLS, HYDROGEN, FINELY
Hazard Class: 2.3				DIVIDED METALS, AMMONIA, STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM
(Poison Gas)				HYDROXIDE), and MANY OTHER CHEMICALS.
SPIL	L/LEAKS			PHYSICAL PROPERTIES
Sma Larg Ventilate area to dispe Stop flow of gas or pla place. DO NOT USE WATEF SOURCE OF LEAK. Toxic to aquatic organ EXPOS OSHA: 1 ppr NIOSH: 0.5 p	solation Distance: (All Directions): Small spill - 30 meters (100 feet) Large spill - 240 meters (800 feet) entilate area to disperse gas. top flow of gas or place leaking cylinder in a safe blace. O NOT USE WATER DIRECTLY ON THE SOURCE OF LEAK. Toxic to aquatic organisms. EXPOSURE LIMITS VSHA: 1 ppm Ceiling IOSH: IOSH: 0.5 ppm 15-minute Ceiling CGIH:		Gloves: B Coverall: D R	N/A N/A N/A 2.5 (air = 1) 5,025 mm Hg at 68° F (20 $^{\circ}$ C) Slightly soluble
ERPG 1 1 ppr	n			0.5 ppm CCR with cartridge for Chlorine or Acid Gas 5 ppm Supplied-air respirator
ERPG 2 3 ppr ERPG 3 20 pp				10 ppm SCBA
· · ·	HEFFECTS		FIRST	AID AND DECONTAMINATION
Skin: Acute: Chronic: damage Irritation, Liquid car Nose, thro coughing Headache Chronic: Cancer - Asthma w wheezing tightness	n cause frostbite bat and lung irritation, (Pulmonary edema) e, nausea, vomiting Tested (Not Classifiable). <i>v</i> ith shortness of breath, , coughing and/or chest to teeth, skin blisters and		Flush eyes with la contact lenses if For contact with / Do not rub or rehe Begin artificial rea necessary. Transfer to a mer	spiration if breathing has stopped and CPR if



Common Name: alpha-CHLOROACETOPHENONE

Synonyms: CN; Chemical Mace; Tear Gas CAS No: 532-27-4 Molecular Formula: C₈H₇CIO RTK Substance No: 0048 Description: Colorless, white or gray, crystalline solid with an irritating floral odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
3 - Health	COMBUSTIBLE SOLID	alpha-Chloroacetophenone in contact with WATER or MOIST AIR may form toxic gases such as <i>Hydrogen</i>		
1 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Chloride.		
0 - Reactivity	Water or foam may cause frothing.	alpha-Chloroacetophenone is not compatible with		
DOT#: UN 1697	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> .	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALDEHYDES; NITRIC ACID; and PERCHLORIC ACID.		
ERG Guide #: 153	Use water spray to keep fire-exposed containers			
Hazard Class: 6.1	cool.			
(Poison)				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

PHYSICAL PROPERTIES d: 0.035 ppm (0.1 to 0.15 mg/m³)

Odor Threshold:	0.035 ppm (0.1 to 0.15 mg/m ³)				
Flash Point:	244°F (118°C)				
Vapor Density:	5.2 (air = 1)				
Vapor Pressure:	0.005 mm Hg at 68°F (20°C)				
Specific Gravity:	1.3 (water = 1)				
Water Solubility:	Very slightly soluble				
Boiling Point:	471° to 473°F (244° to 245°C)				
Ionization Potential:	9.4				
Molecular Weight:	155				

OSHA:	0.3 mg/m ³ , 8-hr TWA
NIOSH:	0.3 mg/m ³ , 10-hr TWA

- ACGIH: 0.3 mg/m³, 8-hr TWA
- **IDLH:** 15 mg/m³
- 5

HEALTH EFFECTS

Eyes:	Severe irritation and burns with redness, blurred vision, pain and tearing	
Skin:	Severe Irritation and burns	
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)	

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H® (>4-hr breakthrough for <i>Aromatic Ketones</i>)
Coveralls:	DuPont Tychem® Responder® (>8-hr breakthrough)
Respirator:	<3 mg/m ³ -full facepiece APR with Organic vapor filters and N100 prefilter >3 mg/m ³ -Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.





Common Name: CHLOROBENZENE

Synonyms: Benzene Chloride; Phenyl Chloride CAS No: 108-90-7 Molecular Formula: C_6H_5Cl RTK Substance No: 0379

Description: Colorless to yellowish liquid with an almond-like odor

		HA	ZARD DAT	۲A		
Hazard Rating	Firefighting FLAMMABLE LIQUID Use dry chemical, CO2 or foam as extinguishing agents. Water may not be effective in fighting fires, but may be used to blanket fire. POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride and Phosgene. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Flow or agitation may generate electrostatic charges.			Reactivity		
3 - Health 3 - Fire 0 - Reactivity DOT#: UN 1134 ERG Guide #: 130 Hazard Class: 3 (Flammable)			ng fires, but may be ICED IN FIRE, <i>hosgene</i> . FIRE. ed containers cool.		Chlorobenzene may react explosively with powdered SODIUM and mixtures of PHOSPHORUS TRIFLUORIDE and SODIUM. Chlorobenzene may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, ALUMINUM and POTASSIUM); NITRIC ACID; and DIMETHYL SULFOXIDE.	
SPI	LL/LEAKS			P	HYSICAL PROPERTIES	
similar material and p disposal. Use only non-sparking when opening and clo Chlorobenzene . Keep Chlorobenzene sewers, because of th DO NOT wash into se	rs (1,000 feet) mile) iculite, dry sand, earth, or a lace into sealed containers for tools and equipment, especially osing containers of out of confined spaces, such as he possibility of an explosion.	eet) 00 feet) dry sand, earth, or a to sealed containers for and equipment, especially ontainers of confined spaces, such as ibility of an explosion. Odor Thresho Flash Point: LEL: UEL: Vapor Density Vapor Pressur Specific Gravi Water Solubili Boiling Point: Freezing Poin Ionization Pot Molecular Wei		Tem /: re: ity: ity: t: :entia	82°F (28°C) 1.3% 9.6% mp: 1,099°F (593°C) 3.9 (air = 1) 8.8 mm Hg at $68^{\circ}F$ (20°C) 1.1 (water = 1) Very slightly soluble 270°F (132°C) -50°F (-46°C) tial: 9.1 eV	
EXPO	SURE LIMITS			PF	ROTECTIVE EQUIPMENT	
OSHA: 75 ppm, 8-h ACGIH: 10 ppm, 8-h IDLH: 1,000 ppm The Protective Action PAC-1 = 10 ppm PAC-2 = 150 ppm PAC-3 = 400 ppm	r TWA		Gloves: Coveralls: Respirator:	(>8 Tyc Tre	yvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® -hr breakthrough) chem® CPF 4, BR, LV, Responder®, and TK; and llchem® HPS and VPS (>8-hr breakthrough)) ppm - Supplied air or SCBA	
HEALTH EFFECTS			FIRS	Т	AID AND DECONTAMINATION	
Inhalation: Nose an Headac	n, rash and burning feeling nd throat irritation he, dizziness, lightheadedness, sing out		Flush eyes wit contact lenses Quickly remov large amounts Begin artificial	h lar if w e co of s resp	n from exposure. ge amounts of water for at least 15 minutes. Remove orn. Intaminated clothing and wash contaminated skin with oap and water. Diration if breathing has stopped and CPR if necessary. to a medical facility.	



Common Name: CHLORODIFLUOROETHANE

Synonyms: Difluoro-1- Chloroethane; Freon 142 CAS No: 75-68-3 Molecular Formula: $C_2H_3CIF_2$ RTK Substance No: 0385 Description: Colorless gas with a slight *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE GAS Shut off all ignition sources.	Chlorodifluoroethane reacts violently with OXIDIZING AGENTS (such as PERCHLORATES,
4 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	including Phosgene, Hydrogen Fluoride, Hydrogen Chloride, Fluorine and Carbonyl Fluoride.	NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM,
DOT#: UN 2517	CONTAINERS MAY EXPLODE IN FIRE	SODIUM and POTASSIUM); and ALKALINE
ERG Guide #: 115	Use water spray to keep fire-exposed containers cool, but DO NOT direct water jet on liquid.	EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM).
Hazard Class: 2.1	FIRE MAY RESTART AFTER IT HAS BEEN	DO NOT expose Chlorodifluoroethane to HEAT,
(Flammable gas)	EXTINGUISHED.	FLAMES or RED HOT METAL as it will
	Vapors may travel to a source of ignition and flash back.	decompose to form <i>Hydrogen Fluoride</i> and
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	Phosgene gases.

SPILL/LEAKS

Isolation Distance:

- Small Spill: 120 meters (400 feet)
- Large Spill or Leak: 1,000 meters (3,000 feet)

Fire: 1,600 meters (1 mile)

Turn leaking cylinder with the leak up to prevent escape of the gas in liquid form.

May cause ozone depletion.

EXPOSURE LIMITS

ERPG-1: 10,000 ppm ERPG-2: 15,000 ppm ERPG-3: 25,000 ppm

HEALTH EFFECTS

Eyes:No informationSkin:FrostbiteInhalation:Headache, dizziness, lightheadedness,
irregular heartbeat

PHYSICAL PROPERTIES

Odor Threshold:	Slightly ethereal	
Flash Point:	Flammable gas	
LEL:	6%	
UEL:	17.9%	
Auto Ignition:	1,170°F (632°C)	
Vapor Density:	3.5 (air = 1)	
Vapor Pressure:	2,540 mm Hg at 77°F (25°C)	
Specific Gravity:	1.1 (water = 1)	
Water Solubility:	Insoluble	
Boiling Point:	14.4°F (-9.8°C)	
Freezing Point:	-203°F (-130.8°C)	
Molecular Weight:	100.47	

PROTECTIVE EQUIPMENT

Gloves:	Insulated Neoprene
Coveralls:	Clothing designed to prevent freezing of body tissues
Respirator:	>10,000 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CHLORODIFLUOROMETHANE

Synonyms: Difluoromonochloromethane; Freon 22®; Genetron-22® CAS No: 75-45-6 Molecular Formula: CHCIF₂ RTK Substance No: 0386 Description: Colorless gas with a slight *Ether*-like odor which is shipped as a liquified gas

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Chlorodifluoromethane	<i>Liquified</i> Chlorodifluoromethane , poured into WATER, can be violently explosive.
0 - Fire	itself does not burn.	Contact with red-hot METAL forms toxic gases of Chlorine,
0 - Reactivity	Use water spray to reduce vapors.	Fluorine, Phosgene and Carbonyl Chloride.
DOT#: UN 1018	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> , <i>Hydrogen</i>	Chlorodifluoromethane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
ERG Guide #: 126	Fluoride, Phosgene, and Carbonyl Chloride.	PERMANGANATES, CHLORATES, NITRATES,
Hazard Class: 2.2	CONTAINERS MAY EXPLODE IN FIRE.	CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); ALKALINE
(Nonflammable gas)	Use water spray to keep fire-exposed containers cool.	EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM); POWDERED ALUMINUM; STRONG ACIDS
		(such as HYDROCHLORIC, SULFURIC and NITRIC); and CHEMICALLY ACTIVE METALS (such as ZINC).

SPILL/LEAKS

Isolation Distance:

Large Spill: 500 meters (1/3 mile)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak

or allow cylinder to empty.

Chlorodifluoromethane is heavier than air and may accumulate in low ceiling spaces causing *Oxygen* deficiency.

Chlorodifluoromethane may be hazardous to the environment. It will accumulate and disperse in the atmosphere and damage the ozone layer.

EXPOSURE LIMITS

NIOSH: 1,000 ppm, 10-hr TWA; 1,250 ppm STEL

ACGIH: 1,000 ppm, 8-hr TWA

HEALTH EFFECTS

Eyes:	Irritation, contact with liquid causes frostbite
Skin:	Irritation, contact with liquid causes frostbite
Inhalation:	Nose, throat and lung irritation with tightness in the chest and difficulty in breathing
	Headache, nausea, dizziness, loss of coordination, passing out, and death

PHYSICAL PROPERTIES

Odor Threshold:	Ether-like odor
Flash Point:	Nonflammable
Vapor Density:	2.9 (air = 1)
Vapor Pressure:	7,144 mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Soluble
Boiling Point:	-41°F (-40.7°C)
Melting Point:	-251°F (-157°C)
Ionization Potential:	12. 5 eV
Molecular Weight:	86.5

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® (>4-hr breakthrough for <i>Freon</i> s)	
Coveralls:	Tychem® BR, LV, Responder®, and TK; Zytron® 500; ONESuit®TEC; and Trellchem® (>8-hr breakthrough for <i>Halogenated compounds</i>)	
Respirator:	Supplied air or SCBA	
FIRST AID AND DECONTAMINATION		
Remove the p	Remove the person from exposure.	

Flush eyes with large amounts of water for at least 15 minutes. Remove

contact lenses if worn. Seek medical attention.

Immerse affected part in warm water. Seek medical attention. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility



Common Name: CHLOROFORM

Synonyms: Trichloromethane; Formyl Trichloride CAS No: 67-66-3 Molecular Formula: CHCl₃ RTK Substance No: 0388 Description: Colorless liquid, with a pleasant, sweet odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Chloroform itself does not	Chloroform reacts with CHEMICALLY ACTIVE METALS such as POTASSIUM, SODIUM, MAGNESIUM and ZINC);
0 - Fire	burn.	ALUMINUM; STRONG BASES (such as SODIUM
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine</i> , <i>Hydrogen Chloride</i>	HYDROXIDE and POTASSIUM HYDROXIDE); and OXIDIZING AGENTS (such as PERCHLORATES,
DOT#: UN 1888	and <i>Phosgene</i> .	PEROXIDES, PERMANGANATES, CHLORATES,
ERG Guide #: 151	Use water spray to keep fire-exposed containers	NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires and explosions.
Hazard Class: 6.1 (Poison)	cool.	Chloroform is not compatible with ALKALI METALS (such as LITHIUM); MIXTURES of WATER and STRONG ALCOHOLS; ACETONE; PERCHLORIC ACID; DINITROGEN DIOXIDE; NITROGEN TETROXIDE; and DISILANE.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

Toxic to aquatic life.

EXPOSURE LIMITS

OSHA: 50 ppm, Ceiling

NIOSH:	2 ppm,	60-min	STEL
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ACGIH: 10 ppm, 8-hr TWA

IDLH: 500 ppm

HEALTH EFFECTS

Eyes:	Irritation, burns, tearing	
Skin:	Irritation, burns, drying and cracking	
Inhalation:	Nose and throat irritation	
	Headache, nausea, dizziness and passing out	
Chronic:	Cancer (liver, kidney, thyroid) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	2.4 to 85 ppm
Flash Point:	Noncombustible
Vapor Density:	4.12 (air = 1)
Vapor Pressure:	160 mm Hg at 68°F (20°C)
Specific Gravity:	1.5 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	143°F (62°C)
Melting Point:	-82°F (-64°C)
Ionization Potential:	11.42 eV
Molecular Weight:	119.4

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	Silver Shield®/4H® and Viton (>8-hr breakthrough) DuPont Tychem® CPF 4, BR, LV, Responder®, and TK; Kappler® Zytron® 500; and Saint-Gobain ONESuit®
	TEC (>8-hr breakthrough)
Respirator:	>2 ppm - Supplied air >500 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.
- Transfer to a medical facility.



Common Name: 2-(4-CHLORO-2-METHYLPHENOXY)PROPIONIC ACID

Synonyms: MCPP; MECOPROP; 2-(2-Methyl-4-Chlorophenoxy)Propionic Acid CAS No: 93-65-2 Molecular Formula: $C_{10}H_{11}CIO_3$ RTK Substance No: 3093

Description: Odorless, colorless to brown, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	2-(4-Chloro-2-Methylphenoxy)Propionic Acid does not burn, however, it may be dissolved in a	2-(4-Chloro-2-Methylphenoxy)Propionic Acid is not compatible with STRONG ACIDS (such as
0 - Fire	liquid carrier that may be flammable or	HYDROCHLORIC, SULFURIC and NITRIC) and
0 - Reactivity	combustible. POISONOUS GASES ARE PRODUCED IN FIRE,	CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC).
DOT#: UN 2765	including Hydrogen Chloride.	2-(4-Chloro-2-Methylphenoxy)Propionic Acid attacks
ERG Guide #: 152	Use water spray to keep fire-exposed containers	some forms of COATINGS and METALS in the presence of MOISTURE.
Hazard Class: 6.1	cool.	
(Toxic)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

2-(4-Chloro-2-Methylphenoxy)Propionic Acid is harmful to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for 2-(4-Chloro-2-Methyl-phenoxy)Propionic Acid.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible solid
Vapor Pressure:	2.3 x 10 ⁻⁶ mm Hg at 68°F (20°C)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	201°F (94°C)
Molecular Weight:	214.7

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®

Respirator: SCBA

FIRST	AID AN	D DECON	JTAMINA	TION
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Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, convulsions, and loss of coordination, unconsciousness and coma
Chronic:	Cancer (lymphatic system) in humans

HEALTH EFFECTS





Common Name: 4-CHLOROPHENOL

Synonyms: p-Chlorophenol; 4-Hydroxychlorobenzene CAS No: 106-48-9 Molecular Formula: C₆H₅CIO RTK Substance No: 0401

Description: Colorless to yellow crystal with an unpleasant, penetrating odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	CORROSIVE	4-Chlorophenol is not compatible with OXIDIZING
1 - Fire	COMBUSTIBLE SOLID Use dry chemical, CO ₂ , water spray or foam as	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	extinguishing agents.	CHLORINE, BROMINE and FLUORINE); ORGANIC
DOT#: UN 2020	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine</i> and <i>Hydrogen Chloride</i> .	ACIDS; and IRON.
ERG Guide #: 153		
Hazard Class: 6.1		
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

4-Chlorophenol is toxic to aquatic organisms and may cause long term effects to the aquatic environment.

EXPOSURE LIMITS

No occupational exposure limits have been established for **4-Chlorophenol**.

The Protective Action Criteria values are:

 $PAC-1 = 400 \text{ mg/m}^3$

 $PAC-2 = 400 \text{ mg/m}^3$

PAC-3 = 400 mg/m^3

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, restlessness, seizures, coma, and even death

PHYSICAL PROPERTIES

Odor Threshold:	30 ppm
Flash Point:	250°F (121°C)
Vapor Density:	4.4 (air = 1)
Vapor Pressure:	0.1 mm Hg at 68°F (20°C)
Specific Gravity:	1.31 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	428°F (220°C)
Melting Point:	110°F (43°C)
Molecular Weight:	128.6

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >400 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: o-CHLOROTOLUENE

Synonyms: 2-Chlorotoluene; o-Tolyl Chloride CAS No: 95-49-8 Molecular Formula: C_7H_7CI RTK Substance No: 1425 Description: Colorless liquid with a strong, irritating odor

	H	HAZARD DATA	
Hazard Rating	Firefighting		Reactivity
2 - Health 2 - Fire 0 - Reactivity DOT#: UN 2238 ERG Guide #: 129 Hazard Class: 3 (Flammable)	Firefighting COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine</i> and <i>Hydrogen Chloride</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Do not get water into containers. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		o-Chlorotoluene reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). o-Chlorotoluene reacts with WATER to form toxic Hydrogen Chloride gas.
SPI	LL/LEAKS	P	HYSICAL PROPERTIES
	ers (1,000 feet) mile) icculite, dry sand, earth, or a eposit in sealed containers. wer.	Odor Threshold: Flash Point: LEL: UEL: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Ionization Potentia Molecular Weight:	
EXPO	SURE LIMITS	PF	ROTECTIVE EQUIPMENT
OSHA: None NIOSH: 50 ppm, 10 ACGIH: 50 ppm, 8-H IDLH: None	hr TWA; 75 ppm, 15- min STEL nr TWA	H Coveralls: Du Zy bre Respirator: >5 ca	lver Shield®/4H® and Viton (>8-hr breakthrough for lalogenated Hydrocarbons) uPont Tychem® BR, LV, Responder® and TK; Kappler® tron® 500; and Saint-Gobain ONESuit® TEC, (>8-hr eakthrough for <i>Aromatic Halogens</i>) i0 ppm -Full facepiece APR with Organic vapor rtridge i00 ppm - Supplied air
HEAL	TH EFFECTS	FIRST /	AID AND DECONTAMINATION
Skin: Irritation Inhalation: Nose, th coughin breath Dizzines	and burns and burns nroat and lung irritation with g, wheezing and shortness of ss, loss of coordination, ions and coma	contact lenses if wo Quickly remove cor large amounts of so	ge amounts of water for at least 15 minutes. Remove orn. Seek medical attention. Intaminated clothing and wash contaminated skin with oap and water. Seek medical attention. Iration if breathing has stopped and CPR if necessary.



Common Name: CHROMIC CHLORIDE

Synonyms: Chromium Chloride; Chromium Trichloride CAS No: 10025-73-7 Molecular Formula: CrCl₃ RTK Substance No: 2248 Description: Odorless, purple or violet, flake-like, or crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Chromic Chloride itself does	Chromic Chloride reacts violently with LITHIUM and NITROGEN.
0 - Fire	not burn.	Chromic Chloride is not compatible with OXIDIZING
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Chlorine compounds.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
DOT#: None	Use water spray to keep fire-exposed containers	CHLORINE, BROMINE and FLUORINE); MOISTURE;
ERG Guide #: None	cool.	and WATER.
Hazard Class: None		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Chromic Chloride is a toxic water pollutant.

EXPOSURE LIMITS

OSHA: 0.5 mg/m^3 , 8-hr TWA NIOSH: 0.5 mg/m^3 , 8-hr TWA ACGIH: 0.5 mg/m^3 , 8-hr TWA IDLH: 25 mg/m^3 (All of the above are for *Chromium*) The Protective Action Criteria values are: PAC-1 = 4.57 mg/m³

 $PAC-2 = 7.61 \text{ mg/m}^3$

 $PAC-3 = 76.1 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing

PHYSICAL PROPERTIES

Flash Point:	Nonflammable
Specific Gravity:	2.8 (water = 1)
Water Solubility:	Insoluble (Reacts)
Boiling Point:	2,373°F (1,300°C)
Melting Point:	2,106°F (1,152°C)
Molecular Weight:	158.35

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.5 mg/m ³ - full facepiece APR with High efficiency filters >5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: CHROMIUM

Synonyms: Chrome; Metallic Chromium CAS No: 7440-47-3 Molecular Formula: Cr RTK Substance No: 0432 Description: Hard, gray, odorless solid with a metallic luster

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Chromium itself does not burn.	Chromium may react violently or explosively with AMMONIUM NITRATE; CARBON DIOXIDE	
3 - Fire	Chromium in powder form is FLAMMABLE	ATMOSPHERES; BROMINE PENTAFLUORIDE; LITHIUM; NITROGEN OXIDES; and SULFUR DIOXIDE.	
0 - Reactivity	and a DANGEROUS FIRE HAZARD. It may also spontaneously explode in air.	Chromium is not compatible with OXIDIZING AGENTS	
DOT#: UN 3089	Use dry sand or dry chemical extinguishing agents	(such as PERCHLORATES, PEROXIDES,	
ERG Guide #: 170	to fight Chromium <i>powder</i> fires.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG	
Hazard Class: 4.1 (Flammable Solid)	CONTAINERS MAY EXPLODE IN FIRE.	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG ACIDS (such as HYDROCHLORIC and SULFURIC); and ALKALI	
		METALS (such as SODIUM and POTASSIUM).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Keep **Chromium** *powder* out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

 OSHA:
 1 mg/m³, 8-hr TWA

 NIOSH:
 0.5 mg/m³, 8-hr TWA

 ACGIH:
 0.5 mg/m³, 8-hr TWA

 IDLH:
 250 mg/m³

The Protective Action Criteria values are: PAC-1 = 1.5 mg/m^3 PAC-3 = 250 mg/m^3

PAC-2 = 2.5 mg/m³

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Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation, burns, itching, rash and skin ulcers
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, fever and chills

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible solid, Flammable powder
Vapor Pressure:	<0 mm Hg at 68°F (20°C) (approximate)
Specific Gravity:	7.2 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	4,788°F (2,642°C)
Melting Point:	3,452°F (1,900°C)
Molecular Weight:	52

PROTECTIVE EQUIPMENT

Gloves: Nitrile or Natural Rubber

Coveralls: Tyvek®

Respirator: >0.5 mg/m³ - full facepiece APR with High efficiency filters >1.5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: CHRYSENE

Synonyms: Benzo(a)phenanthrene CAS No: 218-01-9 Molecular Formula: C₁₈H₁₂ RTK Substance No: 0441 Description: Colorless to white, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	DOES NOT BURN	Chrysene is not compatible with OXIDIZING AGENTS
0 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 3077	FIRE. Use water spray to keep fire-exposed	
ERG Guide #: 171	containers cool.	
Hazard Class: 9 (Miscellaneous Hazardous Materials)		

SPILL/LEAKS	SP	ILL	/LEA	KS
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Isolation Distance:	
Spill: 25 meters (75 feet)	
Fire: 800 meters (1/2 mile)	
Moisten spilled material first or use a HEPA-filte vacuum for clean-up.	۶r
DO NOT wash into sewer.	
May biodegrade in water.	

PHYSICAL PROPERTIES

Odor Threshold:	Unknown
Flash Point:	Noncombustible
Vapor Pressure:	6.3 x 10.9 mm Hg at 68°F (20°C)
Specific Gravity:	1.27 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	838°F (448°C)
Melting Point:	491° to 493°F (255° to 256°C)
Ionization Potential:	7.59+/-0.2 eV
Molecular Weight:	228.3

EXPOSURE LIMITS

	0.2 mg/m ³ , 8-hr TWA
NIOSH:	0.1 mg/m ³ , 10-hr TWA
ACGIH:	Lowest level possible
IDLH:	80 mg/m ³
	(All of the above as Coal Tar Pitch Volatile)

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile or Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ - Supplied air >80 mg/m3 - SCBA

FIRST AID AND DECONTAMINATION

 $\label{eq:resonance} \textbf{Remove} \text{ the person from exposure}.$

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Transfer to a medical facility.

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Eyes:	Irritation
Skin:	Irritation, rash or sunburn with blisters can occur if contaminated skin is exposed to sunlight
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	Cancer (skin, liver, lungs) in animals

HEALTH EFFECTS



Common Name: C.I. FOOD RED 15

Synonyms: Basic Violet 10; Food Red 15; Rhodamine B CAS No: 81-88-9 Molecular Formula: $C_{28}H_{31}CIN_2O_3$ RTK Substance No: 0505 Description: Green crystalline or reddish-violet, odorless powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	C.I. Food Red 15 may burn, but does not readily ignite.	C.I. Food Red 15 is not compatible with OXIDIZING
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	extinguishing agents. POISONOUS GASES ARE PRODUCED IN	CHLORINE, BROMINE and FLUORINE).
DOT#: None	FIRE, including <i>Nitrogen Oxides</i> and <i>Hydrogen</i>	
ERG Guide #: None	Chloride.	
Hazard Class: None	Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

PAC-1 = 1.25 mg/m^3

- $PAC-2 = 7.5 \text{ mg/m}^3$
- $PAC-3 = 50 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing, wheezing and chest tightness Headache, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	May burn
Water Solubility:	Soluble
Melting Point:	329°F (165°C)
Molecular Weight:	479

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

- **Respirator:** <1.25 mg/m³ Full facepiece APR with *Organic vapor* filter and *High efficiency* prefilters
 - >1.25 mg/m³ Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: COAL TAR PITCH

Synonyms: Coal Tar Pitch Volatiles; Coal Tar; Pitch CAS No: 65996-93-2 Molecular Formula: Mixture RTK Substance No: 0519 Description: Dark brown to black, thick liquid with a strong odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	FLAMMABLE LIQUID	Coal Tar Pitch is not compatible with OXIDIZING
3 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and
DOT#: UN 1136	Use water spray to keep fire-exposed containers cool.	POTASSIUM HYDROXIDE).
ERG Guide #: 128	Coal Tar Pitch may form an ignitable vapor/air	
Hazard Class: 3	mixture in closed tanks or containers.	
(Flammable)		

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Coal Tar Pitch**.

Keep **Coal Tar Pitch** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Coal Tar Pitch may be hazardous to the environment, especially to aquatic organisms, and may cause long- term effects.

EXPOSURE LIMITS

OSHA: 0.2 mg/m³, 8-hr TWA (**Coal Tar Pitch** *volatiles*)

NIOSH: 0.1 mg/m³, 10-hr TWA (**Coal Tar Pitch** *volatiles*) **ACGIH:** 0.2 mg/m³, 8-hr TWA (**Coal Tar Pitch** *volatiles*)

IDLH: 80 mg/m³ (Coal Tar Pitch *volatiles*)

The Protective Action Criteria values are:

PAC-1 = 0.6 mg/m³ PAC-2 = 12.5 mg/m³ PAC-3 = 80 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, rash and burning feeling
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, irritability, fainting and coma
Chronic:	Causes (lung, kidney, and skin) cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Coal Tar odor
Flash Point:	81° to 405°F (27° to 207°C)
Auto Ignition Temp:	>932°F (500°C)
Vapor Pressure:	<1 mm Hg at 77°F (25°C)
Specific Gravity:	>1.2 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	>482°F (250°C)
Molecular Weight:	Mixture

PROTECTIVE EQUIPMENT

Gloves:	Silvershield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Hydrocarbons</i>)

Coveralls: Tychem® SL and Responder® (>8-hr breakthrough for *Hydrocarbons, Aromatic Polynuclear*)

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts soap and water.



Common Name: COBALT NAPHTHENATE

Synonyms: Cobalt Naphtha; Naftolite CAS No: 61789-51-3Molecular Formula: Co(C₁₁H₁₀ O₂)₂ RTK Substance No: 0523

Description: Brown powder or bluish-red solid which is often used in a solution of Mineral Oil or Mineral Spirits

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2- Health 2 - Fire 0 - Reactivity DOT#: UN 2001 ERG Guide #: 133 Hazard Class: 4.1 (Flammable solids)	Use dry chemical, CO ₂ , water spray or foam as extinguishing agent. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Cobalt Oxide</i> . Use water spray to keep fire-exposed containers cool. FIRE MAY RESTART AFTER IT HAS BEEN EXTINGUISHED. Cobalt Naphthenate in powder or granular form may explode when mixed in air.	Cobalt Naphthenate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

Aquatic life may be harmed by exposure to this chemical.

EXPOSURE LIMITS

No occupational exposure limits have been established.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, skin allergy with itching and rash
Inholotion	Name there at an allow a further to with

innalation.	coughing, wheezing and shortness of breath
Chronic:	Cobalt and Cobalt compounds may

cause lung cancer in humans.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless (solution may have Mineral Spirits odor)
Flash Point:	121°F (49°C)
LEL:	0.07%
UEL:	6%
Auto Ignition Temp:	529°F (276°C)
Vapor Density:	3.9 (air = 1)
Vapor Pressure:	1 mm Hg at 77°F (25°C)
Specific Gravity:	0.95 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	515°F (268°C)
Molecular Weight:	407

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®, Rubber or Nitrile for solid Cobalt Naphthenate
Coveralls:	DuPont Tyvek® for solid Cobalt Naphthenate
Respirator:	Full facepiece APR respirator with a High efficiency particulate filter or Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: COPPER

Synonyms: Bronze Powder; Gold Bronze CAS No: 7440-50-8 Molecular Formula: Cu RTK Substance No: 0528 Description: Reddish-brown, odorless metal

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Copper itself does not burn.	Finely divided Copper powder reacts violently on contact with OXIDIZING AGENTS (such as PERCHLORATES,
1 - Fire	Finely divided Copper powder may burn in air or	PEROXIDES, PERMANGANATES, CHLORATES,
1 - Reactivity	become an explosion hazard.	NITRATES, CHLORINE, BROMINE and FLUORINE); AZIDES; ETHYLENE OXIDE; IODATES; HYDRAZINES;
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Copper fumes</i> and <i>Copper Oxides</i> .	POTASSIUM COMPOUNDS; SODIUM COMPOUNDS; and ACETYLENES.
ERG Guide #: 171	Use water spray to keep fire-exposed containers	
Hazard Class: 9	cool.	Copper is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); 1-BROMO-
(Environmentally Hazardous Material)		2-PROPYNE; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and ANHYDROUS AMMONIA.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Copper is a toxic water pollutant.

EXPOSURE LIMITS

OSHA:	1 mg/m³(Dust), 0.1 mg/m³(Fume), 8-hr TWA
NIOSH:	1 mg/m ³ (Dust), 0.1 mg/m ³ (Fume), 10-hr TWA
ACGIH:	1 mg/m ³ (Dust), 0.2 mg/m ³ (Fume), 8-hr TWA
	(All the above are for Copper dust and fume)
IDLH:	100 mg/m ³ (as <i>Copper</i>)
PAC:	PAC-1 = 3 mg/m ³ ; PAC-2 = 33 mg/m ³
	$PAC-3 = 200 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, nausea, vomiting and abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible solid
	Combustible/Explosive finely divided powder
Vapor Pressure:	1 mm Hg at 2,962°F (1,628°C)
Specific Gravity:	8.9 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	4,653°F (2,567°C)
Melting Point:	1,981°F (1,083°C)
Molecular Weight:	63.6

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ - Full facepiece APR with High efficiency filter >1 mg/m ³ - Supplied air (Fume)
	>10 mg/m ³ - Supplied air (Dust/Mist)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: CUMENE

Synonyms: 2-Phenylpropane; Isopropylbenzene CAS No: 98-82-8 Molecular Formula: C_9H_{12} RTK Substance No: 0542 Description: Clear, colorless liquid with a sharp, penetrating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Cumene is a FLAMMABLE LIQUID.	Cumene reacts violently with OXIDIZING AGENTS
3 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC,
DOT#: UN 1918	CONTAINERS MAY EXPLODE IN FIRE.	SULFURIC and NITRIC); and
ERG Guide #: 130	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back.	CHLOROSULFONIC ACID to cause fires and explosions.
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	Cumene may form explosive <i>Peroxides</i> above 88°F (31°C).

SPILL/LEAKS

Isolation Distance:

Small Spill: 50 meters (150 feet) Large Spill: 300 meters (1,000 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Keep **Cumene** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Cumene is a marine pollutant and is toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA:	50 ppm, 8-hr TWA
NIOSH:	50 ppm, 10-hr TWA
ACGIH:	50 ppm, 8-hr TWA
IDLH:	900 ppm

HEALTH EFFECTS	
Eyes:	Irritation
Skin:	Irritation, rash, and drying and cracking of the skin with redness
Inhalation:	Nose and throat irritation
	Headache, dizziness, loss of coordination, lightheadedness and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.032 ppm
Flash Point:	92°F (33°C)
LEL:	0.9%
UEL:	6.5%
Auto Ignition:	797°F (425°C)
Vapor Density:	4.2 (air = 1)
Vapor Pressure:	8 mm Hg at 68°F (20°C)
Specific Gravity:	0.86 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	306°F (152°C)
Ionization Potential:	8.8 eV
Molecular Weight:	120.2

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	Viton (>8-hr breakthrough) DuPont Tychem® CPF 4, BR, LV, CSM, Responder® and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthough)
Respirator:	<500 ppm - Full facepiece APR with Organic vapor cartridges >500 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: CUPRIC ACETATE

Synonyms: Copper Diacetate; Crystals of Venus CAS No: 142-71-2 Molecular Formula: Cu(CH₃COO)₂ RTK Substance No: 0546 Description: Blue-green, crystalline solid with a slight Acetic Acid odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Cupric Acetate may burn, but does not readily ignite.	Cupric Acetate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	extinguishing agents.	CHLORINE, BROMINE and FLUORINE); STRONG
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE, including Acetic Acid and Copper Oxides.	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACETYLENE; HYDRAZINE; MERCUROUS
ERG Guide #: 171		CHLORIDE; NITROMETHANE; and SODIUM
Hazard Class: 9 (Environmentally Hazardous Substance)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Cover with dry lime, sand or sodium bicarbonate and place into sealed containers for disposal.

Cover spill with plastic sheet to prevent dissolving in rain or fire fighting water.

DO NOT wash into sewer.

Cupric Acetate is very toxic to aquatic life and it persists and bioaccumulates in the environment.

EXPOSURE LIMITS

- 0.1 mg/m³, 8-hr TWA (as *Copper fume*) OSHA: NIOSH: 0.1 mg/m³, 10-hr TWA (as Copper fume) 0.2 mg/m³, 8-hr TWA (as *Copper fume*) ACGIH:
- IDLH: 100 mg/m³ (as *Copper*)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, nausea, vomiting and abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:	Acetic Acid odor
Flash Point:	Noncombustible
Specific Gravity:	1.9 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	239°F (115°C)
Molecular Weight:	199.7

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >0.1 mg/m³ - Full facepiece APR with High efficiency particulate filter >1 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

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Common Name: CUPRIC NITRATE

Synonyms: Copper Dinitrate; Cupric Dinitrate CAS No: 3251-23-8 Molecular Formula: Cu(HNO₃)₂ RTK Substance No: 0547 Description: Bluish-green, odorless crystalline material

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Cupric Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Cupric Nitrate is a strong OXIDIZER which will react with REDUCING AGENTS and other READILY OXIDIZABLE
0 - Fire	combustion of other substances.	MATERIALS (such as LITHIUM, SODIUM, ALUMINUM
0 - Reactivity	Extinguish fire using an agent suitable for type of surrounding fire. Cupric Nitrate itself does not	and their HYDRIDES); COMBUSTIBLE MATERIALS; ORGANICS; ACETIC ANHYDRIDES; ETHERS;
DOT#: UN 1477	burn.	POTASSIUM FERROCYANIDE; and <i>finely divided</i> TIN.
ERG Guide #: 140	POISONOUS GASES ARE PRODUCED IN FIRE,	Cupric Nitrate is not compatible with ACETYLENE;
Hazard Class: 5.1 (Oxidizer)	including <i>Copper fumes</i> and <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool.	HYDRAZINE; NITROMETHANE; AMMONIA and POTASSIUM AMIDE; SODIUM HYPOBROMITE; METALS; and METAL SALTS.
	Cupric Nitrate may ignite combustibles (wood, paper and oil).	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

- Moisten spilled material first or use a HEPA-filter
- vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Cupric Nitrate is very toxic to aquatic life and bioaccumulates.

EXPOSURE LIMITS

- **OSHA:** 0.1 mg/m³, 8-hr TWA (*Copper fume*)
- **NIOSH:** 0.1 mg/m³, 10-hr TWA (*Copper fume*)
- **ACGIH:** 0.2 mg/m³, 8-hr TWA (*Copper fume*)
- **IDLH:** 100 mg/m³ (as *Copper*)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, nausea, vomiting and abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

Odorless Nonflammable 2.3 (*Anhydrous*) (water = 1) Soluble 338°F (170°C) (*Anhydrous*) 491° to 493°F (255° to 256°C) 187.6

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.1 mg/m ³ - Full facepiece APR with High efficiency filter
	>1 mg/m ³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: CUPRIC SULFATE

Synonyms: Copper Sulfate; Blue Vitriol CAS No: 7758-98-7 Molecular Formula: CuSO₄ RTK Substance No: 0549 Description: Odorless, white or bluish-white granule or crystalline powder

HAZ	ARD	DATA	
			-

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Cupric	Cupric Sulfate reacts with MAGNESIUM to produce flammable and explosive <i>Hydrogen gas</i> and will react with ACETYLENE to form
0 - Fire	Sulfate itself does not burn.	shock-sensitive Copper Acetylides.
0 - Reactivity	POISONOUS GASES ARE	Cupric Sulfate will ignite HYDROXYLAMINE.
	PRODUCED IN FIRE, including	Cupric Sulfate is not compatible with AMINES; METALS (such as
DOT#: UN 3077	Copper Oxides and Sulfur Oxides.	IRON, POTASSIUM, MAGNESIUM and ZINC); REDUCING
ERG Guide #: 171		AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their
Hazard Class: 9		HYDRIDES); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
(Environmentally		CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as
Hazardous Substance)		SODIUM HYDROXIDE and POTASSIUM HYDROXIDE);
,		ISOCYANATES; SODIUM HYPOBROMITE; AMMONIA; and
		NITROMETHANE.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Cover spill with plastic sheet to prevent dissolving in rain or firefighting water.

DO NOT wash into sewer.

Cupric Sulfate is harmful to aquatic life in very low concentrations.

EXPOSURE LIMITS

OSHA:	1 mg/m ³ (Dust), 0.1 mg/m ³ (Fume), 8-hr TWA	
NIOSH:	1 mg/m ³ (Dust), 0.1 mg/m ³ (Fume),10-hr TWA	
ACGIH:	1 mg/m ³ (Dust), 0.2 mg/m ³ (Fume), 8-hr TWA	
	(All the above are for Copper dust and fume)	
IDLH:	100 mg/m ³ (as <i>Copper</i>)	
PAC:	PAC-1 = 7.5 mg/m ³ ; PAC-2 = 10 mg/m ³	
	$PAC_3 = 50 \text{ mg/m}^3$	

PAC-3 = 59 mg/m³

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezingHeadache, nausea, vomiting and
abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	2.3 (water = 1)
Water Solubility:	Soluble
Boiling Point:	1,040° to 1,202°F (560° to 650°C)
Melting Point:	>392°F (>200°C)
Molecular Weight:	249.7

PROTECTIVE EQUIPMENT

Gloves:	Neoprene and Polyvinyl Chloride
Coveralls:	DuPont Tyvek®
Respirator:	>0.1 mg/m ³ - Full facepiece APR with High efficiency particulate filter
	>1 mg/m ³ - Supplied air (Fume)
	>10 mg/m ³ - Supplied air (Dust/Mist)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: CYCLOHEXANE

Synonyms: Benzene Hexahydride; Hexahydrobenzene; Hexamethylene CAS No: 110-82-7 Molecular Formula: C_6H_{12} RTK Substance No: 0565 Description: Colorless liquid with a sweet, pungent odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID	Cyclohexane reacts explosively with
3 - Fire	Use dry chemical, CO ₂ , alcohol-resistant foam or other foam extinguishing agents, as water may not be effective in fighting fires.	NITRATES; NITROGEN DIOXIDE; and DINITROGEN TETRAOXIDE.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	Cyclohexane is not compatible with
_	CONTAINERS MAY EXPLODE IN FIRE.	OXIDIZING AGENTS (such as
DOT#: UN 1145	Use water spray to keep fire-exposed containers cool.	PERCHLORATES, PEROXIDES,
ERG Guide #: 128	Vapors may travel to a source of ignition and flash back.	PERMANGANATES, CHLORATES,
Hazard Class: 3	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	NITRATES, CHLORINE, BROMINE and FLUORINE).
(Flammable)	Cyclohexane may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Metal containers involving the transfer of **Cyclohexane** should be grounded and bonded.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Cyclohexane**.

DO NOT wash into sewer.

Cyclohexane is harmful to aquatic life.

EXPOSURE LIMITS

 OSHA:
 300 ppm, 8-hr TWA

 NIOSH:
 300 ppm, 10-hr TWA

 ACGIH:
 100 ppm, 8-hr TWA

 IDLH:
 1,300 ppm

The Protective Action Criteria values are: PAC-1 = 300 ppm PAC-2 = 1,700 ppm PAC-3 = 10,000 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, lightheadedness,
and passing out

PHYSICAL PROPERTIES

Odor Threshold:	25 ppm
Flash Point:	-4°F (-20°C)
LEL:	1.3%
UEL:	8.4%
Auto Ignition Temp:	473°F (245°C)
Vapor Density:	2.9 (air = 1)
Vapor Pressure:	95 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	177°F (81°C)
Freezing Point:	44°F (7°C)
Ionization Potential:	9.88 eV
Molecular Weight:	84.2

PROTECTIVE EQUIPMENT

	Nitrile, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)	
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)	
•	 >100 ppm - full facepiece APR with Organic vapor cartridges >300 ppm - SCBA 	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: CYCLOHEXANONE

Synonyms: Cyclohexyl Ketone; Pimelic Ketone CAS No: 108-94-1 Molecular Formula: $C_6H_{10}O$ RTK Substance No: 0570

Description: Clear, colorless to pale yellow liquid with a mint or Acetone-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Cyclohexanone is a COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol-resistant	Cyclohexanone forms an explosive <i>Peroxide</i> with HYDROGEN PEROXIDE and NITRIC ACID.
2 - Fire	foam as extinguishing agents.	Cyclohexanone reacts with OXIDIZING AGENTS
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
DOT#: UN 1915	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	CHLORINE, BROMINE and FLUORINE) and
ERG Guide #: 127	Vapors may travel to a source of ignition and flash back.	REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	
	Cyclohexanone may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Metal containers involving the transfer of **Cyclohexanone** should be grounded and bonded. Use only non-sparking tools and equipment, especially

when opening and closing containers of **Cyclohexanone**.

EXPOSURE LIMITS

- OSHA: 50 ppm, 8-hr TWA NIOSH: 25 ppm, 10-hr TWA ACGIH: 20 ppm, 8-hr TWA; 50 ppm STEL
- IDLH: 700 ppm

The Protective Action Criteria values are: PAC-1 = 50 ppm PAC-2 = 50 ppm PAC-3 = 700 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, lightheadedness,
and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.12 to 100 ppm
Flash Point:	111°F (44°C)
LEL:	1.1%
UEL:	9.4%
Auto Ignition Temp:	788°F (420°C)
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	5.2 mm Hg at 77°F (25°C)
Specific Gravity:	0.95 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	313°F (156°C)
Freezing Point:	3°F (-16°C)
Ionization Potential:	9.14 eV
Molecular Weight:	98.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Polyvinyl Alcohol, SilverShield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>20 ppm - full facepiece APR with <i>Organic vapor filters</i> >200 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: CYCLOHEXENE

Synonyms: Benzene Tetrahydride; 1,2,3,4-Tetrahydrobenzene CAS No: 110-83-8 Molecular Formula: C_6H_{10} RTK Substance No: 0572 Description: Clear, colorless liquid with a sweet odor

HAZARD	ΠΔΤΔ
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Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray, alcohol-resistant	Cyclohexene may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire	foam or other foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Water may not be effective in fighting fires.	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2256	POISONOUS GASES ARE PRODUCED IN FIRE.	Cyclohexene can form explosive Peroxides in AIR and may polymerize when exposed to STRONG
ERG Guide #: 130	Use water spray to keep fire-exposed containers cool.	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
Hazard Class: 3	Vapor is heavier than air and may travel a distance to	
(Flammable)	cause a fire, explosion, or flashback far from the	
(source.	
	Flow or agitation may generate electrostatic charges.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of

Cyclohexene.

Keep **Cyclohexene** out of confined spaces, such as sewers, because of the possibility of an explosion.

- OSHA:
 300 ppm, 8-hr TWA

 NIOSH:
 300 ppm, 10-hr TWA

 ACGIH:
 300 ppm, 8-hr TWA

 IDLH:
 2,000 ppm

 The Protective Action Criteria values are:
 PAC-1 = 300 ppm
 - PAC-3 = 500 ppm

HEALTH EFFECTS

Eyes:	Irritation
	Irritation
Skin:	Nose and throat irritation with coughing and wheezing
Inhalation:	Dizziness, lightheadedness, tremors (shakes), collapse and coma.

PHYSICAL PROPERTIES

Odor Threshold:	0.18 to 0.36 ppm
Flash Point:	11°F (-11.7°C)
LEL:	1.2%
UEL:	5%
Auto Ignition Temp:	471° to 590°F (244° to 310°C)
Vapor Density:	2.8 (air = 1)
Vapor Pressure:	67 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	181°F (83°C)
Freezing Point:	-154°F (-103°C)
Ionization Potential:	8.95 eV
Molecular Weight:	82.14

PROTECTIVE EQUIPMENT	
Gloves:	Nitrile, SilverShield®/4H® and Barrier (>8-hr breakthrough for Hydrocarbons, alicyclic, saturated)
Coveralls:	Tychem® F, BR, Responder® and TK; Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons, alicyclic, saturated</i>)
Respirator:	>300 ppm - full facepiece APR with <i>Organic vapor cartridges</i> >500 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: CYCLOHEXYLAMINE

Synonyms: 1-Aminocyclohexane; Hexahydroaniline; Cyclohexanamine CAS No: 108-91-8 Molecular Formula: $C_6H_{13}N$ RTK Substance No: 0576 Description: Clear, colorless to yellow liquid with a strong, fishy odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant	Cyclohexylamine is a STRONG BASE that can react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PEROX
3 - Fire	foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as
0 - Reactivity	Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE.	HYDROCHLORIC, SULFURIC and NITRIC). Cyclohexylamine will react with REDUCING AGENTS (such as
DOT#: UN 2357	including <i>Nitrogen Oxides</i> and <i>Ammonia</i> .	LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to release
ERG Guide #: 132	Use water spray to keep fire-exposed containers cool.	flammable and explosive <i>Hydrogen gas</i> . Cyclohexylamine is not compatible with ISOCYANATES;
Hazard Class: 8 (Corrosive)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash	ORGANIC COMPOUNDS; LEAD; EPOXIDES; ACID CHLORIDES; and ACID ANHYDRIDES.
(<i>/ /</i>	back.	Cyclohexylamine attacks ALUMINUM, COPPER and ZINC.
	Cyclohexylamine may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Cyclohexylamine**.

Metal containers involving the transfer of **Cyclohexylamine** should be grounded and bonded.

Keep **Cyclohexylamine** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

Cyclohexylamine is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA:NoneNIOSH:10 ppm, 10-hr TWAACGIH:10 ppm, 8-hr TWAIDLH:NoneThe Protective Action Criteria values are:PAC-1 = 1.8 ppmPAC-2 = 8.6 ppmPAC-3 = 30 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage	
Skin:	Irritation and burns	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, dizziness, lightheadedness, anxiety and passing out	

PHYSICAL PROPERTIES

Odor Threshold:	2.6 ppm
Flash Point:	88°F (31°C)
LEL:	1.5%
UEL:	9.4%
Auto Ignition Temp:	560°F (293°C)
Vapor Density:	3.42 (air = 1)
Vapor Pressure:	11 mm Hg at 68°F (20°C)
Specific Gravity:	0.865 (water = 1)
Water Solubility:	Very soluble
Boiling Point:	274°F (134°C)
Freezing Point:	0.1°F (-17.7°C)
pH:	11.5
Ionization Potential:	8.37 eV
Molecular Weight:	99.2

PROTECTIVE EQUIPMENT		
Gloves:	SilverShield®/4H® and Barrier® (>4-hr breakthrough for <i>Amines</i> , aliphatic and alicyclic)	
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for <i>Amines, aliphatic</i> and <i>alicyclic</i>) >10% of the LEL use flash protection or turnout gear	
Respirator:	>10 ppm - full facepiece APR with Organic vapor cartridges >30 ppm - SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: CYCLONITE

Synonyms: Hexogen; RDX CAS No: 121-82-4 Molecular Formula: $C_3H_6N_6O_6$ RTK Substance No: 0579 Description: White, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health * - Fire * - Reactivity DOT#: UN 0483 ERG Guide #: 112	* EXPLOSIVE Evacuate and let the fire burn or use large amounts of water from a sheltered position. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool.	Cyclonite detonates on contact with MERCURY FULMINATE. Detonation can also be initiated by SUDDEN SHOCK, HIGH TEMPERATURE and/or FRICTION. Cyclonite reacts violently with COMBUSTIBLES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
Hazard Class: 1.1 (Explosive)	Cyclonite may ignite combustibles (wood, paper and oil).	NITRATES, CHLORINE, BROMINE and FLUORINE); and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).

SPILL/LEAKS

Isolation Distance:

Small Spill: 500 meters (1/3 mile)

Large Spill: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

Use a cleanup specialist .

Keep **Cyclonite** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

This substance is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA:	None
NIOSH:	1.5 mg/m ³ , 10-hr TWA; 3 mg/m ³ , 15-min STEL
ACGIH:	0.5 mg/m ³ , 8-hr TWA
IDLH:	None

HEALTH EFFECTS

Irritation	
Irritation, rash or burning feeling	
Nose and throat irritation	
Headache, nausea, vomiting, weakness, confusion and seizures	
Cancer (liver) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	None
Flash Point:	Explodes
Exothermic Decomp:	212°F (100°C)
Vapor Pressure:	4.1 x 10 ⁻⁹ mm Hg at 68°F (20°C)
Specific Gravity:	1.82 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	528° to 536°F (276° to 280°C)
Melting Point:	402°F (206°C)
Molecular Weight:	222.2

PROTECTIVE EQUIPMENT	
Gloves:	Neoprene
Coveralls:	DuPont Tyvek®
Respirator:	<0.5 mg/m ³ - Full facepiece APR with High efficiency filter >0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.





Common Name: CYCLOPROPANE

Synonym: Trimethylene CAS No: 75-19-4 Molecular Formula: C_3H_6 RTK Substance No: 0588

Description: Colorless gas, or a liquid under pressure, with a mild, sweet, Petroleum-like odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
1 - Health	Cyclopropane is a FLAMMABLE GAS.	Cyclopropane may react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
4 - Fire	DO NOT extinguish fire unless flow can be stopped. Use water in flooding quantities.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE) to cause fires and explosions.
DOT#: UN 1027	CYLINDERS MAY EXPLODE IN FIRE.	
ERG Guide #: 115	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash	
Hazard Class: 2.1	back.	
(Flammable gas)	Flow or agitation may generate electrostatic charge.	

SPILL/LEAKS

Isolation Distance:

Spill: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

If Cyclopropane is leaked, take the following steps:

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Keep **Cyclopropane** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

PAC-1 = 600 ppm PAC-2 = 4,000 ppm

PAC-3 = 6,000 ppm

HEALTH EFFECTS

Eyes:Contact with liquid causes frostbiteSkin:Contact with liquid causes frostbiteInhalation:Headache, dizziness, nausea, loss of
coordination, lightheadedness, and
passing outChronic:Irregular heartbeats (arrhythmias),
difficulty breathing, coma and death

PHYSICAL PROPERTIES

Odor Threshold:	Petroleum-like odor
Flash Point:	Flammable gas
LEL:	2.4%
UEL:	10.4%
Auto Ignition Temp:	928°F (498°C)
Vapor Density:	1.5 (air = 1)
Vapor Pressure:	5,400 mm Hg at 77°F (25°C)
Specific Gravity:	0.68 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	-29°F (-34°C)
Freezing Point:	-197°F (-127°C)
Ionization Potential:	9.86 eV
Molecular Weight:	42

Gloves:	Silver Shield®/4H®, Viton and Barrier® over insulated gloves (>8-hr breakthrough for <i>Hydrocarbons, aliphatic, saturated</i>)
Coveralls:	Tychem® CPF 3, F, BR, LV, Responder®, and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons, aliphatic, saturated</i>)
Respirator:	>600 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention

Immerse affected part in warm water. Seek medical attention.



Common Name: 2,4-D

Synonyms: 2,4-D Acid; Dichlorophenoxyacetic Acid CAS No: 94-75-7 Molecular Formula: $C_8H_6Cl_2O_3$ RTK Substance No: 0593 Description: White to yellow, odorless, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	2,4-D does not burn, however it is often dissolved in a liquid carrier which may be flammable or	2,4-D reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
1 - Fire	combustible.	CHLORATES, NITRATES, CHLORINE, BROMINE and
0 - Reactivity	Use dry chemical, water spray or foam as	FLUORINE) to cause fires and explosions.
DOT# : UN 2765	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	2,4-D is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and
ERG Guide #: 152	including Phosgene and Hydrogen Chloride.	AMMONIA.
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool.	2,4-D attacks some METALS and COATINGS.

Odor Threshold:

Vapor Density:

Vapor Pressure:

Specific Gravity:

Flash Point:

SPILL/LEAKS

Isolation Distance: Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner or use a HEPA-filter vacuum, and deposit in sealed containers.

DO NOT wash into sewer.

Dangerous to aquatic and plant life. Marine pollutant.

EXPOSURE LIMITS

 OSHA:
 10 mg/m³, 8-hr TWA

 NIOSH:
 10 mg/m³, 10-hr TWA

 ACGIH:
 10 mg/m³, 8-hr TWA

 IDLH:
 100 mg/m³

Water Solubility Boiling Point: Melting Point:	Slightly soluble 320°F (160°C) 280°F (138°C)	
Molecular Weig	: 221	
	ROTECTIVE EQUIPMENT	
Gloves:	Natural Rubber and Silver Shield®	
Coveralls:		

Gloves:	Natural Rubber and Silver Shield®	
Coveralls:	DuPont Tychem® Polycoat, CPF 1, QC, SL, and CPF 2;	
	Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC	
Respirator:	>10 mg/m ³ - Full facepiece APR with Organic Vapor	
	cartridges in combination with High efficiency pre-filters	
	or Supplied air	

PHYSICAL PROPERTIES

0.4 mm Hg at 320⁰F (160°C)

Odorless

Nonflammable

1.42 (water = 1)

7.63 (air = 1)

	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Skin:	Irritation Irritation	Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
Inhalation:	Nose, throat and lung irritation with coughing and shortness of breath Headache, nausea, vomiting, muscle weakness, and poor coordination in arms and legs <i>Chlorophenoxy herbicides</i> cause non- Hodgkins lymphoma in humans	 Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed.



Common Name: DECABROMODIPHENYL ETHER

Synonyms: Bis(Pentabromophenyl)Ether CAS No: 1163-19-5 Molecular Formula: C₁₂Br₁₀O RTK Substance No: 0598 Description: White to off-white powder

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
3 - Health 0 - Fire 0 - Reactivity DOT#: None ERG Guide #: None Hazard Class: None	 Extinguish fire using an agent suitable for type of surrounding fire. Decabromodiphenyl Ether itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Bromide</i> and <i>Carbonyl Bromide</i>. Use water spray to keep fire-exposed containers cool. 	Decabromodiphenyl Ether is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Protect from DIRECT SUNLIGHT, MOISTURE and STATIC DISCHARGE.		

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Flash Point:	Nonflammable
Spill: 25 meters (75 feet)	Vapor Pressure:	<1 mm Hg at 68°F (20°C)
Fire: 800 meters (1/2 mile)	Specific Gravity:	3 (water = 1)
	Water Solubility:	Insoluble
Moisten spilled material first or use a HEPA-filter	Boiling Point:	797°F (425°C)
vacuum for clean-up and place into sealed containers for disposal.	Melting Point:	560° to 577°F (293° to 303°C)
	Molecular Weight:	952.2
	monocalar Wolght.	

EXPOSURE LIMITS

No occupational exposure limits have been established for Decabromodiphenyl Ether.

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Natural Rubber and Polyvinyl Chloride
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with <i>P100 filters</i> High levels - SCBA

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation
Chronic:	Cancer (liver) in animals

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: DIACETONE ALCOHOL

Synonyms: 2-Methyl-2-Pentanol-4-One CAS No: 123-42-2 Molecular Formula: $C_6H_{12}O_2$ RTK Substance No: 0606 Description: Clear, colorless liquid with a pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
1 - Health 2 - Fire 0 - Reactivity DOT#: UN 1148 ERG Guide #: 129 Hazard Class: 3	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance	Diacetone Alcohol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to form flammable and explosive <i>Hydrogen gas</i> . Diacetone Alcohol is decomposed by STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and AMINES to form	
(Flammable)	to cause a fire or explosion far from the source.	Acetone and Mesityl Alcohol.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

PHYSICAL PROPERTIES

Odor Threshold:	0.28 ppm
Flash Point:	126° to 147°F (52° to 64°C)
LEL:	1.8%
UEL:	6.9%
Auto Ignition Temp:	1,118° to 1,190°F (603° to 643°C)
Vapor Density:	4 (air = 1)
Vapor Pressure:	1 mm Hg at 68°F (20°C)
Specific Gravity:	0.94 (water = 1)
Water Solubility:	Miscible
Boiling Point:	328° to 334°F (164° to 168°C)
Freezing Point:	-45° to -53°F (-43° to -47°C)
Molecular Weight:	116.2

EXPOSURE LIMITS

 OSHA:
 50 ppm, 8-hr TWA

 NIOSH:
 50 ppm, 10-hr TWA

 ACGIH:
 50 ppm, 8-hr TWA

 IDLH:
 1,800 ppm

The Protective Action Criteria values are: PAC-1 = 50 ppm PAC-2 = 50 ppm PAC-3 = 1,800 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing Headache, dizziness, weakness, lightheadedness, and passing out

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Barrier® (>8-hr breakthrough)	
Coveralls:	Tychem® BR and Responder®, and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Ketones</i>)	
Respirator:	>50 ppm - full facepiece APR with Organic vapor cartridges >500 ppm - SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 4,4'-DIAMINODIPHENYL ETHER

Synonyms: 4,4'-Oxydianiline; DADPE CAS No: 101-80-4 Molecular Formula: C₁₂H₁₂N₂O RTK Substance No: 0612 Description: Colorless crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	4,4'-Diaminodiphenyl Ether may burn, but does not readily ignite.	4,4'-Diaminodiphenyl Ether is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
0 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	resistant foam as extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC,
DOT#: N/A	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	SULFURIC and NITRIC).
ERG Guide #: N/A Hazard Class: N/A	Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Does not bioaccumulate in aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for 4,4'-Diaminodiphenyl Ether.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation
Chronic:	Cancer (liver and thyroid) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	426°F (219°C)
Vapor Pressure:	3.07 x 10 ⁻⁷ mm Hg at 77°F (25°C)
Water Solubility:	Insoluble
Boiling Point:	>572°F (300°C)
Melting Point:	367° to 368°F (186° to 187°C)
pH:	5
Molecular Weight:	200.3

PROTECTIVE EQUIPMENT Gloves: Nitrile and Polyethylene **Coveralls:** DuPont Tyvek® **Respirator:** Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

New Jersey Department of Health

Common Name: DIAZINON

Synonyms: Dimpylate; Basudin®; Spectracide® CAS No: 333-41-5 Molecular Formula: C₁₂H₂₁N₂O₃PS RTK Substance No: 0618

Description: Colorless, nearly odorless liquid *Organophosphate* pesticide when pure; the technical product is pale to dark brown with a faint odor; and the commercial products may be liquids, solids or powders

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Diazinon does not burn, however, it is often dissolved in a liquid carrier which may be	Diazinon may react with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to
1 - Fire	flammable or combustible.	form highly toxic and flammable <i>Phosphine gas</i> .
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Diazinon is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 2783	POISONOUS GASES ARE PRODUCED IN FIRE,	PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 152	including Nitrogen Oxides, Sulfur Oxides and Phosphorus Oxides.	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
Hazard Class: 6.1	Use water spray to keep fire-exposed containers cool.	NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); COPPER COMPOUNDS; and WATER.

SPILL/LEAKS

Isolation Distance:

Spill (liquid): 50 meters (150 feet)

Spill (solid): 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Keep *flammable solutions* of **Diazinon** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 0.1 mg/m³, 10-hr TWA

ACGIH: 0.01 mg/m³, 8-hr TWA

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene (>8-hr breakthrough for Organophosphorus compounds)
Coveralls:	Tychem® CSM (>8-hr breakthrough)
Respirator:	SCBA

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Headache, sweating, nausea and vomiting, loss of coordination, and death (<i>Organophosphate poisoning</i>)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Shampoo hair immediately if contaminated.

σμνεισλι	PROPERTIES
PHISICAL	PROPERTIES

Flash Point:	82 ° to 180 °F (28 ° to 82 °C) (for Diazinon in <i>solution</i> , pure Diazinon is difficult to burn)
Auto Ignition Temp:	>752 °F (>400 °C)
Vapor Pressure:	0.0001 mm Hg at 68 [°] F (20 [°] C) (<i>Solid</i>)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	>248 °F (>120 °C) (Decomposes)
Molecular Weight:	304.4



Common Name: DIBENZ(a,h)ANTHRACENE

Synonyms: 1,2,5,6-DBA; 1,2,5,6-Dibenzanthracene CAS No: 53-70-3 Molecular Formula: $C_{22}H_{14}$ RTK Substance No: 0622 Description: Colorless, white or light yellow, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Dibenz(a,h)Anthracene may burn, but does not readily ignite.	Dibenz(a,h)Anthracene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers	Protect from SUNLIGHT.
ERG Guide #: 171	cool.	
Hazard Class: 9		
(Environmentally Hazardous Substance)		

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Vapor Pressure:	1 x 10 ⁻¹⁰ mm Hg at 68°F (20°C)
Spill: 25 meters (75 feet)	Specific Gravity:	1.28 (water = 1)
Fire: 800 meters (1/2 mile)	Water Solubility:	Insoluble
Moisten spilled material first or use a HEPA-filter	Boiling Point:	975°F (524°C)
vacuum for clean-up and place into sealed containers for disposal.	Melting Point:	511° to 513°F (266° to 267°C)
DO NOT wash into sewer.	Molecular Weight:	278.36
Dibenz(a,h)Anthracene may bioaccumulate in sea food.		

EXPOSURE LIMITS

No occupational exposure limits have been established for **Dibenz(a,h)Anthracene**.

The Protective Action Criteria values are:

PAC-1 = 0.0025 mg/m^3

 $PAC-2 = 0.015 \text{ mg/m}^3$

 $PAC-3 = 15 \text{ mg/m}^3$

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation, skin rash, dryness and redness
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, nausea and vomiting
Chronic:	Cancer (lung, skin, mammary) in animals

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with P100 filters >15 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: DIBENZ[a,j]ACRIDINE

Synonyms: 1,2,7,8-Dibenzacridine CAS No: 224-42-0 Molecular Formula: $C_{21}H_{13}N$ RTK Substance No: 0623 Description: Yellow, crystalline powder or solid

HA	ZARD	DATA	

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Dibenz[a,j]Acridine may burn, but does not readily ignite.	Dibenz[a,j]Acridine may react with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and
1 - Fire	Use dry chemical, CO ₂ , water spray or foam as	their HYDRIDES) to produce flammable Hydrogen gas.
0 - Reactivity	extinguishing agents.	Dibenz[a,j]Acridine is not compatible with HALIDES
DOT#: None	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	(such as CHLOROFLUOROCARBONS, METHYLENE CHLORIDE and METHYL BROMIDE) and SULFATES.
ERG Guide #: None	Use water spray to keep fire-exposed containers	
Hazard Class: None	cool. Dibenz[a,j]Acridine may form an explosive dust/air mixture.	

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Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Dibenz[a,j]Acridine**.

PHYSICAL PROPERTIES

Flash Point: Water Solubility: Melting Point: Molecular Weight: May burn Insoluble 421° to 426°F (216° to 219°C) 279.35

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Neoprene Coveralls: Tyvek®

Respirator:

r: Spill: full facepiece APR with *P100 filters* Fire: SCBA

HEALTH EFFECTS		FIRST
Eyes: Skin: Inhalation:	Irritation Irritation Nose and throat irritation with coughing and wheezing Headache, dizziness, nausea and vomiting	Remove the person Flush eyes with la contact lenses if w Quickly remove or large amounts of Begin artificial res
Chronic:	Cancer (lung and skin) in animals	Transfer promptly

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.





Common Name: DIBORANE

Synonyms: Boroethane; Boron Hydride CAS No: 19287-45-7 Molecular Formula: B₂H₆ RTK Substance No: 0629

Description: Colorless gas with a sickly, sweet odor which is usually shipped in pressurized cylinders diluted with Hydrogen, Argon, Nitrogen or Helium

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health	FLAMMABLE AND REACTIVE GAS that can ignite on contact with AIR.	Diborane will ignite spontaneously in MOIST AIR at room temperature and will react with WATER, ALCOHOLS, and
4 - Fire	Stop flow of gas and allow to burn out or use dry	HALOGENATED COMPOUNDS (such as CARBON
3-₩ - Reactivity	chemical or <i>liquid Nitrogen</i> as extinguishing agents. DO NOT USE WATER or HALOGENATED	TETRACHLORIDE and TRICHLOROETHYLENE) to generate flammable and explosive <i>Hydrogen gas</i> and shock-sensitive mixtures.
DOT#: UN 1911	AGENTS to extinguish fire as fires and explosions will occur.	Diborane reacts explosively with BENZENE VAPOR; NITRIC ACID; TETRAVINYL LEAD; DIMETHYL SULFOXIDE; and OXIDIZING
ERG Guide #: 119	POISONOUS GASES ARE PRODUCED IN FIRE,	AGENTS (such as PERCHLORATES, PEROXIDES,
Hazard Class: 2.3 (Poisonous Gas)	including <i>Hydrogen, Boric Acid</i> , and <i>Boric Oxide</i> . CYLINDERS MAY EXPLODE IN FIRE.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
(,)	Use water spray only to keep fire-exposed containers cool.	Diborane will react with AMMONIA; METAL OXIDES; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and other READILY OXIDIZABLE MATERIALS to form <i>Hydrides</i> which may ignite spontaneously in air.

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 300 meters (1,000 feet)

Fire: 1,600 meters (1 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Keep Diborane out of confined spaces, such as sewers, because of the possibility of an explosion. Use only non-sparking tools and equipment, especially when opening and closing containers of Diborane.

EXPOSURE LIMITS

OSHA: 0.1 ppm, 8-hr TWA

IDLH: 15 ppm

The Protective Action Criteria values are:

PAC-1 = 0.15 ppm

PAC-2 = 1 ppm

PAC-3 = 3.7 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, dizziness, nausea, vomiting, tremor, convulsions and confusion

PHYSICAL PROPERTIES

Odor Threshold: 2.5 p	ppm
Flash Point: -130	°F (-90°C)
LEL: 0.8%)
UEL: 98%	
Auto Ignition Temp: 104°	to 122°F (40° to 50°C)
Vapor Density: 0.96	(air = 1)
Vapor Pressure: 224	mm Hg at -170°F (-112°C)
Specific Gravity: 0.2 t	o 0.4 (water = 1)
Water Solubility: Dec	omposes
Boiling Point: -135	°F (-93°C)
Melting Point: -265	°F (-165°C)
Ionization Potential: 11.4	eV
Molecular Weight: 27.7	

PROTECTIVE EQUIPMENT

Gloves:	Plastic, Butyl or Rubber (<1-hr breakthrough)
Coveralls:	Tychem $\ensuremath{\mathbb{B}}\xspace$ BR, LV, Responder $\ensuremath{\mathbb{B}}\xspace$ and TK (>8-hr breakthrough)
Respirator:	>0.1 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: DI-n-BUTYL PHLTHALATE

Synonyms: n-Butyl Phthalate; DBP; Dibutyl 1,2-Benzenedicarboxylate CAS No: 84-74-2 Molecular Formula: $C_{16}H_{22}O_4$ RTK Substance No: 0773 Description: Colorless to slightly yellow, oily liquid with a slight odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 1 - Fire 0 - Reactivity DOT#: UN 3082 ERG Guide #: 171 Hazard Class: 9 (Environmentally Hazardous Substance)	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. Water jets may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	Di-n-Butyl Phthalate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Di-n-Butyl Phthalate is toxic to aquatic organisms.

EXPOSURE LIMITS

 OSHA:
 5 mg/m³, 8-hr TWA

 NIOSH:
 5 mg/m³, 10-hr TWA

 ACGIH:
 5 mg/m³, 8-hr TWA

 IDLH:
 4,000 mg/m³, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 15 mg/m³ PAC-2 = 75 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation
	Headache, dizziness and seizures

PHYSICAL PROPERTIES

Odor Threshold:	Faint odor (<i>aromatic</i>)
Flash Point:	315°F (157°C)
LEL:	0.5%
UEL:	2.5%
Auto Ignition Temp:	757°F (403°C)
Vapor Density:	9.6 (air = 1)
Vapor Pressure:	<1 mm Hg at 68°F (20°C)
Specific Gravity:	1.0 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	644°F (340°C)
Freezing Point:	-31°F (-35°C)
Molecular Weight:	278.34

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, SilverShield®/4H® and Viton (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough for <i>Esters</i> , <i>Carboxylic</i>)
Respirator:	>5 mg/m ³ - Full facepiece APR with <i>High efficiency filters</i> >50 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: DICAMBA

Synonyms: Banvel; Mediben CAS No: 1918-00-9 Molecular Formula: $C_8H_6Cl_2O_3$ RTK Substance No: 0634 Description: Colorless, white or brown crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
1 - Health 1 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Dicamba itself does not burn.	Dicamba is not compatible with SULFURIC ACID; STRONG BASES (such as SODIUM HYDROXIDE and
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> .	POTASSIUM HYDROXIDE); AMMONIA, ALIPHATIC AMINES; ALKANOLAMINES; ISOCYANATES;
DOT#: UN 2769	Use water spray to keep fire-exposed containers	ALKYLENE OXIDES; and EPICHLOROHYDRIN.
ERG Guide #: 151	cool.	
Hazard Class: 6.1 (Poison)		

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance: 25 meters (75 feet)	Odor Threshold:	250.8 ppm
Fire: 800 meters (1/2 mile)	Flash Point:	Not combustible
Collect powdered material in the most convenient and safe manner and deposit in sealed containers.	Vapor Density:	7.64 (air = 1)
	Vapor Pressure:	0.00375 mm Hg at 212°F (100°C)
Dicamba is harmful to aquatic organisms.	Specific Gravity:	1.56 (water =1)
	Water Solubility:	Slightly soluble
	Melting Point:	237° to 241°F (114° to 116°C)
	Molecular Weight:	221

EXPOSURE LIMITS		PROTECTIVE EQUIPMENT
No occupational exposure limits have been	Gloves:	Rubber
established for Dicamba .	Coveralls:	DuPont Tyvek®
	Respirator:	APR with High efficiency filters or Supplied air

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes:	Irritation, burns	Remove the person from exposure.
Skin:Irritation, burnsInhalation:Nose, throat and lung irritation with coughing and shortness of breath Headache, nausea, vomiting and muscle weakness	Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.	
	Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.	
	Begin artificial respiration if breathing has stopped and CPR if necessary.	
		Transfer to a medical facility.
		January 2008



Common Name: 3,3'-DICHLOROBENZIDINE

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
3 - Health	3,3'-Dichlorobenzidine may burn, but does not readily ignite.	3,3'-Dichlorobenzidine ma y react with REDUCING AGENTS (such as LIT HIUM, SODIUM, ALUMINUM an d	
1 - Fire	Use dry chemical, CO ₂ , water spray, alcohol-	their HYDRIDES) to pr oduce flamm able and e xplosive	
0 - Reactivity	resistant foam or other foam as extinguishing agents.	Hydrogen gas.	
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE,		
ERG Guide #: 171	including Nitrogen Oxides and Hydrogen		
Hazard Class: 9 (Environmentally Hazardous Substance)	<i>Chlorides.</i> Use water spray to keep fire-exposed containers cool.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

3,3'-Dichlorobenzidine is toxic to aquatic organisms.

EXPOSURE LIMITS

Exposure by all routes should be controlled to levels as low as possible.

The Protective Action Criteria values are:

- PAC-1 = 6 mg/m^3
- $PAC-2 = 40 \text{ mg/m}^3$
- $PAC-3 = 2.000 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, nausea and
vomitingChronic:Cancer (liver, breast, bladder) in animals

PHYSICAL PROPERTIES

Auto Ignition Temp:	662°F (350°C)
Water Solubility:	Insoluble
Boiling Point:	788°F (420°C)
Melting Point:	270° to 271°F (132° to 133°C)
Molecular Weight:	253.13

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator:

Full facepiece APR with *P100 filters* >6 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 1,1-DICHLOROETHANE

Synonyms: 1,1-DCE; Ethylidene Chloride CAS No: 75-34-3 Molecular Formula: $C_2H_4Cl_2$ RTK Substance No: 0651 Description: Colorless, oily liquid with an *Ether* or *Chloroform*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID	1,1 Dichloroethane reacts violently with OXIDIZING
3 - Fire	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. Solid	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	streams of water may not be effective.	CHLORINE, BROMINE and FLUORINE) and POTASSIUM.
DOT#: UN 2362	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phosgene</i> .	1,1 Dichloroethane is not compatible with AMINES;
ERG Guide #: 130	CONTAINERS MAY EXPLODE IN FIRE.	STRONG BASES (such as SODIUM HYDROXIDE and
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	POTASSIUM HYDROXIDE); ALKALI METALS (such as LITHIUM, SODIUM and CESIUM); and ALKALINE EARTH METALS (such as BARIUM, MAGNESIUM and CALCIUM).

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit into sealed containers. Keep **1,1 Dichloroethane** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

1,1 Dichloroethane is a marine pollutant.

EXPOSURE LIMITS

OSHA:	100 ppm, 8-hr TWA	
NIOSH:	100 ppm, 10-hr TWA	
ACGIH:	100 ppm, 8-hr TWA	
IDLH:	3,000 ppm	

HEALTH EFFECTS		
Eyes: Skin:	Irritation Irritation	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, nausea, vomiting, dizziness and passing out	
Chronic:	Cancer (liver, circulatory, and mammary gland) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	100 to 200 ppm
Flash Point:	2°F (-17°C)
LEL:	5.4%
UEL:	16%
Auto Ignition Temp:	856°F (458°C)
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	182 mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	135° to 138°F (57° to 59°C)
Ionization Potential:	11.06 eV
Molecular Weight:	99

	PROTECTIVE EQUIPMENT
Gloves:	Viton (2.4-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder® and TK; Zytron® 500; and ONESuit® TEC (>8-hr breakthrough for <i>Halogen compounds</i>)
Respirator:	>100 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: 1,2-DICHLOROETHANE

Synonyms: 1,2-DCE; Ethylene Dichloride CAS No: 107-06-2 Molecular Formula: $C_2H_4Cl_2$ RTK Substance No: 0652 Description: Clear, colorless liquid with a pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant foam	1,2-Dichloroethane may explode when mixed with <i>liquid</i> AMMONIA; NITROGEN TETROXIDE; and other
3 - Fire	as extinguishing agents.	OXIDIZING AGENTS (such as PERCHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride, Vinyl Chloride, Acetylene and Phosgene.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 1184	CONTAINERS MAY EXPLODE IN FIRE.	1,2-Dichloroethane is not compatible with STRONG
ERG Guide #: 131	Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); CHEMICALLY ACTIVE METALS (such as
Hazard Class: 3	fire or explosion far from the source.	POTASSIUM, SODIUM, MAGNESIUM and ZINC); ALKALI AMIDES (such as SODIUM AMIDE).
(Flammable)	Flow or agitation may generate electrostatic charges.	· · · · · · · · · · · · · · · · · · ·
. ,	1,2-Dichloroethane may form an ignitable vapor/air mixture in closed tanks or containers.	1,2-Dichloroethane attacks METALS in the presence of WATER.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **1,2-Dichloroethane**.

Use foam to blanket release and to suppress vapors.

Keep **1,2-Dichloroethane** out of confined spaces, such as sewers, because of the possibility of an explosion.

Sewers, because of the pos

DO NOT wash into sewer.

1,2-Dichloroethane is dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

NIOSH:1 ppm, 10-hr TWA; 2 ppm, CeilingACGIH:10 ppmIDLH:50 ppmThe Protective Action Criteria values are:PAC-1 = 50 ppmPAC-2 = 200 ppmPAC-3 = 300 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, lightheadedness, confusion, tremor, loss of memory and even passing out
Chronic:	Cancer (blood vessel, lung, breast) in animals

PHYSICAL PROPERTIES

Odor Threshold:	88 ppm
Flash Point:	56°F (13°C)
LEL:	6.2%
UEL:	15.9%
Auto Ignition Temp:	775°F (413°C)
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	64 mm Hg at 68°F (20°C)
Specific Gravity:	1.25 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	182°F (83°C)
Freezing Point:	-32°F (-36°C)
Ionization Potential:	11.05 eV
Molecular Weight:	98.96

Gloves:	SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	SCBA

PROTECTIVE FOLIIPMENT

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.
- Medical observation is recommended as symptoms may be delayed.



Common Name: DICHLOROFLUOROMETHANE

Synonyms: HCFC-21; CFC 21; Freon® 21; Halon® 112; Genetron® 21 CAS No: 75-43-4 Molecular Formula: CHCl₂F RTK Substance No: 3109 Description: Colorless gas, or a compressed liquefied gas, with a sweet *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Dichlorofluoromethane itself	Dichlorofluoromethane reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC)
0 - Fire	does not burn.	and ACID FUMES to produce toxic and corrosive
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	Hydrogen Fluoride and Hydrogen Chloride gases.
o nouonny	including Hydrogen Fluoride, Carbonyl Fluoride,	Dichlorofluoromethane is not compatible with
DOT#: UN 1029	Hydrogen Chloride, and Phosgene.	POWDERED ALUMINUM; MAGNESIUM; ZINC;
ERG Guide #: 126	CONTAINERS MAY EXPLODE IN FIRE.	SODIUM; POTASSIUM; CALCIUM; and OXIDIZING
Hazard Class: 2.2 (Nonflammable)	Use water spray to keep fire-exposed containers cool.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).

SPILL/LEAKS

Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Turn leaking cylinder with leak up to prevent escape of gas in the liquid state.

DO NOT DIRECT water jet on liquid.

DO NOT wash into sewer.

Dichlorofluoromethane is considered to be an *Ozone* depleting substance.

EXPOSURE LIMITS

Dichlorofluoromethane is an asphyxiant at high concentrations.

 NIOSH:
 10 ppm, 10-hr TWA

 ACGIH:
 10 ppm, 8-hr TWA

IDLH: 5,000 ppm

The Protective Action Criteria values are:

PAC-1 = 30 ppm PAC-2 = 100 ppm PAC-3 = 5,000 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation. Contact with liquid causes frostbite
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/or shortness of breath
	Headache, dizziness, lightheadedness, confusion, tremors, unconsciousness and death

PHYSICAL PROPERTIES

Odor Threshold:	<i>Ether</i> -like
Flash Point:	Nonflammable gas
Auto Ignition Temp:	972°F (522°C)
Vapor Density:	3.8 (air = 1)
Vapor Pressure:	1,193 mm Hg at 70°F (21°C)
Specific Gravity:	1.48 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	48°F (8.9°C)
Freezing Point:	-211°F (-135°C)
Ionization Potential:	12.39 eV
Molecular Weight:	102.92

PROTECTIVE EQUIPMENT

Gloves:	Insulated Neoprene (<1-hr breakthrough) and Barrier ${ m (>8-hr}$ breakthrough)
Coveralls:	Tychem® Responder® (>8-hr breakthrough)
Respirator:	>30 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Immerse affected part in warm water. Seek medical attention.



Common Name: 1,3-DICHLOROPROPENE

Synonyms: DCP; 3-Chloroallyl Chloride CAS No: 542-75-6 Molecular Formula: $C_3H_4Cl_2$ RTK Substance No: 0666

Description: Clear to straw-colored liquid with a sharp, sweet, irritating (Chloroform-like) odor

HAZARD DATA					
Hazard Rating					ivity
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 2047 ERG Guide #: 129 Hazard Class: 3 (Flammable)	Firefighting FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		1,3-Dic reactio ALLOY and FL (such a ZINC); 1,3-Dic AGEN PERM, STROM	hloropropene may polymerize (uncontrolled n) with ALUMINUM and MAGNESIUM (and their 'S); HALOGENS (such as CHLORINE, BROMINE UORINE); CHEMICALLY ACTIVE METALS as POTASSIUM, SODIUM, MAGNESIUM and and METAL SALTS. hloropropene is not compatible with OXIDIZING TS (such as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, and NITRATES); NG ACIDS (such as HYDROCHLORIC, JRIC and NITRIC); and STRONG BASES (such as IM HYDROXIDE and POTASSIUM HYDROXIDE).	
SPI	LL/LEAKS			ΡΗ	SICAL PROPERTIES
Isolation Distance: Small Spill: 60 meters (150 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep 1,3-Dichloropropene out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Low to moderate toxicity to birds and aquatic life.			Odor Thresho Flash Point: LEL: UEL: Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point: Melting Point Molecular We	/: re: ity: ity: ight:	1 to 3 ppm 77° to 95°F (25° to 35°C) 5% 14.5% 3.8 (air = 1) 28 mm Hg at 68°F (20°C) 1.2 (water =1) Very slightly soluble 219°F (104°C) 232°F (111°C) 111
	SURE LIMITS			PRO	TECTIVE EQUIPMENT
OSHA: None NIOSH: 1 ppm, 10-1 ACGIH: 1 ppm, 8-hr IDLH: None			Gloves: Coveralls: Respirator:	DuPont and Sai haloger	 8-hr breakthrough) Responder® and CSM; Kappler® Zytron® 500; int-Gobain ONESuit® TEC (>8-hr breakthrough for a compounds) Supplied air
HEAL	TH EFFECTS		FIRS		AND DECONTAMINATION
Skin: Irritation Inhalation: Nose, th coughin breath Headac vomiting	a and burns a and burns proat and lung irritation with g, wheezing and shortness of he, dizziness, nausea and g, and passing out (bladder and lung) in animals		contact lenses Quickly removes skin with large Begin artificial	th large a s if worn. ve contar e amounts respirati	m exposure. Imounts of water for at least 15 minutes. Remove Seek medical attention immediately. ninated clothing. Immediately wash contaminated s of soap and water. on if breathing has stopped and CPR if necessary. medical facility.



Common Name: 2,2-DICHLOROPROPIONIC ACID

Synonyms: Dalapon; 2,2-DPA CAS No: 75-99-0 Molecular Formula: C₃H₄Cl₂O₂ RTK Substance No: 0668

Description: Colorless liquid, or the commercial product can be a light tan powder, with a strong, sharp odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. 2,2-Dichloropropionic Acid	2,2-Dichloropropionic Acid reacts slowly with WATER and MOIST AIR to produce corrosive <i>Hydrogen Chloride</i> .		
0- Fire	itself does not burn.	2,2-Dichloropropionic Acid attacks and corrodes		
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN	ALUMINUM, COPPER and their ALLOYS.		
DOT# : UN 1760	FIRE, including <i>Hydrogen Chloride</i> . Use water spray to keep fire-exposed containers	2,2-Dichloropropionic Acid is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,		
ERG Guide #: 154	cool.	PEROXIDES, PERMANGANATES, CHLORATES,		
Hazard Class: 8		NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC		
(Corrosive)		and NITRIC).		

SPILL/LEAKS

Odor Threshold:	Strong, sharp odor
Flash Point:	Noncombustible
Vapor Density:	4.9 (air = 1)
Vapor Pressure:	5.1 mm Hg at 160°F (71°C)
Specific Gravity:	1.4 (water = 1)
Water Solubility:	Soluble
Boiling Point:	374°F (190°C)
Melting Point:	46°F (8°C)
Molecular Weight:	143
	Flash Point: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point:

EXPOSURE LIMITS

NIOSH: 1 ppm (6 mg/m³), 10-hr TWA

ACGIH: 5 mg/m³, 8-hr TWA

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Neoprene, Silver Shield®/4H®, Viton and Barrier® (>4-hr breakthrough for <i>Acids, carboxylic, substituted</i>)
Coveralls:	Tychem® F, BR, Responder® and TK (>8-hr break- through for <i>Acids, carboxylic, substituted</i>)
Respirator:	>5 mg/m ³ - APR with <i>Organic vapor</i> cartridges and <i>P100</i> <i>prefilters</i> >50 mg/m ³ - SCBA

PHYSICAL PROPERTIES

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION	
Eyes:	Severe irritation, burns and possible eye damage	Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove	; ;
Skin:	Irritation and burns	contact lenses if worn. Seek medical attention.	
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of	Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.	I
	breath	Begin artificial respiration if breathing has stopped and CPR if necessary	/.
	Headache, dizziness, weakness, nausea and vomiting	Transfer promptly to a medical facility.	



Common Name: DIELDRIN

Synonyms: HEOD; Octalox®; Quintox® CAS No: 60-57-1 Molecular Formula: C₁₂H₈Cl₆O RTK Substance No: 0683

Description: White (when pure) to light-tan, crystalline or flaked powder with a chemical-like odor

	HAZARD DATA				
Hazard Rating	Firefighting	Reactivity			
2 - Health	Dieldrin does not burn, however, it is often dissolved in a liquid carrier which may be	Dieldrin may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,			
0 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,			
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and	CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and			
DOT#: UN 2761	Chlorine.	NITRIC).			
ERG Guide #: 151	Use water spray to keep fire-exposed containers cool.	Dieldrin is not compatible with MINERAL ACIDS; ACID CATALYSTS; PHENOLS; METALS (such as COPPER,			
Hazard Class: 6.1	cool.	ZINC, and IRON and their SALTS); and ALKALI METALS			
(Poison)		(such as MAGNESIUM, SODIUM and POTASSIUM).			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Ventilate and wash area after clean-up is complete.

DO NOT wash into sewer.

Dieldrin is very toxic to aquatic life and bees. It is also persistent in the environment.

EXPOSURE LIMITS

 OSHA:
 0.25 mg/m^3 , 8-hr TWA

 NIOSH:
 0.25 mg/m^3 , 10-hr TWA

 ACGIH:
 0.25 mg/m^3 , 8-hr TWA

 IDLH:
 50 mg/m^3

 The Protective Action Criteria values are:
 PAC-1 = 0.75 mg/m^3

 PAC-2 = 2.5 mg/m^3

 PAC-3 = 50 mg/m^3

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	No information available
Inhalation:	Headache, nausea, vomiting, dizziness, lightheadedness, and passing out
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.041 ppm
Flash Point:	Noncombustible
Vapor Density:	13.2 (air = 1)
Vapor Pressure:	8 x 10 ⁻⁷ mm Hg at 68°F (20°C)
Specific Gravity:	1.75 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	Decomposes
Melting Point:	347° to 349°F (175° to 176°C)
Molecular Weight:	380.9

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.25 mg/m ³ - Supplied air >0.75 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and immediately wash contaminated skin with large amounts of soap and water.



Common Name: DIETHANOLAMINE

Synonyms: DEA; 2,2'-Dihydroxydiethylamine; Ethanol, 2,2'-Iminobis-CAS No: 111-42-2 Molecular Formula: C₄H₁₁NO₂ RTK Substance No: 0686 Description: White, crystalline solid or colorless to yellow, syrupy liquid with a mild *Ammonia*-like odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire	Diethanolamine may burn, but does not readily ignite. Use dry chemical, CO ₂ , water spray or	Diethanolamine reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
0 - Reactivity DOT#: UN 1760 ERG Guide #: 154	alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	Diethanolamine is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALDEHYDES; KETONES; ACRYLATES; ORGANIC ANHYDRIDES; ORGANIC HALIDES; FORMATES; and OXALATES.
Hazard Class: 8 (Corrosive)	Use water spray to keep fire-exposed containers cool.	Diethanolamine reacts with NITROGEN COMPOUNDS (such as SODIUM NITRITE and NITROGEN OXIDES) to form cancer-causing <i>Nitrosamines</i> . Diethanolamine reacts with CARBON DIOXIDE and absorbs MOISTURE in the air.
		Diethanolamine is corrosive to ALUMINUM, COPPER, ZINC, and GALVANIZED IRON.

SPILL/LEAKS	Pł	IYSICAL PROPERTIES
Isolation Distance:	Odor Threshold:	0.27 ppm
Spill (solid): 25 motors (75 foot)	Flash Point:	273° to 342°F (134° to 172°C)
Spill (solid): 25 meters (75 feet)	LEL:	1.6%
Spill (liquid): 50 meters (150 feet)	UEL:	9.8%
Fire: 800 meters (1/2 mile)	Auto Ignition Temp:	1,224°F (662°C)
	Vapor Density:	3.65 (air = 1)
Absorb liquids in dry sand, earth, or a similar material	Vapor Pressure:	<0.01 mm Hg at 68°F (20°C)
and place into sealed containers for disposal.	Specific Gravity:	1.1 (water = 1)
Moisten solid spilled material first or use a HEPA-filter	Water Solubility:	Very soluble
vacuum for clean-up and place into sealed containers	Boiling Point:	514°F (268°C)
for disposal.	Melting Point:	82°F (28°C)
DO NOT wash into sewer.	Critical Temp:	828°F (442°C)
Diethanolamine is harmful to aquatic organisms.	Molecular Weight:	105.2
EXPOSURE LIMITS	DD	
NIOSH: 15 mg/m ³ , 10-hr TWA	SH: 15 mg/m ³ , 10-hr TWA Gloves: Butyl, Nitrile, Neoprene, Polyvinyl Chloride, Viton and	

Coveralls:

Respirator:

NIOSH:	15 mg/m°, 10-hr TWA
ACGIH:	1 mg/m ³ , 8-hr TWA

The Protective Action Criteria values are: PAC-1 = 25 mg/m³ PAC-2 = 150 mg/m³ PAC-3 = 300 mg/m³

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing

>10 mg/m³ or Fire - SCBA

P100 cartridges

Tychem® CPF 3 and CSM (>8-hr breakthrough)

>1 mg/m³ - full facepiece APR with Organic vapor and

Barrier® (>8-hr breakthrough)

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: DIETHYL CARBINOL

Synonyms: Isoamyl Alcohol; Pentan-3-ol; 3-Pentanol CAS No: 584-02-1 Molecular Formula: $C_5H_{12}O$ RTK Substance No: 0696 Description: Colorless liquid with a strong, sweet odor

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Hazard Rating	Firefighting	Reactivity
1 - Health	Diethyl Carbinol is a COMBUSTIBLE LIQUID that may become HIGHLY FLAMMABLE in the	Diethyl Carbinol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
2 - Fire	presence of SPARKS and STATIC DISCHARGE.	CHLORATES, NITRATES, CHLORINE, BROMINE and
0 - Reactivity	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	FLUORINE) and HYDROGEN TRISULFIDE, to cause fires and explosions.
DOT#: UN 1105	POISONOUS GASES ARE PRODUCED IN FIRE.	Diethyl Carbinol will react with ALKALINE EARTH METALS (such
ERG Guide #: 129	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash	as BERYLLIUM, MAGNESIUM and CALCIUM) to form flammable and explosive <i>Hydrogen gas</i> .
Hazard Class: 3 (Flammable)	back. Flow or agitation may generate electrostatic charges.	Diethyl Carbinol is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALIPHATIC AMINES; ISOCYANATES; ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); and NITRIDES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

- Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.
- Keep **Diethyl Carbinol** out of confined spaces, such as sewers, because of the possibility of an explosion.
- DO NOT wash into sewer.

EXPOSURE LIMITS

The Protection Action Criteria values for Pentanol are:

- PAC-1 = 150 ppm
- PAC-2 = 150 ppm
- PAC-3 = 1,500 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezingHeadache, dizziness, lightheadedness
and passing out
Higher levels can cause coma and death

PHYSICAL PROPERTIES

Odor Threshold:	Strong, sweet odor
Flash Point:	93° to 105°F (34° to 41°C)
LEL:	1.2%
UEL:	9%
Auto Ignition Temp:	650° to 680°F (343° to 360°C)
Vapor Density:	3 (air = 1)
Vapor Pressure:	8.3 mm Hg at 77°F (25°C)
Specific Gravity:	0.82 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	241°F (116°C)
Freezing Point:	-92°F (-69°C)
Ionization Potential:	9.8 +/- 0.2 eV
Molecular Weight:	88.2

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Nitrile, Viton and Barrier® (>8-hr breakthrough for <i>n-Pentanol</i>)
Coveralls:	Tychem® Responder® and TK (>8-hr breakthrough for <i>Hydroxyl compounds, aliphatic</i>)
Respirator:	>150 ppm - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: DIETHYLENE GLYCOL DINITRATE

Synonyms: DEGDN; Diglycol Dinitrate CAS No: 693-21-0 Molecular Formula: C₄H₈N₂O₇ RTK Substance No: 0699

Description: Colorless, odorless, thick, oily liquid

	HAZARD DATA	
Hazard Rating	Firefighting	Reactivity
2 - Health 4 - Fire	Diethylene Glycol Dinitrate is an EXPLOSIVE that can be ignited by HEAT, FRICTION, SHOCK, VIBRATION, and/or ELECTROSTATIC CHARGE.	Diethylene Glycol Dinitrate is an EXTREMELY SENSITIVE EXPLOSIVE if not properly desensitized with an additive (phlegmatizer) for stablization.
4 - Reactivity DOT#: UN 0075	Diethylene Glycol Dinitrate is FLAMMABLE and REACTIVE and a DANGEROUS FIRE and EXPLOSION HAZARD.	Diethylene Glycol Dinitrate may react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
ERG Guide #: 112 Hazard Class: 1 (Explosive)	DO NOT FIGHT FIRE. Evacuate area and let burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Diethylene Glycol Dinitrate may ignite combustibles (wood, paper and oil).	NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES), resulting in detonation.

SPILL/LEAKS

Isolation Distance:

Spill: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

DO NOT CLEAN-UP OR DISPOSE OF EXCEPT UNDER SUPERVISION OF A SPECIALIST.

Keep **Diethylene Glycol Dinitrate** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Diethylene Glycol Dinitrate is harmful to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Diethylene Glycol Dinitrate**.

HEALTH EFFECTS

Eyes: Skin: No information No information

Inhalation: Headache, fatigue, dizziness, and a blue color to the skin and lips (*methemoglobinemia*)

PHYSICAL PROPERTIES

Odor Threshold: Flash Point: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight: Odorless Explosive 0.00015 mm Hg at 68°F (20°C) 1.4 (water = 1) Slightly soluble Decomposes at 387°F (197°C) 11°F (-12°C) 196

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H® and Barrier® (>8-hr breakthrough for <i>Glycol Ethers</i>)
Coveralls:	Tychem® Responder® and TK (>8-hr breakthrough for <i>Glycol Ethers</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: DIETHYL PHTHALATE

Synonyms: DEP; Diethyl 1,2-Benzenecarboxylate; Ethyl Phthalate CAS No: 84-66-2 Molecular Formula: $C_{12}H_{14}O_4$ RTK Substance No: 0707 Description: Odorless, colorless, oil liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Diethyl Phthalate may burn, but does not readily ignite.	Diethyl Phthalate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	resistant foam as extinguishing agents. DO NOT use water jet directly on Diethyl Phthalate .	CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
DOT#: UN 3082	POISONOUS GASES ARE PRODUCED IN FIRE,	NITRIC).
ERG Guide #: 171	including Phthalic Anhydride.	Diethyl Phthalate may attack plastics.
Hazard Class: 9	Use water spray to keep fire-exposed containers	
(Environmentally	cool.	
Hazardous Substance)		

Gloves:

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Diethyl Phthalate may be hazardous to the environment, especially to fish.

EXPOSURE LIMITS

ACGIH: 5 mg/m^3 , 8-hr TWA

The Protective Action Criteria values are: PAC-1 = 15 mg/m^3 PAC-2 = 100 mg/m^3

PAC-3 = 300 mg/m³

HEALTH EFFECTS

Eyes:IrritationSkin:Irritation (skin absorbable)Inhalation:Nose and throat irritation with coughing
and wheezing

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	322°F (161°C)
LEL:	0.7%
UEL:	Unknown
Auto Ignition Temp:	855°F (457°C)
Vapor Density:	7.7 (air = 1)
Vapor Pressure:	0.002 mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	568°F (298°C)
Freezing Point:	-41°F (-40.6°C)
Molecular Weight:	222.3

PROTECTIVE EQUIPMENT Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough)

Coveralls:Tychem® F, BR, CSM and TK (>8-hr breakthrough for
Esters, Carboxylic)Respirator:>5 mg/m³ - full facpiece APR with P100 filters
Fire or >15 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: DIETHYLSTILBESTROL

Synonyms: DES; Estrogen CAS No: 56-53-1 Molecular Formula: C₁₈H₂₀O₂ RTK Substance No: 0709 Description: Odorless, tasteless, white, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Diethylstilbestrol is not compatible with OXIDIZING
1 - Fire	POISONOUS GASES ARE PRODUCED IN	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG
DOT#: None	Use water spray to keep fire-exposed containers cool.	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ACID CHLORIDES; and
ERG Guide #: None		ACID ANHYDRIDES.
Hazard Class: None		

SPILL/LEAKS	PH	IYSICAL PROPERTIES
Isolation Distance:	Odor Threshold:	Odorless
Spill: 25 meters (75 feet)	Water Solubility:	Very slightly soluble
Fire: 800 meters (1/2 mile)	Melting Point:	336° to 342°F (169° to 172°C)
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.	Molecular Weight:	268.38
EXPOSURE LIMITS	PRO	DTECTIVE EQUIPMENT

The Protective Action Criteria values are:

- $PAC-1 = 0.075 \text{ mg/m}^3$
- $PAC-2 = 0.6 \text{ mg/m}^3$
- $PAC-3 = 15 \text{ mg/m}^{3}$

Coveralls:	Tyvek®
Respirator:	Full facepiece APR with P100 filters

Nitrile and Natural Rubber

>15 mg/m³ - SCBA

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes:	Irritation	Remove the person from exposure.
Skin:	Irritation	Flush eyes with large amounts of water for at least 15 minutes. Remove
Inhalation:	Nose and throat irritation	contact lenses if worn.
	Headache, nausea, dizziness, weakness and irritability	Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
Chronic:	Cancer (breast and liver) in humans	Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Gloves:



Common Name: DIETHYL SULFATE

Synonyms: Ethyl Sulfate CAS No: 64-67-5 Molecular Formula: $C_4H_{10}O_4S$ RTK Substance No: 0710 Description: Clear, colorless, oily liquid with a mint or *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-	Diethyl Sulfate reacts slowly with WATER, and decomposes in HOT WATER, to form <i>Ethyl Alcohol, Ethyl Sulfate</i> and <i>Sulfuric Acid.</i>
1 - Reactivity	resistant foam as extinguishing agents. DO NOT USE WATER directly on Diethyl Sulfate . POISONOUS GASES ARE PRODUCED IN FIRE,	Diethyl Sulfate reacts violently with a combination of 3,8-DINITRO-9-PHENYLPHENANTHRIDINE and
DOT#: UN 1594 ERG Guide #: 152	including Ethyl Ether, Ethylene Oxide and Sulfur Oxides.	WATER. Diethyl Sulfate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC);
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool.	STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and NITRATES.
		Keep Diethyl Sulfate away from METALS and MOISTURE as flammable and explosive <i>Hydrogen gas</i> can be released.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Diethyl Sulfate is harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Diethyl Sulfate**.

The Protective Action Criteria values are:

PAC-1 = 0.2 ppm PAC-2 = 1.5 ppm PAC-3 = 25 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Nausea, vomiting and abdominal pain
Chronic:	Cancer (skin) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Mint or <i>Ether</i> -like
Flash Point:	220°F (104°C)
LEL:	4.1%
UEL:	12.2%
Auto Ignition Temp:	817°F (436°C)
Vapor Density:	5.3 (air = 1)
Vapor Pressure:	1 mm Hg at 117°F (47°C)
Specific Gravity:	1.2 (water =1)
Water Solubility:	Insoluble
Boiling Point:	409°F (209.4°C)
Freezing Point:	-13°F (-25°C)
Molecular Weight:	154.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl/Viton (>8-hr breakthrough)
Coveralls:	Tychem® CSM and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 1,1-DIFLUOROETHANE

Synonyms: Ethylidene Fluoride; Freon 152A; Genetron 100 CAS No: 75-37-6 Molecular Formula: $C_2H_4F_2$ RTK Substance No: 0715 Description: Colorless and odorless gas used as a liquefied compressed gas

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE GAS. Stop flow and use dry chemical, CO ₂ , water spray or	1,1-Difluoroethane may react violently with OXIDIZING AGENTS (such as PERCHLORATES,
4 - Fire	foam as extinguishing agents.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and
0 - Reactivity	If flow cannot be stopped, let fire burn. POISONOUS GASES ARE PRODUCED IN FIRE,	FLUORINE), and forms explosive compounds with
DOT#: UN 1030	including Hydrogen Fluoride and Carbonyl Fluoride.	BARIUM; SODIUM; POTASSIUM; and other <i>divalent light</i> METALS and METALLIC AZIDES.
ERG Guide #: 115	CONTAINERS MAY EXPLODE IN FIRE.	1,1-Difluoroethane is not compatible with
Hazard Class: 2.1 (Flammable gas)	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back.	powdered ALUMINUM and MAGNESIUM, and their ALLOYS; LIQUID OXYGEN; BRASS; and STEEL.
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spill: 100 meters (300 feet)

Large Spill: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

Stop flow of gas.

Eyes:

Skin:

Inhalation:

Keep **1,1-Difluoroethane** out of confined spaces, such as sewers, because of the possibility of an explosion.

May be toxic to aquatic life. Considered to be an Ozone depleting substance.

EXPOSURE LIMITS

HEALTH EFFECTS

Irritation. Contact with liquid can cause

Irritation, drying and cracking of the skin

coughing, wheezing and/or shortness of

Headache, dizziness, lightheadedness

Contact with liquid can cause frostbite

Nose, throat and lung irritation with

No occupational exposure limits have been established for 1,1-Difluoroethane.

frostbite.

breath

and passing out

PHYSICAL PROPERTIES		
Odor Threshold:	Odorless	
LEL:	3.7%	
UEL:	18%	
Vapor Density:	2.4 (air = 1)	
Vapor Pressure:	4,437 mm Hg at 77°F (25°C)	
Specific Gravity:	0.95 (water = 1)	
Water Solubility:	Very slightly soluble	
Boiling Point:	-16.6°F (-27°C)	
Melting Point:	-179°F (-117°C)	
Molecular Weight:	66.1	

PROTECTIVE EQUIPMENT

Gloves:	Insulated Neoprene or Rubber
Coveralls:	DuPont Tychem® CSM, Responder®, and TK; Kappler Zytron® 400; and Saint-Gobain ONESuit® TEC
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Immerse affected part in warm water. Seek medical attention. Transfer to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: 1,2-DIHYDROXYBENZENE

Synonyms: Catechol; o-Dihydroxybenzene; Pyrocatechol CAS No: 120-80-9 Molecular Formula: C₆H₆O₂ RTK Substance No: 0722 Description: Colorless, crystalline solid, with a slight *Phenolic* odor, that becomes a vapor at ordinary temperatures

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE SOLID Use dry chemical, CO ₂ , water spray or alcohol-	1,2-Dihydroxybenzene reacts violently with NITRIC ACID.
1 - Fire	resistant foam as extinguishing agents.	1,2-Dihydroxybenzene is not compatible with
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	OXIDIZING AGENTS (such as PERCHLORATES,
DOT#: UN 2811	Use water spray to keep fire-exposed containers cool.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
ERG Guide #: 154	Flow or agitation may generate electrostatic	ACID CHLORIDES; ACID ANHYDRIDES; and STRONG
Hazard Class: 6.1 (Poison)	charge.	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).

SPILL/LEAKS

Isolation Distance:

Small Spills: 30 meters (100 feet)

Large Spills: 100 meters (300 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

1,2-Dihydroxybenzene is moderately to highly toxic to aquatic organisms.

EXPOSURE LIMITS

NIOSH: 5 ppm, 10-hr TWA

ACGIH: 5 ppm, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 5 ppm

PAC-2 = 7.5 ppm

PAC-3 = 20 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Dizziness, nausea, vomiting and convulsions
	Methemoglobinemia with headache, fatigue and blue color to the skin and lips
Chronic:	Cancer (stomach) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Phenolic odor
Flash Point:	260°F (127°C)
Auto Ignition Temp:	950°F (510°C)
Vapor Density:	3.8 (air = 1)
Vapor Pressure:	5 mm Hg at 219°F (104°C)
Specific Gravity:	1.34 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	473°F (245°C)
Melting Point:	221°F (105°C)
Ionization Potential:	8.15 +/- 1.0 eV
Molecular Weight:	110

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Viton (>8-hr breakthrough for aromatic Phenols)
Coveralls:	Tychem® BR, LV, Responder® and TK (>8-hr breakthrough for <i>aromatic Phenols</i>)
Respirator:	>5 ppm -Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: DIMEFOX

Synonyms: Bis(Dimethylamido)Fluorophosphate; DMF CAS No: 115-26-4 Molecular Formula: $C_4H_{12}FN_2OP$ RTK Substance No: 2342 Description: Colorless liquid with a fishy odor

Hazard Rating	Firefighting	Reactivity
3 - Health	Dimefox may burn, but does not readily ignite.	Dimefox can form highly toxic and flammable <i>Phosphine</i>
1 - Fire	Use dry chemical, CO ₂ or water spray as extinguishing agents.	gas in the presence of REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	Dimefox is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: None	including <i>Phosphine.</i> CONTAINERS MAY EXPLODE IN FIRE.	PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 152	Use water spray to keep fire-exposed containers	CHLORINE, BROMINE and FLUORINE). Dimefox is corrosive to METALS.
Hazard Class: 6.1	cool.	Difference is confusive to METALS.
(Toxic)		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Dimefox may pollute waterways.

EXPOSURE LIMITS

IDLH: 1 mg/m³

The Protective Action Criteria values are:

No information

 $PAC-1 = 0.6 \text{ mg/m}^3$

PAC-2 = 1 mg/m^3

 $PAC-3 = 1 \text{ mg/m}^3$

HEALTH EFFECTS	
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Eyes:

Skin: No information

Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, sweating, nausea and vomiting, loss of coordination, and death

vomiting, loss of coordination, and death (Organophosphate poisoning)

PHYSICAL PROPERTIES

Odor Threshold:	Fishy odor
Flash Point:	May burn
Vapor Pressure:	0.36 mm Hg at 77°F (25°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	187°F (86°C)
Molecular Weight:	154.1

PROTECTIVE EQUIPMENT

Gloves: Neoprene and Silver Shield®/4H® (>8-hr breakthrough for Organo-phosphorus compounds)

Coveralls: Tychem® BR, LV, Responder® and TK (>8-hr breakthrough for *Organo-phosphorus compounds*)

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.
- Shampoo hair immediately if contaminated.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Health Right to Know Hazardous Substance Fact Sheet

Common Name: 3,3'-DIMETHOXYBENZIDINE

Synonyms: o-Dianisidine; 3,3'-Dianisidine CAS No: 119-90-4 Molecular Formula: C₁₄H₁₆N₂O₂ **RTK Substance No: 0734** Description: Colorless, crystalline solid

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
2 - Health 1 - Fire 0 - Reactivity DOT#: UN 2431	 3,3'-Dimethoxybenzidine may burn, but does not readily ignite. Use dry chemical, CO₂, or water spray as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. 	3,3'-Dimethoxybenzidine is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Protect from LIGHT, HEAT and AIR.	
ERG Guide #: 153 Hazard Class: 6.1 (Poison)			

SP		1/	F	Δ	K	S
эr	ᇿ	L/	с,	А	N	Э.

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

EXPOSURE LIMITS

No occupational exposure limits have been established for 3,3'-Dimethoxybenzidine.

The Protective Action Criteria values are:

 $PAC-1 = 4 \text{ mg/m}^3$

 $PAC-2 = 25 \text{ mg/m}^3$

 $PAC-3 = 400 \text{ mg/m}^3$

HE.	AL	ΤН	EF	FE	CTS

Eyes:	Irritation
Skin:	Irritation, rash, redness and itching
Inhalation:	Nose and throat irritation
Chronic:	Cancer (bladder, intestines, skin) in animals

PHYSICAL PROPERTIES

Flash Point:	403°F (206°C)
Vapor Density:	8.5 (air = 1)
Vapor Pressure:	8.8 x 10 ⁻⁹ mm Hg at 77°F (25°C)
Water Solubility:	Very slightly soluble
Melting Point:	279°F (137°C)
Molecular Weight:	244.3

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with P100 filters >4 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Chemical Name: DIMETHYLAMINOETHANOL

Synonym: Dimethylethanolamine CAS No: 108-01-0 Molecular Formula: C₄H₁₁NO RTK Substance No: 3111 Description: Colorless, corrosive, combustible liquid with a strong fishy odor.

		IFPA RA	TINGS	.
Hazard Rating	Firefighting			Reactivity
3 - Health 2 - Fire 0 – Reactivity DOT#: UN 2051 ERG Guide#: 132 Hazard Class: 8.3 (Corrosive)	 Combustible Use dry chemical, CO₂, or alcohol-resistant foam, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. May flash back Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 		 Dimethylaminoethanol reacts violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID CHLORIDES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and ISOCYANATES. Dimethylaminoethanol is not compatible with CELLULOSE NITRATE; ZINC ALLOYS; GALVANIZED IRON; COPPER and COPPER ALLOYS; NITROGEN COMPOUNDS; ACRYLATES; ALCOHOLS; ALDEHYDES; KETONES; HALOGENATED COMPOUNDS; and GLYCOLS. 	
D	OT ERG			PHYSICAL PROPERTIES
- Absorb liquids in ve	60 meters (200 feet) for toxic, corrosive, organic liquids. rmiculite, dry sand, earth, or a d deposit in non-metallic sealed	Flash Pe LEL: UEL: Vapor D Vapor P Water S Boiling	ensity: ressure: olubility	105°F (41°C) 1.6 11.9 3.1 (air = 1) 4 mm Hg at 68°F (20°C) Soluble 272°F (133°C)
EXPOS	SURE LIMITS		Р	ROTECTIVE EQUIPMENT
OSHA: N/A NIOSH: N/A ACGIH: N/A IDLH LEVEL: N/A		Gloves: Coveral Boot: Respira	l: N B	utyl, Nitrile, Polyvinyl Alcohol, Viton® o Information utyl upplied Air
HEAL	TH EFFECTS	F	IRST	AID AND DECONTAMINATION
Acute: Nose, thi pulmona Chronic: Cancer – Sympton wheezing	burning skin burns roat and lung Irritation, ry edema, headache Not tested. ns of asthma – cough, g, shortness of breath. May e nervous system.	 Remove the person from exposure. Flush eyes with large amount of water for at least 30 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with wate Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Observation is recommended as symptoms may be delayed. 		



Common Name: DIMETHYLANILINE

Synonyms: N,N-Dimethylaminobenzene; Dimethylphenylamine CAS No: 121-69-7 Molecular Formula: $C_8H_{11}N$ RTK Substance No: 0741 Description: Yellow to brownish, oily liquid with a fish-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health		Dimethylaniline reacts explosively with DIISOPROPYL PEROXYDICARBONATE; BENZOYL PEROXIDE; and
2 - Fire	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	OXIDIZING AGENTS (such as PERCHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Aniline</i> .	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2253	CONTAINERS MAY EXPLODE IN FIRE.	Dimethylaniline may react with METALS to release flammable and explosive <i>Hydrogen gas</i> .
ERG Guide #: 153	Use water spray to keep fire-exposed containers	Dimethylaniline is not compatible with STRONG ACIDS
Hazard Class: 6.1	cool.	(such as HYDROCHLORIC, SULFURIC and NITRIC);
(Poison)	Dimethylaniline , when heated, may form an ignitable vapor/air mixture in closed tanks or containers.	ACID CHLORIDES; ACID ANHYDRIDES; and CHLOROFORMATES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Dimethylaniline**.

EXPOSURE LIMITS

 OSHA:
 5 ppm, 8-hr TWA

 NIOSH:
 5 ppm, 10-hr TWA; 10 ppm STEL

 ACGIH:
 5 ppm, 8-hr TWA; 10 ppm STEL

 IDLH:
 100 ppm

The Protective Action Criteria values are: PAC-1 = 10 ppm PAC-2 = 10 ppm PAC-3 = 100 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Headache fat

nhalation: Headache, fatigue and blue color to the skin and lips (methemoglobinemia)

PHYSICAL PROPERTIES

	0.010
Odor Threshold:	0.013 ppm
Flash Point:	145°F (63°C)
LEL:	1%
UEL:	7%
Auto Ignition Temp:	700°F (371°C)
Vapor Density:	4.2 (air = 1)
Vapor Pressure:	1 mm Hg at 85°F (29.4°C)
Specific Gravity:	0.95 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	379°F (193°C)
Melting Point:	36.4°F (2.5°C)
Ionization Potential:	7.14 eV
Molecular Weight:	121.2

PROTECTIVE EQUIPMENT

Gloves: SilverShield®/4H® (>4-hr breakthrough)

Coveralls: Tychem® BR, Responder® and TK (>8-hr breakthrough)

Respirator:

>5 ppm - Supplied air >50 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 3,3'-DIMETHYLBENZIDINE

Synonyms: o-Toluidine CAS No: 119-93-7 Molecular Formula: $C_{14}H_{16}N_2$ RTK Substance No: 0742 Description: White to reddish crystal or powder

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
2 - Health	3,3'-Dimethylbenzidine may burn, but does not readily ignite.	3,3'-Dimethylbenzidine is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,		
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	PEROXIDES, PERMANGANATES, CHLORATES,		
0 - Reactivity	extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE).		
DOT#: UN 2811	POISONOUS GASES ARE PRODUCED IN FIRE.			
ERG Guide #: 154	Use water spray to keep fire-exposed containers cool.			
Hazard Class: 6.1				
(Poison)				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

PHYSICAL PROPERTIES

Flash Point:	471°F (244°C)
Auto Ignition Temp:	979°F (526°C)
Specific Gravity:	1 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	392°F (200°C)
Melting Point:	264° to 270°F (129° to 132°C)
Molecular Weight:	212.3

PROTECTIVE EQUIPMENT

Full facepiece APR with P100 filters

Nitrile and Natural Rubber

>0.2 mg/m³ - SCBA

Tyvek®

EXPOSURE LIMITS

NIOSH: 0.02 mg/m³, 60-minute Ceiling

The Protective Action Criteria values are:

PAC-1 = 0.3 mg/m^3

 $PAC-2 = 2 mg/m^3$

 $PAC-3 = 100 \text{ mg/m}^3$

		1
HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes:	Irritation	Remove the person from exposure.
Skin:	No information	Flush eyes with large amounts of water for at least 15 minutes. Remove
Inhalation:	Nose and throat irritation with coughing and wheezing.	contact lenses if worn. Remove contaminated clothing and wash contaminated skin with soap and
Chronic:	Cancer (liver, bladder, mammary gland) in animals	water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Gloves:

Coveralls:

Respirator:

INFORMATION FOR EMERGENCY RESPONDERS

Common Name: 2,3-DIMETHYLBUTANE

Synonyms: Diisopropyl CAS No: 79-29-8 Molecular Formula: C₆H₁₄ RTK Substance No: 0744

Description: Clear, colorless liquid ΗΔΖΑΡΟ ΟΔΤΔ

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
1 - Health	Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents.	2,3-Dimethylbutane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,	
3 - Fire	Water may not be effective in fighting fires.	PEROXIDES, PERMANGANATES, CHLORATES,	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	NITRATES, CHLORINE, BROMINE and FLUORINE).	
DOT#: UN 2457	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	r Lookine).	
ERG Guide #: 128	Vapors may travel to a source of ignition and flash		
Hazard Class: 3 (Flammable)	back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		

SPILL/LEAKS

Isolation Distance:

Small Spills: 50 meters (150 feet)

Large Spills: 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Cover with an activated carbon adsorbent and place in covered containers for disposal.

May be harmful to animal and plant life.

EXPOSURE LIMITS

OSHA:	None		
NIOSH:	100 ppm, 10-hr TWA; 510 ppm,		
	15-min Ceiling		
ACGIH:	500 ppm, 8-hr TWA; 1,000 ppm,		
	15-min STEL		
IDLH:	1,100 ppm (as <i>Hexane</i>)		

HEALTH EFFECTS	

Eyes:	Irritation		
Skin:	Irritation		
Inhalation:	Nose, throat and lungs Headache, nausea, dizziness and lightheadedness		

PHYSICAL PROPERTIES

Odor Threshold:	65 to 248 ppm
Flash Point:	-20°F (-29°C)
LEL:	1.2%
UEL:	7.0%
Vapor Density:	3 (air = 1)
Vapor Pressure:	200 mm Hg at 68°F (20°C)
Specific Gravity:	0.65 - 0.66 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	122° to 145°F (50° to 63°C)
Molecular Weight:	86.2

PROTECTIVE EQUIPMENT

Gloves:	Viton, Nitrile or Silver Shield®/4H® (>8-hr breakthrough)
Coveralls:	DuPont Tychem® CPF 3, CPF 4, BR and LV, Responder®, TK; Kappler Zytron® 300; and Saint- Gobain ONESuit®TEC or equivalent (>8-hr breakthrough)
Respirator:	>100 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: DIMETHYLCARBAMOYL CHLORIDE

Synonyms: DMCC; Chloroformic Acid Dimethylamide CAS No: 79-44-7 Molecular Formula: C_3H_6CINO RTK Substance No: 0746 Description: Clear, colorless liquid with an unpleasant odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Dimethylcarbamoyl Chloride is a COMBUSTIBLE LIQUID.	Dimethylcarbamoyl Chloride will react with WATER, STEAM and MOISTURE to produce toxic	
2 - Fire	Use dry chemical, CO ₂ , alcohol-resistant foam or other	Hydrogen Chloride and Dimethylamine.	
1 - Reactivity	foam extinguishing agents.	Dimethylcarbamoyl Chloride reacts vigorously or	
DOT#: UN 2262 ERG Guide #: 156 Hazard Class: 8 (Corrosive)	DO NOT USE WATER. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray only to keep fire-exposed containers cool as water will decompose Dimethylcarbamoyl Chloride to form toxic <i>Hydrogen Chloride</i> and	explosively if mixed with DIISOPROPYL ETHER or other ETHERS in the presence of small amounts of METAL SALTS. Dimethylcarbamoyl Chloride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALCOHOLS; STRONG BASES (such	
	Dimethylamine.	as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and AMINES.	

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT USE WATER OR WET METHOD. DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA:NoneNIOSH:Lowest feasible concentrationACGIH:0.005 ppm, 8-hr TWAIDLH:None

	ritation and hurna		
Eyes: Ir	ritation and burns		
Skin: Ir	Irritation and burns		
с	lose, throat and lung irritation with oughing, wheezing and shortness of reath		
H	leadache, nausea and vomiting		
Chronic: C	ancer (nose and skin) in animals		

PHYSICAL PROPERTIES

Odor Threshold:	Unpleasant odor
Flash Point:	155°F (68°C)
Vapor Density:	3.7 (air = 1)
Vapor Pressure:	2.5 mm Hg at 77°F (25°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Reactive/Decomposes
Boiling Point:	329° to 333°F (165° to 167°C)
Melting Point:	-27°F (-33°C)
Molecular Weight:	107.6

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®
Coveralls:	DuPont Tychem® CSM, Responder®, and TK (for <i>known</i> carcinogens)
Respirator:	>0.005 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: DIMETHYLFORMAMIDE

Synonyms: DMF; Formyldimethylamine; N,N-Dimethylformamide CAS No: 68-12-2 Molecular Formula: C₃H₇NO RTK Substance No: 0759 Description: Colorless to pale yellow liquid with a fishy or Ammonia-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health 2 - Fire	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-	Dimethylformamide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity DOT#: UN 2265	resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen</i> . Use water spray to keep fire-exposed containers	CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); and CARBON TETRACHLORIDE and other CHLORINATED HYDROCARBONS in the	
ERG Guide #: 129	cool.	presence of IRON.	
Hazard Class: 3 (Flammable)		Dimethylformamide is not compatible with ALKYL ALUMINUM COMPOUNDS (such as TRIETHYLALUMINUM) and <i>inorganic</i> NITRATES.	

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold:	0.47 ppm to 100 ppm
Spill: E0 meters (1E0 feet)	Flash Point:	136°F (58°C)
Spill: 50 meters (150 feet)	LEL:	2.2%
Fire: 800 meters (1/2 mile)	UEL:	15.2%
Absorb liquids in dry sand, earth, or a similar material	Auto Ignition Temp:	883°F (473°C)
and place into sealed containers for disposal.	Vapor Density:	2.5 (air = 1)
	Vapor Pressure:	4 mm Hg at 77°F (25°C)
	Specific Gravity:	0.95 (water = 1)
	Water Solubility:	Soluble
	Boiling Point:	307°F (153°C)
	Freezing Point:	-78°F (-61°C)
	Critical Temp:	653°F (345°C)
	Ionization Potential:	9.12 eV
	Molecular Weight:	73.09

EXPOSURE LIMITS			PROTECTIVE EQUIPMENT
OSHA: 10 ppm, 8-hr TWA		Gloves:	Barrier® (>8-hr breakthrough)
NIOSH: 10 ppm, 10-hr TWA		Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)
ACGIH: 10 ppm, 8-hr TWA		Coverails.	
IDLH: 500 ppm		Respirator:	SCBA
The Protective Action Criteria values are:			
PAC-1 = 2 ppm PAC-2 = 91 ppm PAC-3 = 530 ppm			

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 1,2-DIMETHYLHYDRAZINE

Synonyms: N,N'-Dimethylhydrazine; SDMH CAS No: 540-73-8 Molecular Formula: C₂H₈N₂ RTK Substance No: 1008

Description: Clear, colorless liquid, with a strong, Ammonia-like odor, that turns yellow and fumes in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	FLAMMABLE AND CORROSIVE Use dry chemical, CO ₂ , water in flooding quantities	Contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
3 - Fire	or alcohol-resistant foam as extinguishing agents.	CHLORATES, NITRATES, CHLORINE, BROMINE and
1 - Reactivity	1,2-Dimethylhydrazine may re-ignite if not diluted	FLUORINE); and METALLIC OXIDES (such as COPPER OXIDES, LEAD OXIDES and IRON OXIDES) may result
DOT#: UN 2382	with water. POISONOUS GASES ARE PRODUCED IN FIRE.	in fires and explosions.
ERG Guide #: 131	including Nitrogen Oxides.	1,2-Dimethylhydrazine is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
Hazard Class: 6.1	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source	NITRIC) and STRONG BASES (such as SODIUM
(Poison)	and flashback.	HYDROXIDE and POTASSIUM HYDROXIDE). Protect from AIR and LIGHT.
	Flow or agitation may generate electrostatic charges.	

LEL:

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet) Large Spill: 100 meters (300 feet) Fire: 800 meters (1/2 mile) Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. Use only non-sparking tools and equipment. Metal containers involving the transfer of 1,2-Dimethylhydrazine should be grounded and bonded. Keep 1,2-Dimethylhydrazine out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

ACGIH: 0.01 ppm, 8-hr TWA (as 1,1-Dimethylhydrazine)

The Protective Action Criteria values are:

PAC-1 = 1.5 ppm PAC-2 = 3 ppm PAC-3 = 11 ppm

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage	
Skin:	Severe irritation and burns	
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema)	
	Headache, dizziness, lightheadedness, and passing out	
Chronic:	Cancer (blood vessels, intestines, liver) in animals	

PHYSICAL PROPERTIES Flash Point: 5 °F (-15 °C) 2% (for 1,1-Dimethylhydrazine) 95% (for 1 1-Dimethylhydrazine)

UEL:	95% (for 1,1-Dimethylhydrazine)
Vapor Density:	0.76 (air = 1)
Specific Gravity:	0.83 (water = 1)
Water Solubility:	Soluble
Boiling Point:	178 °F (81 °C)
Melting Point:	160 °F (-9 °C)
Molecular Weight:	60.12

PROTECTIVE EQUIPMENT

Gloves:	Butyl (>8-hr breakthrough for Dimethylhydrazine)
Coveralls:	Tychem® BR, CSM and TK; Trellchem® HPS and VPS (>8-hr breakthrough for <i>Dimethylhydrazine</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eves with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: DIMETHYL MERCURY

Synonyms: None CAS No: 593-74-8 Molecular Formula: C₂H₆Hg RTK Substance No: 0763 **Description: Colorless liquid**

ZARD DATA	HA

Hazard Rating	Firefighting		Reactivity
3 - Health 3 - Fire 0 - Reactivity DOT#: UN 2024 ERG Guide #: 151 Hazard Class: 6.1 (Poison)	Dimethyl Mercury is a FLAMMAB Use dry chemical, CO ₂ , water spra extinguishing agents. POISONOUS GASES ARE PROD including <i>Mercury vapors</i> . CONTAINERS MAY EXPLODE IN Use water spray to keep fire-expos cool. Vapor is heavier than air and may fi	y or foam as UCED IN FIRE, FIRE. led containers travel a distance	Dimethyl Mercury reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause a fire hazard.
SPI	to cause a fire or explosion far fror		PHYSICAL PROPERTIES

SPILL/LEAKS

Isolation Distance:

Small Spills: 60 meters (200 feet)

Large Spills: 270 meters (900 feet)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

DO NOT let this substance enter the environment as it bioaccumulates.

EXPOSURE LIMITS

	0.01 mg/m ³ , 8-hr TWA; 0.04 mg/m ³ , STEL
NIOSH:	0.01 mg/m ³ , 10-hr TWA; 0.03 mg/m ³ , STEL
ACGIH:	0.01 mg/m ³ , 8-hr TWA; 0.03 mg/m ³ , STEL
IDLH:	2 mg/m ³
	(All the above are as Maroury)

(All the above are as Mercury)

HEALTH EFFECTS

Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Acute:	Irritation of the nose, throat and lungs with coughing, wheezing and/or shortness of breath	
Chronic:	Carcinogen (kidney) in animals	
	Several Methyl Mercury compounds are known teratogens	
	Sore gums, tingling or "pins and needles" feeling in fingers, irritability and weakness, slurred speech and metallic taste	

Odor Threshold: No information

Flash Point:	41°F (5°C)
Vapor Density:	7.9 (air = 1)
Vapor Pressure:	50 mm Hg at 68°F (20°C)
Specific Gravity:	3 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	204°F (96°C)
Melting Point:	-45.4°F (-43°C)
Molecular Weight:	230.7
PROT	ECTIVE EQUIPMENT
Gloves: 4-H/Silv	er Shield $^{ m (60-minutes breakthrough)}$

Gloves:	4-H/Silver Shield® (60-minutes breakthrough)
Coveralls:	DuPont Tychem® Responder®, CSM and TK for toxic and corrosive chemical vapors
Boots:	No information
Respirator:	>0.01 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: 2,3-DIMETHYLPENTANE

Synonyms: 3,4 Dimethylpentane CAS No: 565-59-3 Molecular Formula: C_7H_{16} RTK Substance No: 4147 Description: Colorless liquid with a gasoline odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID	2,3-Dimethylpentane is not compatible
3 - Fire	Use dry chemical, CO ₂ , alcohol-resistant foam or other foam extinguishing agents, as water may not be effective in fighting fires.	with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	PERMANGANATES, CHLORATES,
DOT#: UN 1206 ERG Guide #: 128	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back.	NITRATES, CHLORINE, BROMINE and FLUORINE).
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	
	Electrostatic discharges may be generated resulting in ignition or explosion.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **2,3-Dimethylpentane** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

ACGIH: 400 ppm, 8-hr TWA; 500 ppm, STEL

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation
	Headache, dizziness, lack of coordination, nausea and vomiting

PHYSICAL PROPERTIES Flash Point: $< 20^{\circ}F(-7^{\circ}C)$ LEL: 1.1% UEL: 6.7% Auto Ignition Temp: $635^{\circ}F(335^{\circ}C)$ Vapor Density: 3.5 (air = 1) Vapor Pressure: 48 mm Hg at $77^{\circ}F(25^{\circ}C)$

	- 5
Specific Gravity:	0.7 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	194°F (90°C)
Molecular Weight:	94.2

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>n-Heptane</i>)
Coveralls:	Tychem® CPF 3, BR, LV, Responder®, and TK; Zytron® 300; ONESuit®TEC; and Trellchem® fabrics (>8-hr breakthrough for <i>n-Hexane</i> and <i>n-Heptane</i>)
Respirator:	>400 ppm - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

 $\ensuremath{\textit{Remove}}$ contaminated clothing and wash contaminated skin with soap and water.





Common Name: 2,4-DIMETHYLPHENOL

Synonym: m-Xylenol CAS No: 105-67-9 Molecular Formula: C₈H₁₀O RTK Substance No: 0764

Description: Colorless, crystalline solid or yellow-brown liquid

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
2 - Health	2,4-Dimethylphenol is a COMBUSTIBLE LIQUID or SOLID.	2,4-Dimethylphenol may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) resulting in fires.	
1 - Fire	Use dry chemical, water spray or foam as		
0 - Reactivity	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE.		
DOT#: UN 2261	Use water spray to keep fire-exposed containers	2,4-Dimethylphenol is not compatible with STRONG	
ERG Guide #: 153cool.Hazard Class: 6.1 (Poison)2,4-Dimethylphenol can be ignited by statistic discharge or sparks.		ACIDS (such as HYDROCHLORIC, SULFURIC and	
	2,4-Dimethylphenol can be ignited by static discharge or sparks.	NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ACID CHLORIDES; ACID ANHYDRIDES; and AMMONIA.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Collect solid material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

2,4-Dimethylphenol is toxic to aquatic organisms and may bioaccumulate.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- PAC-1 = 1 mg/m^3
- $PAC-2 = 6 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose, throat and lung irritation with
coughing, wheezing and shortness of
breath
Headache, nausea and vomiting

PHYSICAL PROPERTIES

Flash Point: >230°F (>110°C)		
LEL:	1.1%	
UEL:	6.4%	
Auto Ignition Temp:	1,110°F (599°C)	
Vapor Pressure: 0.062 mm Hg at 68°F (20°C)		
Specific Gravity:	0.97 (water = 1)	
Water Solubility:	Very slightly soluble	
Boiling Point:	413°F (212°C)	
Melting Point:	78° to 79°F (25° to 26°C)	
Ionization Potential:	8 +/- 0.2 eV	
Molecular Weight:	122.2	

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Nitrile and Viton (>8-hr breakthrough for <i>aromatic Phenols</i>)
Coveralls:	Tychem® BR, LV, Responder® and TK (>8-hr breakthrough for <i>aromatic Phenols</i>)
Respirator:	>1 mg/m ³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: DIMETHYL SULFATE

Synonyms: DMS; Methyl Sulfate; Sulfuric Acid, Dimethyl Ester CAS No: 77-78-1 Molecular Formula: $C_2H_6O_4S$ RTK Substance No: 0768 Description: Colorless, oily liquid with a faint onion-like odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health 2 - Fire	Dimethyl Sulfate is a COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Dimethyl Sulfate reacts violently with concentrated AMMONIA and ignites on contact with BARIUM CHLORIDE.
1 - Reactivity DOT#: UN 1595 ERG Guide #: 156 Hazard Class: 6.1 (Poison)	 POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i>. Use water spray to keep fire-exposed containers cool and to reduce vapors. Dimethyl Sulfate may form an ignitable vapor/air mixture in closed tanks or containers at temperatures above 182°F (83°C). 	Dimethyl Sulfate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and SODIUM AZIDE.
		Dimethyl Sulfate decomposes in WATER and MOIST AIR to form corrosive <i>Sulfuric Acid</i> .

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Dimethyl Sulfate can be neutralized using dilute (<10%) *Ammonia*.

Dimethyl Sulfate is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA: 1 ppm, 8-hr TWA NIOSH: 0.1 ppm, 10-hr TWA ACGIH: 0.1 ppm, 8-hr TWA IDLH: 7 ppm The Protective Action Criteria values are: PAC-1 = 0.024 ppm PAC-2 = 0.12 ppm PAC-3 = 1.6 ppm

HEALTH EFFECTS

Eyes:	Severe irritation and burns	
Skin:	Irritation, burns, itching and ulcers (skin absorbable)	
Inhalation:	Nose, throat and lung irritation, with coughing and severe shortness of breath (pulmonary edema)	
	Headache, dizziness, nausea, vomiting and coma	
Chronic:	Cancer (nasal cavity and brain) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	Onion-like
Flash Point:	182°F (83°C)
Auto Ignition Temp:	370°F (188°C)
Vapor Density:	4.35 (air = 1)
Vapor Pressure:	0.1 to 0.5 mm Hg at 68°F (20°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	370°F (188°C)
Freezing Point:	-25°F (-32°C)
Molecular Weight:	126.1

	PROTECTIVE EQUIPMENT		
Gloves: Neoprene, Viton/Butyl and SilverShield®/4H® (>4-hr breakthrough)		Neoprene, Viton/Butyl and SilverShield®/4H® (>4-hr breakthrough)	
	Coveralls:	Tychem® CSM (>8-hr breakthrough)	
	Respirator:	SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: 2,4 DINITROTOLUENE

Synonyms: 2,4-DNT; 2,4-Dinitrotoluol CAS No: 121-14-2 Molecular Formula: $C_6H_3CH_3(NO_2)_2$ RTK Substance No: 0783

Description: Orange-yellow, crystalline solid often shipped in a molten state

HAZA			ТА		
Hazard Rating	Firefighting		Reactivity		
3 - Health 1 - Fire 3 - Reactivity DOT#: UN 2038 ERG Guide #: 152 Hazard Class: 6.1 (Poison)	 2,4-Dinitrotoluene is REACTIVE DANGEROUS EXPLOSION HA 2,4-Dinitrotoluene may burn, bu ignite. Use dry chemical, CO₂, water sp resistant foam or other foam as agents. POISONOUS GASES ARE PRO including <i>Nitrogen Oxides</i>. CONTAINERS MAY EXPLODE Use water spray to keep fire-exp cool. 	ZARD. ut does not readily ray, alcohol- extinguishing DUCED IN FIRE, IN FIRE.	 2,4-Dinitrotoluene becomes explosive when exposed to PRESSURE and HIGH TEMPERATURES. 2,4-Dinitrotoluene reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); TIN; ZINC; and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to cause fires and/or explosions. 		
SP	ILL/LEAKS		PHYSICAL PROPERTIES		
 Isolation Distance: Spill: 25 meters (75 feet) for solid 50 meters (150 feet) for molten Cover <i>liquid</i> spill with dry sand, earth, or a similar material and place into sealed containers for disposal. Moisten spilled <i>solid</i> material first and place into sealed containers for disposal. 		Odor Thresho Flash Point: LEL: Vapor Density Vapor Pressur Specific Gravi Water Solubili Boiling Point: Melting Point: Molecular Wei	404°F (207°C) 1.4% 1.3 (water = 1) 1.3 (water = 1) 1.5% (wa		
EXPO	SURE LIMITS		PROTECTIVE EQUIPMENT		
OSHA: 1.5 mg/m ³ , 8-hr TWA NIOSH: 1.5 mg/m ³ , 10-hr TWA ACGIH: 0.2 mg/m ³ , 8-hr TWA IDLH: 50 mg/m ³ (All of the above are for <i>Dinitrotoluene</i>) The Protective Action Criteria values are: PAC-1 = 7.5 mg/m ³ PAC-2 = 50 mg/m ³		Gloves: Coveralls: Respirator:	Butyl (>8-hr breakthrough for 2,4-Dinitrotoluene in 30% to 70% solution) Tyvek® (<i>solid</i> 2,4-Dinitrotoluene); Tychem® BR, CSM and TK; Trellchem® HPS and VPS (>8-hr breakthrough for <i>Nitro compounds, unsubstituted</i>) SCBA		
PAC-3 = 50 mg/m ³ HEALTH EFFECTS		EIDS	T AID AND DECONTAMINATION		
Eyes: Irritation Skin: Irritation Inhalation: Nose at and wh Headac skin and	n and burns n and burns (skin absorbable) nd throat irritation with coughing	Remove the per- Flush eyes with contact lenses Quickly remov large amounts Begin artificial	erson from exposure. h large amounts of water for at least 15 minutes. Remove if worn. Seek medical attention immediately. e contaminated clothing and wash contaminated skin with of soap and water. Seek medical attention. respiration if breathing has stopped and CPR if necessary. ptly to a medical facility.		



Common Name: DIOXOLANE

Synonyms: 1,3-Dioxolan; Formal Glycol; Glycol Methylene Ether CAS No: 646-06-0 Molecular Formula: $C_3H_6O_2$ RTK Substance No: 0791 Description: Clear, colorless liquid with an *Ether*-like odor

HAZARD DATA

	TIAZARO DATA	
Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID	Dioxolane reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire	Use dry chemical, CO ₂ , alcohol-resistant foam or other foaming agent as extinguishing agents, as water may	PERMANGANATES, CHLORATES, NITRATES,
2 - Reactivity	not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE). Dioxolane reacts with ACIDS (such as
DOT#: UN 1166 ERG Guide #: 127	CONTAINERS MAY EXPLODE IN FIRE.	HYDROCHLORIC, SULFURIC and NITRIC) to form <i>Hemiacetals</i> and <i>Formaldehyde</i> .
	Use water spray to keep fire-exposed containers cool.	Peroxides can form on exposure to AIR.
Hazard Class: 3	Vapors may travel to a source of ignition and flash back.	
(Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile)

Cover with dry lime, sand or soda ash, and place in covered containers for disposal.

Keep **Dioxolane** out of confined spaces, such as sewers, because of the possibility of an explosion. Metal containers involving the transfer of **Dioxolane** should be grounded and bonded.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Dioxolane**.

Biodegradation products are not toxic.

EXPOSURE LIMITS

OSHA:	None
NIOSH:	None
ACGIH:	20 ppm, 8-hr TWA
IDLH:	None

HEALTH EFFECTS

- Eyes: Skin:
- Irritation and burns Irritation and burns
- Inhalation: Nose and throat irritation with coughing and wheezing

PHYSICAL PROPERTIES

Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity:	Ether-like $35^{\circ}F(2^{\circ}C)$ 2.1% 20.5% $525^{\circ}F(274^{\circ}C)$ 2.6 (air = 1) 79 mm Hg at $68^{\circ}F(20^{\circ}C)$ 1.1 (water = 1)
•	
Vapor Density:	
Vapor Pressure:	79 mm Hg at 68°F (20°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	78°F (26°C)
Molecular Weight:	74.09

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H® (>8-hr breakthrough for <i>Ethylene Glycol</i>)
Coveralls:	DuPont Tychem® Responder®, CSM, and TK; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC
Respirator:	>20 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.





Common Name: DIPHENYL

Synonyms: Biphenyl; Lemonene; Phenyl Benzene CAS No: 92-52-4 Molecular Formula: $C_{12}H_{10}$ RTK Substance No: 0795

Description: Colorless, white to yellow, leaf-like or crystalline solid with a pleasant, characteristic odor

		HA		A	
Hazard Ra	ting Firefighting			React	livity
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 3 ERG Guide # Hazard Clas (Miscellaneous Hazardous Ma	Diphenyl is a COMBUSTIBLE dispersed particles may form air. y Use dry chemical, CO ₂ , water 077 resistant foam as extinguishin #: 171 Water or foam may cause frot pOISONOUS GASES ARE P Use water spray to keep fire-e cool. cool.	 Diphenyl is a COMBUSTIBLE SOLID and <i>finely</i> dispersed particles may form explosive mixtures in air. Use dry chemical, CO₂, water spray or alcoholresistant foam as extinguishing agents. Water or foam may cause frothing. POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers 		Diphenyl is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and contact may cause fire and explosion.	
	SPILL/LEAKS			PH\	SICAL PROPERTIES
Moisten spille vacuum for o for disposal. DO NOT was Diphenyl is v			Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point: Melting Point: Ionization Pot Molecular We	Temp: /: re: ity: ity: ential:	Pleasant odor $235^{\circ}F (113^{\circ}C)$ 0.6% 5.8% $1,004^{\circ}F (540^{\circ}C)$ 5.3 (air = 1) $0.005 \text{ mm Hg at } 68^{\circ}F (20^{\circ}C)$ 1.2 Insoluble $489^{\circ} \text{ to } 491^{\circ}F (254^{\circ} \text{ to } 255^{\circ}C)$ $156^{\circ} \text{ to } 160^{\circ}F (69^{\circ} \text{ to } 71^{\circ}C)$ 7.95 eV 154.2
E	EXPOSURE LIMITS				
NIOSH: 1 ACGIH: 1 IDLH: 10) mg/m ³		Gloves: Coveralls: Respirator:	Tyvek® >1 mg/i	nd Neoprene m ³ - Full facepiece APR with Organic vapor ge and High efficiency particulate prefilter m ³ - Supplied air or SCBA
I	HEALTH EFFECTS		FIRS		O AND DECONTAMINATION
Eyes: Skin: Inhalation:	Irritation Irritation Nose, throat and lung irritation with coughing, wheezing and shortness of breath		contact lenses Quickly removing large amounts	h large a if worn. e contar of soap	amounts of water for at least 15 minutes. Remove minated clothing and wash contaminated skin with and water.
Chronic:	Nausea, vomiting and abdominal pain Polychlorinated Biphenyls cause liver cancer in humans and animals.		-		ion if breathing has stopped and CPR if necessar medical facility. January 200



Common Name: 1,2-DIPHENYLHYDRAZINE

Synonyms: Hydrazobenzene; DPH CAS No: 122-66-7 Molecular Formula: $C_{12}H_{12}N_2$ RTK Substance No: 0800 Description: Odorless, white to yellow or orange crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health	1,2-Diphenylhydrazine is a COMBUSTIBLE SOLID.	1,2-Diphenylhydrazine is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,	
2 - Fire	Use dry chemical, CO ₂ , water spray or foam as	PEROXIDES, PERMANGANATES, CHLORATES,	
1 - Reactivity	extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE).	
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	1,2-Diphenylhydrazine reacts with MINERAL ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC);	
ERG Guide #: 171	CONTAINERS MAY EXPLODE IN FIRE.	ACID CHLORIDES; and ACID ANHYDRIDES to produce toxic <i>Benzidine</i> .	
Hazard Class: 9	Use water spray to keep fire-exposed containers	toxic benziaine.	
(Environmentally	cool.		
Hazardous Material)			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up, and deposit in sealed containers.

DO NOT wash into sewer.

1,2-Diphenylhydrazine is toxic to aquatic life and will bioaccumulate in fish.

EXPOSURE LIMITS

No occupational exposure limits have been established for **1,2-Diphenylhydrazine**.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, fatigue, dizziness and blue color to the skin and lips (<i>methemoglobinemia</i>)
Chronic:	Cancer (liver and mammary gland) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Combustible
Vapor Density:	1.158 (air = 1)
Vapor Pressure:	1 mm Hg at 217°F (103°C)
Specific Gravity:	1.158 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	559°F (293°C)
Melting Point:	253° to 259°F (123° to 126°C)
Molecular Weight:	184.24

PROTECTIVE EQUIPMENT

Gloves:	Natural Rubber and Nitrile
Coveralls:	DuPont Tyvek®
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Remove** contaminated clothing and wash contaminated skin with soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: DIPROPYLENE GLYCOL METHYL ETHER

Synonyms: Dowanol® DPM; DPGME CAS No: 34590-94-8Molecular Formula: $C_7H_{16}O_3$ RTK Substance No: 0804 Description: Colorless liquid with a mild and pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 2 - Fire 0 - Reactivity DOT#: None	Dipropylene Glycol Methyl Ether is a COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing agents.	Dipropylene Glycol Methyl Ether will react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires and explosions.
ERG Guide #: None Hazard Class: None	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	May form explosive <i>Peroxides</i> on contact with AIR. Attacks METALS to form flammable and explosive <i>Hydrogen gas</i> .

SPILL/LEAKS

Isolation Distance:

Small Spills: 50 meters (200 feet)

Large Spills: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

May be toxic to aquatic life.

EXPOSURE LIMITS

OSHA:	100 ppm, 8-hr TWA
NIOSH:	100 ppm, 10-hr TWA 150 ppm, 15-min STEL
ACGIH:	100 ppm, 8-hr TWA 150 ppm, 15-min STEL
IDLH LEVEL:	600 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation
	Headache, dizziness, lightheadedness and passing out

PHYSICAL PROPERTIES

Odor Threshold:	35 ppm
Flash Point:	180°F (82°C)
LEL:	1.1%
UEL:	3.0%
Auto Ignition Temp:	518°F (270°C)
Vapor Density:	5.1 (air = 1)
Vapor Pressure:	0.28 mm Hg at 68°F (20°C)
Specific Gravity:	0.95 (water = 1)
Water Solubility:	Miscible
Boiling Point:	408°F (209°C)
Molecular Weight:	148.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Nitrile (>8-hr breakthrough)
Coveralls:	DuPont <i>Tychem</i> ® <i>CPF 4</i> , or equivalent for <i>hydroxylic compounds</i> (>8-hr breakthrough)
Respirator:	>100 ppm - full facepiece APR with an Organic vapor cartridge >600 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: EPICHLOROHYDRIN

Synonyms: Chloromethyl Oxirane; 3-Chloropropylene Oxide; 1-Chloro-2,3-Epoxypropane CAS No: 106-89-8 Molecular Formula: C₃H₅CIO RTK Substance No: 0828 Description: Clear, colorless liquid with an irritating odor

HAZARD DATA Hazard Rating Firefighting Reactivity Epichlorohydrin is a FLAMMABLE and REACTIVE Epichlorohydrin can react with HEAT; STRONG ACIDS (such 4 - Health LIQUID that can polymerize violently when exposed to as HYDROCHLORIC, SULFURIC and NITRIC) and STRONG HEAT. BASES (such as SODIUM HYDROXIDE and POTASSIUM 3 - Fire HYDROXIDE) to cause violent and uncontrollable Use dry chemical, CO₂, water spray or alcohol-resistant 2 - Reactivity polymerization. foam as extinguishing agents. Epichlorohydrin may react violently or explosively with POISONOUS GASES ARE PRODUCED IN FIRE, DOT#: UN 2023 OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, including Hydrogen Chloride and Phosgene. PERMANGANATES, CHLORATES, NITRATES, CHLORINE, ERG Guide #: 131P CONTAINERS MAY EXPLODE IN FIRE. BROMINE and FLUORINE); ALCOHOLS; AMINES (especially Use water spray to keep fire-exposed containers cool. Hazard Class: 6.1 ANILINE and ETHYLENE DIAMINE); ALUMINUM; ZINC; Vapor is heavier than air and may travel a distance to METAL SALTS (such as IRON and ALUMINUM CHLORIDE); (Poison) cause a fire or explosion far from the source or flash PHENOLS; POTASSIUM TERT-BUTOXIDE; and WATER. back. Epichlorohydrin will react with TRICHLOROETHYLENE to form Epichlorohydrin may form an ignitable vapor/air mixture explosive Dichloroacetylene. in closed tanks or containers.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment.

Metal containers involving the transfer of **Epichlorohydrin** should be grounded and bonded.

Keep **Epichlorohydrin** out of confined spaces, such as sewers, because of the possibility of an explosion.

Epichlorohydrin is harmful to aquatic life.

EXPOSURE LIMITS

OSHA:5 ppm, 8-hr TWANIOSH:Lowest feasible concentrationACGIH:0.5 ppm, 8-hr TWAIDLH:75 ppmThe Protective Action Criteria values are:PAC-1 = 1.7 ppmPAC-1 = 1.7 ppmPAC-2 = 24 ppmPAC-3 = 72 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns (skin absorbable)
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema)
Chronic:	Cancer (nasal cavity and skin) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.08 to 12 ppm
Flash Point:	88°F (31°C)
LEL:	3.8%
UEL:	21%
Auto Ignition Temp:	772°F (411°C)
Vapor Density:	3.29 (air = 1)
Vapor Pressure:	13 mm Hg at 68°F (20°C)
Specific Gravity:	1.17 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	242°F (117°C)
Freezing Point:	-54°F (-47.8°C)
Ionization Potential:	10.6 eV
Molecular Weight:	92.53

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK; Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	>0.5 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: 2,3-EPOXY-1-PROPANOL

Synonyms: Glycidol; Epoxypropyl Alcohol CAS No: 556-52-5 Molecular Formula: $C_3H_6O_2$ RTK Substance No: 0831 Description: Colorless, slightly thick liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 2 - Fire 0 - Reactivity	2,3-Epoxy-1-Propanol is a COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	2,3-Epoxy-1-Propanol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2810 ERG Guide #: 153 Hazard Class: 6.1 (Poison)	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	2,3-Epoxy-1-Propanol may decompose and/or polymerize, with the release of HEAT, when in contact with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); METALS (such as ALUMINUM, COPPER and ZINC); METAL SALTS (such as IRON
		CHLORIDE and TIN CHLORIDE); and TRICHLOROETHYLENE.

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 300 meters (1,200 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

No environmental information available.

EXPOSURE LIMITS

 OSHA:
 50 ppm, 8-hr TWA

 NIOSH:
 25 ppm, 10-hr TWA

 ACGIH:
 2 ppm, 8-hr TWA

 IDLH:
 150 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation, burns, rash, dryness and redness
Inhalation:	Nose, throat and lung irritation with coughing, wheezing, and shortness of breath
	Headache, dizziness, lightheadedness, and passing out
Chronic:	Cancer (lung, skin, mammary glands) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Unknown
Flash Point:	162°F (72°C)
LEL:	3.7%
UEL:	Unknown
Auto Ignition Temp:	779°F (415°C)
Vapor Density:	2.15 (air = 1)
Vapor Pressure:	0.9 mm Hg at 68°F (20°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Miscible
Boiling Point:	320°F (160°C)
Molecular Weight:	74.1

	PROTECTIVE EQUIPMENT
Gloves:	Butyl and Silver Shield®/4H®
Coveralls:	DuPont Tychem® BR, LV, Responder®, and TK; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Heterocyclic compounds</i> , <i>Oxygen</i> ,
Respirator:	Epoxides)
	>2 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: ETHANOL, 1,2-DICHLORO-, ACETATE

Synonyms: 1,2-Dichloroethyl Acetate CAS No: 10140-87-1 Molecular Formula: $C_4H_6Cl_2O_2$ RTK Substance No: 2394 Description: Water-white liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 1 - Fire 0 - Reactivity DOT#: UN 1993	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine</i> and <i>Phosgene</i> . CONTAINERS MAY EXPLODE IN FIRE.	Ethanol, 1,2-Dichloro-, Acetate explodes when heated with NITRATES. Ethanol, 1,2-Dichloro-, Acetate reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to release heat and poisonous gases (such as <i>Hydrogen Chloride</i>).
ERG Guide #: 128 Hazard Class: 3 (Flammable)	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Ethanol, 1,2-Dichloro-, Acetate may form an ignitable vapor/air mixture in closed tanks or containers.	Ethanol, 1,2-Dichloro-, Acetate is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. Foam can be used to suppress vapors.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Ethanol**, **1,2-Dichloro-**, **Acetate**.

The Protective Action Criteria values are:

PAC-1 = 1 ppm PAC-2 = 1.71 ppm PAC-3 = 6 ppm

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Flash Point:	162.3°F (72.4°C)
Specific Gravity:	1.29 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	136° to 149°F (58° to 65°C)
Freezing Point:	-26°F (-32.2°C)
Molecular Weight:	157

Gloves:	Viton/Butyl, Silver Shield®/4H®, Viton and Barrier® (>4-hr breakthrough)
Coveralls:	Tychem BR, CSM and TK® (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: 2-ETHOXYETHANOL

Synonyms: Cellosolve; Ethylene Glycol Monoethyl Ether CAS No: 110-80-5 Molecular Formula: C₄H₁₀O₂ RTK Substance No: 0839 Description: Clear, colorless liquid with a sweet odor

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
1 - Health	2-Ethoxyethanol is a COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol-	2-Ethoxyethanol may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
2 - Fire	resistant foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE) and form explosive <i>peroxides</i> .	
DOT#: UN 1171	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	2-Ethoxyethanol is not compatible with STRONG	
ERG Guide #: 127	Vapors may travel to a source of ignition and flash	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM	
Hazard Class: 3	back.	HYDROXIDE and POTASSIUM HYDROXIDE); and	
(Flammable)	Flow or agitation may generate electrostatic charges.	COPPER.	
	2-Ethoxyethanol may form an ignitable vapor/air mixture in closed tanks or containers at temperatures above 111°F (44°C).		

Molecular Weight:

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of 2-Ethoxyethanol.

Metal containers involving the transfer of

2-Ethoxyethanol should be grounded and bonded. DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 200 ppm, 8-hr TWA NIOSH: 0.5 ppm, 10-hr TWA ACGIH: 5 ppm, 8-hr TWA IDLH: 500 ppm The Protective Action Criteria values are:

PAC-1 = 5 ppm PAC-2 = 5 ppm PAC-3 = 500 ppm

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES		
Odor Threshold:	2.7 ppm	
Flash Point:	105° to 110°F (41° to 43°C)	
LEL:	1.7%	
UEL:	15.6%	
Auto Ignition Temp:	455°F (235°C)	
Vapor Density:	3.1 (air = 1)	
Vapor Pressure:	3.8 mm Hg at 68°F (20°C)	
Specific Gravity:	0.9 (water = 1)	
Water Solubility:	Soluble	
Freezing Point:	275°F (135°C)	
Melting Point:	-130°F (-90°C)	

	PROTECTIVE EQUIPMENT
Gloves:	Viton/Butyl, SilverShield®/4H® and Viton (>8-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)
Respirator:	SCBA

90.1

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ETHYL ALCOHOL

Synonyms: Alcohol; Ethanol; Methylcarbinol CAS No: 64-17-5 Molecular Formula: C₂H₅OH RTK Substance No: 0844

Description: Clear, colorless liquid with a wine-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant	Ethyl Alcohol reacts violently with ACETYL BROMIDE and ACETYL CHLORIDE.
3 - Fire	foam as extinguishing agents.	Contact with concentrated SULFURIC ACID; POTASSIUM; and
0 - Reactivity	Solid streams of water may be ineffective.	HYDROGEN PEROXIDE can cause explosions.
	POISONOUS GASES ARE PRODUCED IN FIRE.	Ethyl Alcohol will react with PLATINUM BLACK; CALCIUM
DOT#: UN 1170	CONTAINERS MAY EXPLODE IN FIRE.	HYPOCHLORITE; SILVER OXIDE; AMMONIA; NITRIC ACID;
ERG Guide #: 127	Use water spray to keep fire-exposed containers cool.	MERCURIC NITRATE; SILVER NITRATE; MAGNESIUM
	Vapor is heavier than air and may travel a distance to	PERCHLORATE; and other STRONG OXIDIZERS to cause fire
Hazard Class: 3	cause a fire or explosion far from the source and	and explosions.
(Flammable)	flashback.	Ethyl Alcohol reacts violently with ISOCYANATES; MINERAL
, , ,	Ethyl Alcohol may form an ignitable vapor/air mixture in closed tanks or containers.	ACIDS; and CHLOROFORM.
		Protect from SUNLIGHT.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Ethyl Alcohol**.

Keep **Ethyl Alcohol** out of confined spaces, such as sewers, because of the possibility of an explosion.

Metal containers involving the transfer of **Ethyl Alcohol** should be grounded and bonded.

Ethyl Alcohol may affect aquatic life.

EXPOSURE LIMITS

 OSHA:
 1,000 ppm, 8-hr TWA

 NIOSH:
 1,000 ppm, 10-hr TWA

 ACGIH:
 1,000 ppm, STEL

 IDLH:
 3,300 ppm

The Protective Action Criteria values are:

PAC-1 = 1,800 ppm PAC-2 = 3,300 ppm

PAC-3 = 15,000 ppm

HEALTH EFFECTS

Eyes: Skin: Inhalation:	Irritation Irritation Nose, throat and lung irritation with coughing and shortness of breath
	Headache, drowsiness, nausea and vomiting, and unconsciousness

PHYSICAL PROPERTIES

Odor Threshold:	84 ppm
Flash Point:	55 °F (13 °C)
LEL:	3%
UEL:	19%
Auto Ignition Temp:	685 °F (363 °C)
Vapor Density:	1.59 (air = 1)
Vapor Pressure:	44 mm Hg at 68 °F (20 °C)
Specific Gravity:	0.79 (water = 1)
Water Solubility:	Soluble
Boiling Point:	173 °F (78 °C)
Melting Point:	-173 °F (-114 °C)
Ionization Potential:	10.47 eV
Molecular Weight:	46.1

PROTECTIVE EQUIPMENT

Gloves: Butyl, Neoprene, Silver Shield®/4H®, Viton, Viton/Butyl and Barrier® (>8-hr breakthrough)

Coveralls: Tychem® CPF 3 (>8-hr breakthrough)

Respirator: >1,000 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ETHYL ALUMINUM SESQUICHLORIDE

Synonyms: Triethyltrichlorodialuminum; Triethylaluminum Sesquichloride CAS No: 12075-68-2 Molecular Formula: $C_6H_{15}Al_2Cl_3$ RTK Substance No: 0846 Description: Clear, yellow liquid

HAZARD DATA

		1
Hazard Rating	Firefighting	Reactivity
3 - Health 3 - Fire 3₩ - Reactivity	FLAMMABLE AND REACTIVE LIQUID Ethyl Aluminum Sesquichloride is SPONTANEOUSLY COMBUSTIBLE in AIR and REACTS VIOLENTLY with WATER to form	Ethyl Aluminum Sesquichloride IGNITES when exposed to AIR or OXYGEN and REACTS VIOLENTLY with WATER to form corrosive <i>Hydrogen Chloride</i> and flammable <i>Ethane gases</i> .
DOT#: UN 3052 ERG Guide #: 135 Hazard Class: 4.2 (Spontaneously combustible)	corrosive <i>Hydrogen Chloride</i> and flammable <i>Ethane gases.</i> Use dry chemical or dry graphite as extinguishing agents. DO NOT USE WATER. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Aluminum Oxide.</i> CONTAINERS MAY EXPLODE IN FIRE.	Ethyl Aluminum Sesquichloride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALCOHOLS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and CARBON TETRACHLORIDE. Keep Ethyl Aluminum Sesquichloride dry and protect from SHOCK and HEAT.

SPI	LL/	LE.	AKS
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Isolation Distance:

- Small Spill: 30 meters (100 feet)
- Large Spill: 60 meters (200 feet)
- Fire: 800 meters (1/2 mile)
- Absorb liquids in dry sand, dry earth, or a similar material and place into sealed containers for disposal.
- Use only non-sparking tools and equipment, especially when opening and closing containers of **Ethyl Aluminum Sesquichloride**.

DO NOT USE WATER OR WET METHOD.

DO NOT allow Ethyl Aluminum Sesquichloride to enter water systems.

EXPOSURE LIMITS

OSHA: None NIOSH: 2 mg/m³, 10-hr TWA (for *Aluminum Alkyls* measured as *Aluminum*) ACGIH: None

HEALTH EFFECTS

Eyes:Severe irritation and burnsSkin:Severe irritation and burnsInhalation:Nose, throat and lung irritation with
coughing, wheezing and shortness of
breath
Headache, nausea and vomiting

PHYSICAL PROPERTIES

Flash Point:
Vapor Density:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Freezing Point:
Molecular Weight:

-4°F (-20°C) 8.49 (air = 1) 0.012 mm Hg at 77°F (25°C) 1.1 (water = 1) Reacts Violently 297° to 399°F (147° to 204°C) -4°F (-20°C) 247.5

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H® and Barrier® (>4-hr breakthrough for highly toxic chemicals)
Coveralls:	Tychem® Responder® and TK (>8-hr breakthrough for Organo-Metallic compounds)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ETHYL BENZENE

Synonyms: EB; Ethylbenzol; Phenylethane CAS No: 100-41-4 Molecular Formula: C_8H_{10} RTK Substance No: 0851 Description: Clear, colorless liquid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID	Ethyl Benzene is not compatible with
3 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	PERMANGANATES, CHLORATES,
DOT#: UN 1175	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to reduce vapors and to keep containers cool.	NITRATES, CHLORINE, BROMINE and FLUORINE).
ERG Guide #: 130	Vapor is heavier than air and may travel a distance to cause a	
Hazard Class: 3	fire or explosion far from the source or flash back.	
(Flammable)	Flow or agitation may generate electrostatic charges.	
	Ethyl Benzene may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Ground and bond containers when transferring **Ethyl Benzene**.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Ethyl Benzene**.

DO NOT wash into sewer.

Ethyl Benzene is toxic to aquatic organisms.

EXPOSURE LIMITS

 OSHA:
 100 ppm, 8-hr TWA

 NIOSH:
 100 ppm, 10-hr TWA; 125 ppm, STEL

 ACGIH:
 20 ppm, 8-hr TWA

 IDLH:
 800 ppm

 The Protective Action Criteria values are:
 PAC-1 = 33 ppm

 PAC-3 = 1,800 ppm

HEALTH EFFECTS

	Eyes: Skin:	Irritation Irritation (skin absorbable)
Inhalation: Nose and throat irritation		Nose and throat irritation
		Headache, dizziness, lightheadedness, loss of coordination and passing out. Very high levels can cause trouble breathing and even death.
	Chronic:	Cancer (kidney, testes, lung, liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	2.3 ppm
Flash Point:	59° to 70°F (15° to 21°C)
LEL:	0.8%
UEL:	6.7%
Auto Ignition Temp:	810° to 860°F (432° to 460°C)
Vapor Density:	3.7 (water = 1)
Vapor Pressure:	7 mm Hg at 68°F (20°c)
Specific Gravity:	0.9 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	277°F (136°C)
Melting Point:	-139°F (-95°C)
Ionization Potential:	8.76 eV
Molecular Weight:	106.2

	PROTECTIVE EQUIPMENT
Gloves:	Viton/Butyl, Viton and Barrier $^{\ensuremath{\mathbb{R}}}$ (>8-hr breakthrough)
Coveralls:	Use turn out gear or flash protection if ignition/fire is the greatest hazard.
Respirator:	>20 ppm - full facepiece APR with <i>Organic Vapor</i> <i>Cartridges</i> >200 ppm - SCBA

FIRST AID AND DECONTAMINATION

- ► Remove the person from exposure.
- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- ▶ Begin artificial respiration if breathing has stopped and CPR if necessary.
- Transfer promptly to a medical facility.



Common Name: ETHYL-4,4'-DICHLOROBENZILATE

Synonyms: Benzeneacetic Acid; Chlorobenzilate CAS No: 510-15-6 Molecular Formula: $C_{16}H_{14}Cl_2O_3$ RTK Substance No: 0205

Description: Colorless to pale yellow solid or a thick yellow or brownish liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Ethyl-4,4'-Dichlorobenzilate may burn and can	Ethyl-4,4'-Dichlorobenzilate is not compatible with
1 - Fire	also be dissolved in a flammable or combustible liquid carrier.	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE)
DOT#:	extinguishing agents.	and LIME).
UN 2996 (liquid)	POISONOUS GASES ARE PRODUCED IN FIRE.	
UN 2761 (solid)	Use water spray to keep fire-exposed containers	
ERG Guide #: 151	cool.	
Hazard Class: 6.1		
(Toxic)		

SPILL/LEAKS

Isolation Distance:

- Spills (liquid): 50 meters (150 feet) (solid): 25 meters (75 feet)
- Fire: 800 meters (1/2 mile)
- Eliminate all ignition sources.
- Dampen solid spill with 60 to 70% *Ethanol* and place in sealed containers for disposal.
- Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.
- Wash all contaminated surfaces with 60 to 70% *Ethanol.*

DO NOT wash into sewer and then wash with soap and water.

EXPOSURE LIMITS

The Protective Action Criteria values are: PAC-1 = 0.75 mg/m^3 PAC-2 = 6 mg/m^3 PAC-3 = 300 mg/m^3

HEALTH EFFECTS

Eyes:IrritationSkin:Irritation with rash or burning feelingInhalation:Headache, loss of appetite, nausea,
vomiting and diarrhea.Chronic:Cancer (liver) in animals

PHYSICAL PROPERTIES

Vapor Pressure: $2.2 \times 10^{-6} \text{ mm Hg at } 68^{\circ}\text{F} (20^{\circ}\text{C})$ Specific Gravity:1.3 (water = 1)Water Solubility:InsolubleBoiling Point: $295^{\circ} \text{ to } 316^{\circ}\text{F} (146^{\circ} \text{ to } 158^{\circ}\text{C})$ Melting Point: $95^{\circ} \text{ to } 99^{\circ}\text{F} (35^{\circ} \text{ to } 37^{\circ}\text{C})$ Molecular Weight:325.2

PROTECTIVE EQUIPMENT

Gloves:	Viton
Coveralls:	Tyvek®

Respirator: >0.75 mg/m³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility



Common Name: ETHYLENEDIAMINETETRAACETIC ACID

Synonyms: Edetic Acid; EDTA; Tetrine Acid CAS No: 60-00-4 Molecular Formula: C₁₀H₁₆N₂O₈ RTK Substance No: 0876 Description: Odorless, colorless or white, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ethylenediaminetetraacetic	Ethylenediaminetetraacetic Acid reacts violently with LEAD DIOXIDE.
0 - Fire	Acid itself does not burn.	Ethylenediaminetetraacetic Acid is not compatible with
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
DOT#: UN 3077	including <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool.	NITRATES, CHLORINE, BROMINE and FLUORINE);
ERG Guide #: 171		STRONG ACIDS (such as HYDROCHLORIC,
		SULFURIC and NITRIC); STRONG BASES (such as
Hazard Class: 9 (Miscellaneous Hazardous Material)		SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) COPPER; COPPER ALLOYS; NICKEL; ALUMINUM; AMMONIA: AMINES; ISOCYANATES; and
		EPICHLOROHYDRIN.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Ethylenediaminetetraacetic Acid is harmful to aquatic organisms.

EXPOSURE LIMITS

The Protective Action Criteria values are:

 $PAC-1 = 125 \text{ mg/m}^3$ $PAC-2 = 150 \text{ mg/m}^3$ $PAC-3 = 150 \text{ mg/m}^3$

Gloves: Neoprene Tyvek®

Coveralls:

>125 mg/m³ - Supplied air or SCBA **Respirator:**

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation and skin rash Inhalation: Nose and throat irritation with coughing and wheezing

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Transfer promptly to a medical facility.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless	
Flash Point:	Noncombustible	
Vapor Pressure:	2 x 10 ⁻¹² mm Hg at 77°F (25°C)	
Specific Gravity:	0.86 (water = 1)	
Water Solubility:	Slightly soluble	
Melting Point:	Decomposes at 464°F (240°C)	
Molecular Weight:	292.3	

PROTECTIVE EQUIPMENT



Common Name: ETHYLENE DIBROMIDE

Synonyms: EDB; Ethylene Bromide CAS No: 106-93-4 Molecular Formula: $C_2H_4Br_2$ RTK Substance No: 0877 Description: Colorless, thick liquid with a slightly sweet, pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ethylene Dibromide itself does	Ethylene Dibromide may react violently with <i>powdered</i> ALUMINUM, MAGNESIUM and ZINC.
0 - Fire	not burn.	Ethylene Dibromide may react with SODIUM;
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Bromide.	POTASSIUM; CALCIUM; LIQUID AMMONIA; OXIDIZING AGENTS (such as PERCHLORATES,
DOT#: UN 1605	Use water spray to keep fire-exposed containers	PEROXIDES, PERMANGANATES, CHLORATES,
ERG Guide #: 154	cool.	NITRATES, CHLORINE, BROMINE and FLUORINE);
Hazard Class: 6.1 (Poison)		and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) to cause fires and explosions.
		Ethylene Dibromide decomposes on HOT SURFACES to form toxic and corrosive <i>Hydrogen Bromide</i> and <i>Bromine</i> gases.

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold:	Slightly sweet
	Flash Point:	Noncombustible
Spill: 30 meters (100 feet)	Vapor Density:	6.5 (air = 1)
Fire: 800 meters (1/2 mile)	Vapor Pressure:	12 mm Hg at 68°F (20°C)
Absorb liquids in dry sand, earth, or a similar material	Specific Gravity:	2.2 (water = 1)
and place into sealed containers for disposal.	Water Solubility:	Very slightly soluble
Use foam to blanket release and suppress vapors.	Boiling Point:	268° to 270°F (131° to 132°C)
Ethylene Dibromide may be hazardous to the	Melting Point:	50°F (10°C)
environment.	Ionization Potential:	9.45 eV
	Molecular Weight:	187.8

OSHA: 20 ppm, 8-hr TWA; 30 ppm, Ceiling; 50 ppm Peak (5 min.)

NIOSH: 0.045, 10-hr TWA; 0.13 ppm, Ceiling

IDLH: 100 ppm

The Protective Action Criteria values are:

PAC-1 = 17 ppm PAC-2 = 24 ppm PAC-3 = 46 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, drowsiness, unconsciousness and coma
Chronic:	Cancer (nasal cavity, circulatory system, mammary gland, and other sites) in animals

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, TK and CSM (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: ETHYLENE GLYCOL

Synonyms: 1,2-Dihydroxyethane; 1,2-Ethanediol; Ethylene Alcohol CAS No: 107-21-1 Molecular Formula: $C_2H_6O_2$ RTK Substance No: 0878 Description: Clear, colorless, thick liquid

	IAZARI	D DATA			
Hazard Rating	Firefighting		Reactivity	,	
2 - Health 1 - Fire 0 - Reactivity DOT#: None ERG Guide #: 171 Hazard Class: None	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water sp alcohol-resistant foam as exting agents. POISONOUS GASES ARE PRO IN FIRE.	MBUSTIBLE LIQUID e dry chemical, CO ₂ , water spray or cohol-resistant foam as extinguishing ents. ISONOUS GASES ARE PRODUCED FIRE. e water spray to keep fire-exposed		Ethylene Glycol is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACID (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASE (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALIPHATIC AMINES; ISOCYANATES; CHLOROSULFONIC ACID; an OLEUM.	
SPIL	.L/LEAKS		PH	YSICAL PROPERTIES	
Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.		Flash Point:23LEL:3.3UEL:15Auto Ignition Temp:74Vapor Density:2.3Vapor Pressure:0.0Specific Gravity:1.3Water Solubility:SoBoiling Point:38Freezing Point:8.0Critical Temp:83		62.5 ppm 232°F (111°C) 3.2% 15.3% 748°F (398°C) 2.14 (air = 1) 0.05 mm Hg at 68°F (20°C) 1.1 (water = 1) Soluble 387°F (197°C) 8.6°F (-13°C) 833°F (445°C) 62.07	
EXPOS	URE LIMITS		PRO	TECTIVE EQUIPMENT	
ACGIH: 39 ppm, Ceiling The Protective Action Criteria values are: PAC-1 = 30 ppm PAC-2 = 40 ppm PAC-3 = 60 ppm		Gloves: Coveral Respira	Shield breakt Ils: Tyche and V and V	Nitrile, Neoprene, Natural Rubber, Silver (®/4H®, Viton, Viton/Butyl and Barrier® (>8-hr through) m® SL, BR, CSM and TK; and Trellchem® HPS PS (>8-hr breakthrough) ng/m ³ - full facepiece APR with <i>Organic vapor</i> and <i>P100 cartridges</i> ng/m ³ in fire conditions - SCBA	
HEALT	H EFFECTS		FIRST AI	D AND DECONTAMINATION	
Chronic: Headache	l throat irritation e, nausea, vomiting, dizziness, beech, convulsions, and coma	Flush e contact Quickly large ar Begin a	lenses. remove contan mounts of soap ırtificial respiration	mounts of water for at least 15 minutes. Remove ninated clothing and wash contaminated skin with	



Common Name: ETHYLENEIMINE

Synonyms: Aminoethylene; Azacyclopropane; Aziridine; Dimethyleneimine CAS No: 151-56-4 Molecular Formula: C_2H_5N RTK Substance No: 0881

Description: Clear, colorless liquid with an Ammonia-like odor

	HAZARD DA	ГА
Hazard Rating	Firefighting	Reactivity
4 - Health 3 - Fire 3 - Reactivity DOT#: UN 1185 ERG Guide #: 131 Hazard Class: 6.1 (Poison)	 FLAMMABLE and REACTIVE LIQUID Use dry chemical, water spray or alcohol-resistant foam as extinguishing agents. Ethyleneimine can polymerize violently when exposed to ELEVATED TEMPERATURES if not inhibited. The vapors of Ethyleneimine are NOT stabilized and may form polymers in vents or other confined spaces, resulting in fires and explosions. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool and to disperse vapors. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source and flashback. Ethyleneimine may form an ignitable vapor/air mixture in closed tanks or containers. 	 Ethyleneimine can polymerize violently, if not inhibited, when exposed to ELEVATED TEMPERATURES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). Ethyleneimine reacts with SODIUM HYPOCHLORITE to form explosive 1-Chloroazidine. Contact with SILVER and ALUMINUM may result in the formation of explosive compounds. Protect from HEAT, SUNLIGHT, and WATER.

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance: Small Spill: 30 meters (100 feet) Large Spill: 100 meters (300 feet) Fire: 800 meters (1/2 mile) Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. Use only non-sparking tools and equipment. Ground and bond all metal containers when transferring Ethyleneimine.	PH Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point:	1.5 ppm 12 °F (-11 °C) 3.3% 46% 608 °F (320 °C) 1.5 (air = 1) 160 mm Hg at 68 °F (20 °C) 0.83 (water = 1) Soluble 131 ° to 135 °F (55 ° to 57 °C)	
Keep Ethyleneimine out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer as Ethyleneimine is harmful to	Freezing Point: Ionization Potential:	-98 °F (-72 °C) 9.2 eV	
aquatic organisms.	Molecular Weight:	43	

EXPOSURE LIMITS

OSHA/NIOSH: Lowest feasible concentration ACGIH: 0.05 ppm, 8-hr TWA; 0.1 ppm, STEL IDLH: 100 ppm The Protective Action Criteria values are: PAC-1 = 0.1 ppm PAC-2 = 4.6 ppm PAC-3 = 9.9 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
Chronic:	Cancer (lung and liver) in animals

PROTECTIVE EQUIPMENT

Gloves:	Butyl (>8-hr breakthrough)
Coveralls:	Tychem® TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: ETHYLENE OXIDE

Synonyms: Dimethylene Oxide; 1,2-Epoxyethane; ETO; Oxirane CAS No: 75-21-8 Molecular Formula: C_2H_4O RTK Substance No: 0882

Description: Colorless gas or liquid with an Ether-like odor

		H	AZARD	D	ATA	
Hazard Rating	Firefighting				Reactivity	
3- Health 4 - Fire 3 - Reactivity DOT#: UN 1040 ERG Guide #: 119 Hazard Class: 2.3 (Poisonous gas)	Health FLAMMABLE AND REACTIVE GAS OR LIG • Fire Use dry chemical, CO ₂ , water spray, alcoho foam or other foam as extinguishing agents • Reactivity Let fire burn if it cannot be stopped. • T#: UN 1040 • RG Guide #: 119P • Acade Class: 2.3			to 1 I. D	Ethylene Oxide poly with HEAT; STRONG SULFURIC and NITH HYDROXIDE and PC CHLORIDES (such a CHLORIDE); and ME and COPPER OXIDE Ethylene Oxide is ex OXIDIZING AGENTS PERMANGANATES BROMINE and FLUC Ethylene Oxide is no (such as POTASSIU MERCAPTANS; CYA	tremely explosive in the presence of S (such as PERCHLORATES, PEROXIDES, , CHLORATES, NITRATES, CHLORINE, DRINE) and AIR. Dt compatible with AMMONIA; METALS M, SILVER and MERCURY); ALCOHOLS; ANIDES; AMINES; and HALOGENATED (such as METHYLENE CHLORIDE and
	SPILL/LEAKS			Т	PHYSIC	CAL PROPERTIES
Isolation Distance: Small Spill: 30 meters (100 feet) Fire: 1,600 meters Large Spill: 150 meters (500 feet) Stop flow of gas. If source of leak is a cylinder and the leak car stopped in place, remove the leaking cylinder to a safe place in air, and repair leak or allow cylinder to empty. Absorb liquids in vermiculite, dry sand, earth, or a similar mater place into sealed containers for disposal. Use only non-sparking tools and equipment, especially when op closing containers of Ethylene Oxide. Keep Ethylene Oxide out of confined spaces, such as sewers, the possibility of an explosion. Use water spray to keep containers cool. Turn leaking cylinder with leak up to prevent escape of gas in th state. No adverse ecological effects are expected.		ial a benii	be open nd ng and ause of		Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Potential: Molecular Weight:	257 to 690 ppm -4°F (-20°C) 3% 100% 804°F (429°C) 1.5 (air = 1) 1,095 mm Hg at 68°F (20°C) 0.87 (water = 1) Miscible 51°F (11°C) -170°F (-112°C) 10.56 eV 44.06
EXP		ļļ			PROTECTIV	E EQUIPMENT
OSHA: 1 ppm, 8-hr TWA; 5 ppm, 15-min Excursion NIOSH: <0.1 ppm, 10-hr TWA; 5 ppm, 10-min Ceiling ACGIH: 1 ppm, 8-hr TWA IDLH: 800 ppm The Protective Action Criteria values are: PAC-1 = 5 ppm PAC-2 = 45 ppm PAC-3 = 200 ppm			Gloves: Coveralls: Respirator	:	Tychem® BR, TK a HPS and VPS (>8-	f®/4H® (<1-hr breakthrough) and Responder ®; and Trellchem® hr breakthrough) use turn-out gear or flash protection
HEA	LTH EFFECTS		FIRST AID AND DECONTAMINATION			ECONTAMINATION
Skin: Sever cause Inhalation: Nose, and s edem Heada twitch	, ache, nausea, vomiting, dizziness, ing, and seizures	id Flush eye contact le g, Quickly re large amo Immerse a Begin artii Transfer p		wit nses mov unts ffec cial rom	if worn. Seek medical att e contaminated clothing a of soap and water. ted part in warm water. So respiration if breathing has ptly to a medical facility.	nd wash contaminated skin with eek medical attention. s stopped and CPR if necessary.
Chronic: Cance	er (leukemia) in humans		Medical ob	ser	vation is recommended as	s symptoms may be delayed. August 2016



Common Name: FERRIC AMMONIUM CITRATE

Synonyms: Ammonium Ferric Citrate; Citric Acid, Ammonium Iron (3+) Salt CAS No: 1185-57-5 Molecular Formula: $C_6H_{13}NFeO_{10}$ RTK Substance No: 0918 Description: Yellowish-brown to red or green powder with a faint *Ammonia*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ferric Ammonium Citrate itself	Ferric Ammonium Citrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,		
0 - Fire	does not burn.	PEROXIDES, PERMANGANATES, CHLORATES,		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Ammonia</i> .	NITRATES, CHLORINE, BROMINE and FLUORINE) and IODIDES.		
DOT#: UN 3077	Use water spray to keep fire-exposed containers	Ferric Ammonium Citrate may decompose on exposure		
ERG Guide #: 171	cool.	to LIGHT and MOISTURE.		
Hazard Class: 9				
(Environmentally				
Hazardous Material)				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

For water spills neutralize with Agricultural Lime, crushed Limestone or Sodium Bicarbonate.

DO NOT wash into sewer.

Ferric Ammonium Citrate may be toxic to aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Ferric Ammonium Citrate**.

The Protective Action Criteria values are:

PAC-1 = 5.4 mg/m^3

 $PAC-2 = 500 \text{ mg/m}^3$

 $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes: Irritation

Skin: Irritation

Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:Ammonia-like odorFlash Point:NoncombustibleSpecific Gravity:1.8 (water = 1)Water Solubility:SolublepH:<7 in aqueous solution</td>Molecular Weight:Varies

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator:

>5 mg/m³ - full facepiece APR with High efficiency filters >500 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: FERRIC NITRATE

Synonyms: Iron Nitrate; Iron Trinitrate CAS No: 10421-48-4 Molecular Formula: FeN₃0₉ RTK Substance No: 0924 Description: Pale violet, green or white, odorless, crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Ferric Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Ferric Nitrate may react with ORGANIC COMPOUNDS; COMBUSTIBLES; REDUCING AGENTS (such as
0 - Fire	combustion of other substances.	LITHIUM, SODIUM, ALUMINUM and their HYDRIDES);
0 - Reactivity	Use water only. DO NOT USE DRY CHEMICAL or	and ALKYL ESTERS to cause fires and explosions.
DOT#: UN 1466	CO ₂ as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	Ferric Nitrate is not compatible with METALS (such as finely divided ALUMINUM and MAGNESIUM); CYANIDE
ERG Guide #: 140	including Nitrogen Oxides and Nitric Acid.	COMPOUNDS; METAL SALTS; STRONG ACIDS (such
Hazard Class: 5.1 (Oxidizer)		as HYDROCHLORIC, SULFURIC and NITRIC); ALCOHOLS; HYDRAZINE; PEROXIDES; GLYCIDOL; ETHERS; and ISOPROPYL CHLOROCARBONATE.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Neutralize liquid spills with dry lime, sand or soda ash and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 1 mg/m³, 10-hr TWA (as Iron)

ACGIH: 1 mg/m^3 , 8-hr TWA (as *Iron*)

The Protective Action Criteria values are:

 $PAC-1 = 13 \text{ mg/m}^{3}$

 $PAC-2 = 21.7 \text{ mg/m}^3$

PAC-3 = 100 mg/m^3

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, fatigue, dizziness and a blue color to the skin and lips (<i>methemoglobinemia</i>)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	1.7 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes at <212°F (<100°C)
Melting Point:	117°F (47°C)
Molecular Weight:	242

PROTECTIVE EQUIPMENT

Nitrile and Natural Rubber

Gloves:

Coveralls:

Respirator: >1 mg/m³ - full facepiece APR with High efficiency filter >13 mg/m³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Tvvek®

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: FERRIC SULFATE

Synonyms: Iron Persulfate; Iron (3+) Sulfate CAS No: 10028-22-5 Molecular Formula: $Fe_2O_{12}S_3$ RTK Substance No: 0925 Description: Odorless, grayish-white or yellow powder or crystalline, lumpy solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ferric Sulfate itself does not	Ferric Sulfate may react violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM		
0 - Fire	burn.	HYDROXIDE).		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i> and <i>Iron Oxides</i> .	Ferric Sulfate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
DOT#: UN 3077	Use water spray to keep fire-exposed containers	PERMANGANATES, CHLORATES, NITRATES,		
ERG Guide #: 171	cool.	CHLORINE, BROMINE and FLUORINE).		
Hazard Class: 9		Ferric Sulfate is hygroscopic and sensitive to light.		
(Miscellaneous				
Hazardous Material)				

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Ferric Sulfate is dangerous to aquatic life.

EXPOSURE LIMITS

NIOSH: 1 mg/m³, 10-hr TWA (as *Iron*)

ACGIH: 1 mg/m³, 8-hr TWA (as *Iron*)

The Protective Action Criteria values are:

PAC-1 = 10.7 mg/m^3

PAC-2 = 17.9 mg/m³

 $PAC-3 = 75 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezing.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	3.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	Decomposes at 896°F (480°C)
Molecular Weight:	399.9

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Natural Rubber
Coveralls:	Tyvek®
Respirator:	 >1 mg/m³ - Supplied air or full-facepiece APR with High efficiency particulate filters >10 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: FERROUS SULFATE

Synonyms: Copperas; Green Vitriol; Iron Monosulfate CAS No: 7720-78-7 Molecular Formula: FeSO₄ RTK Substance No: 0931 Description: Greenish, yellow-brown or white, odorless, crystalline (sand-like) powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Ferrous Sulfate itself does not	Ferrous Sulfate may react violently or explosively on contact with ARSENIC TRIOXIDE; SODIUM NITRATE;	
0 - Fire	burn.	METHYL ISOCYANOACETATE; and STRONG BASES	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i> .	(such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).	
DOT#: UN 3077	Use water spray to keep fire-exposed containers	Ferrous Sulfate is not compatible with OXIDIZING	
ERG Guide #: 171	cool.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,	
Hazard Class: 9 (Miscellanous		CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and	
Hazardous Material)		POTASSIUM); CARBONATES (such as LIME); and GOLD and SILVER SALTS.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Ferrous Sulfate is harmful to aquatic life in very low concentrations.

EXPOSURE LIMITS

NIOSH: 1 mg/m³, 10-hr TWA (as *Iron salts*) **ACGIH:** 1 mg/m³, 8-hr TWA (as *Iron salts*)

The Protective Action Criteria values are:

- PAC-1 = 8.2 mg/m³
- $PAC-2 = 41 \text{ mg/m}^3$
- PAC-3 = 250 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	3 (water = 1)
Water Solubility:	Soluble
Boiling Point:	572°F (300°C)
Melting Point:	147°F (64°C)
Molecular Weight:	151.9

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>1 mg/m ³ - full facepiece APR with High efficiency filters >8 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: FORMALDEHYDE

Synonyms: Formalin; Methyl Aldehyde; Methylene Oxide CAS No: 50-00-0 Molecular Formula: CH₂O RTK Substance No: 0946

Description: Colorless gas with a strong odor, usually found in a Methanol and water solution

		HAZARD DAT	Α
Hazard Rating	Firefighting	Reac	tivity
4 - Health 4 - Fire 0 - Reactivity DOT#: UN 1198 (Solutions, Flammable) UN 2209 (Solutions) ERG Guide #: 132 Hazard Class: UN 1198 (3, Flammable UN 2209 (8, Corrosive)	Formaldehyde is a FLAMM or COMBUSTIBLE SOLUT Use dry chemical, CO ₂ , wat alcohol-resistant foam as e agents. Use water spray to reduce v POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLO	ABLE GAS ION. er spray or xtinguishing rapors. DDE IN -exposed AGEN PERM BROM ANILIN HYDRO Formal SODIU IRON; OXYG	Idehyde reacts violently with NITROGEN OXIDES; OXIDIZING TS (such as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, CHLORINE, INE and FLUORINE); mixtures of PERCHLORIC ACID and IE; NITROMETHANE; MAGNESIUM CARBONATE; and OGEN PEROXIDE. Idehyde reacts with PHENOL and HYDROGEN CHLORIDE to oxic <i>Bis(Chloromethyl) Ether</i> . Idehyde is not compatible with STRONG ACIDS (such as OCHLORIC, SULFURIC and NITRIC); STRONG BASES (such a IM HYDROXIDE and POTASSIUM HYDROXIDE); IODINE; SILVER; ISOCYANATES; AMINES; ANHYDRIDES; and LIQUID
SPIL	L/LEAKS		PHYSICAL PROPERTIES
material and place into sea Stop flow of gas. If source cannot be stopped in place safe place in the open air, empty. Use only non-sparking tool opening and closing conta Keep Formaldehyde out o	f confined spaces, such possibility of an explosion.	Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Tem Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Potentia Molecular Weight:	1.07 (air = 1) (gas), obs 1 (100 0) (containly) 1.07 (air = 1) (gas) 760 mm Hg at 68°F (20°C) 0.8 to 1.1 (water = 1) Soluble -3°F (-19.4°C) -134°F (-92°C) al: 10.88 eV
EXPOS	URE LIMITS		PROTECTIVE EQUIPMENT
ACGIH: 0.3 ppm, Ceiling IDLH: 20 ppm The Protective Action Crite	TWA; 0.1 ppm, 15-min Ceiling	Coveralls:	Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough) Tychem® BR, Responder® and TK (>8-hr breakthrough) SCBA
HEALT	H EFFECTS	FIRST	AID AND DECONTAMINATION
Skin: Severe irrit Inhalation: Nose, mou coughing, a (pulmonary	ation, burns and possible damage ation and burns th, throat and lung irritation, with and severe shortness of breath edema) sopharynx and leukemia) in	lenses if worn. See Quickly remove co amounts of soap a	ge amounts of water for at least 30 minutes. Remove contact ek medical attention. ntaminated clothing and wash contaminated skin with large nd water. Seek medical attention. piration if breathing has stopped and CPR if necessary.



Common Name: FORMIC ACID

Synonyms: Aminic Acid; Methanoic Acid CAS No: 64-18-6 Molecular Formula: CH₂O₂ RTK Substance No: 0948 Description: Colorless liquid with a strong, penetrating odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Formic Acid is a COMBUSTIBLE	Formic Acid reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,	
2 - Fire	Use dry chemical, CO ₂ , water spray or	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);	
0 - Reactivity	alcohol-resistant foam as extinguishing agents.	STRONG INORGANIC BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and STRONG ORGANIC BASES (such	
DOT#: UN 1779	POISONOUS GASES ARE	as AMINES) causing a fire and explosion hazard.	
ERG Guide #: 153	PRODUCED IN FIRE.	Formic Acid reacts with CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC) to form flammable	
Hazard Class: 8	Use water spray to keep fire-exposed	and explosive Hydrogen gas and metal salts.	
(Corrosive)	containers cool and to reduce vapors.	Formic Acid is decomposed by STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) for form poisonous <i>Carbon Monoxide gas</i> and reacts with CYANIDE SALTS to form toxic <i>Hydrogen Cyanide gas</i> .	

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold: Flash Point:	49 ppm 122° to 156°F (50° to 69°C)
Spill: 50 meters (150 feet)	LEL:	122 10 150 F (50 10 69 C) 18%
Fire: 800 meters (1/2 mile)	UEL:	57%
	Auto Ignition Temp:	1,004° to 1,114°F (540° to 601°C)
Cover with dry lime, sodium bicarbonate or soda ash	Vapor Density:	1.6 (air = 1)
and place into sealed containers for disposal.	Vapor Pressure:	35 mm Hg at 68°F (20°C)
DO NOT wash into sewer.	Specific Gravity:	1.22 (water = 1)
Dangerous to aquatic life in high concentrations.	Water Solubility:	Soluble
	Boiling Point:	213° to 224°F (101° to 107°C)
	Melting Point:	47°F (9°C)
	Ionization Potential:	11.05 eV

Molecular Weight:

EXPOSURE LIMITS	PROTECTIVE EQUIPMENT	
OSHA: 5 ppm, 8-hr TWA NIOSH: 5 ppm, 10-hr TWA	Gloves:	Butyl, Neoprene and Barrier® (>8-hr breakthrough)
ACGIH: 5 ppm, 8-hr TWA; 10 ppm, STEL	Coveralls:	Tychem® BR, Responder® and TK; Trellchem® HPS and VPS (>8-hr breakthrough)
IDLH:30 ppmThe Protective Action Criteria values are:PAC-1 = 10 ppmPAC-2 = 10 ppmPAC-3 = 10 ppm	Respirator:	SCBA

46.02

HEALTH EFFECTS

Eyes:	Severe irritation and burns with possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema) Headache, dizziness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Right to Know Hazardous Substance Fact Sheet

Common Name: FUEL OILS (Light)

Synonyms: #2 Heating Oil; Distillate (Light) Diesel Fuels; Fuel Oil No. 2; Diesel Oil No. 2 CAS No: None Molecular Formula: Varies RTK Substance No: 2444 Description: Brown to straw-colored, slightly thick liquids with a distinct *Petroleum* odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	COMBUSTIBLE LIQUIDS	Fuel Oils are not compatible with OXIDIZING
2 - Fire	Use dry chemical, CO ₂ , water fog or foam as extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	NITRATES, CHLORINE, BROMINE and
DOT#: UN 1202	including <i>Sulfur Oxides</i> and <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE.	FLUORINE) and ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM).
ERG Guide #: 128	Use water spray to keep fire-exposed containers cool.	
Hazard Class: 3	Vapors may travel to a source of ignition and flash back.	
(Flammable)	Fuel Oils may accumulate static electrical charge of sufficient energy to cause a fire and/or explosion.	

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 330 meters (1,100 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

When off-loading bulk **Fuel Oils** for delivery or transfer, static electricity grounding must be completed prior to discharge.

DO NOT wash into sewer.

May affect aquatic life.

EXPOSURE LIMITS

OSHA: None

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ACGIH: 100 mg/m<sup>3</sup>, 8-hr TWA
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IDLH: None

The Protective Action Criteria values are: PAC-1 = 100 mg/m³ PAC-2 = 500 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, drying and cracking with redness and swelling
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, blurred vision, and loss of balance and coordination

PHYSICAL PROPERTIES

Odor Threshold:	0.7 ppm
Flash Point:	>125°F (>52°C)
LEL:	0.6% to 1.3%
UEL:	4.7% to 7.5%
Auto Ignition Temp:	351° to 624°F (177° to 329°C)
Vapor Density:	>3 (air = 1)
Vapor Pressure:	less than 1 mm Hg at 68°F (20°C)
Specific Gravity:	0.87 to 0.95 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	340° to 676°F (171° to 358°C)
Molecular Weight:	Varies

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Viton
Coveralls:	Tychem® SL and Responder®; Zytron® 200 and Zytron® 300; and ONESuit® TEC
Respirator:	 >100 mg/m³ - APR with Organic vapor cartridge and P100 prefilters >500 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: FURAN

Synonyms: Divinylene Oxide; Oxole CAS No: 110-00-9 Molecular Formula: C₄H₄O RTK Substance No: 0952 Description: A clear, colorless liquid with a pleasant odor, which turns brown upon standing in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUID	Furan reacts violently with OXIDIZING AGENTS
4 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and
1 - Reactivity	Water may not be effective in fighting fires.	STRONG ACIDS (such as HYDROCHLORIC,
DOT#: UN 2389	POISONOUS GASES ARE PRODUCED IN FIRE.	SULFURIC and NITRIC).
ERG Guide #: 128	Use water spray to keep fire-exposed containers cool.	Furan may form explosive <i>Peroxides</i> on exposure to AIR.
Hazard Class: 3	Vapors may travel to a source of ignition and flash back.	
(Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spills: 50 meters (150 feet) Large Spills: 300 meters (1,000 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

Keep **Furan** out of confined spaces, such as sewers, because of the possibility of an explosion. Volatile in soil and water with minimal degredation.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Furan**.

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns
	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Pleasant odor
Flash Point:	<32°F (0°C)
LEL:	2.3%
UEL:	14.3%
Vapor Density:	2.3 (air = 1)
Vapor Pressure:	493 mm Hg at 68°F (20°C)
Specific Gravity:	0.9 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	88°F (31°C)
Melting Point:	-122°F (-85.6°C)
Molecular Weight:	68

	PROTECTIVE EQUIPMENT
Gloves:	Polyvinyl Chloride, Polyvinyl Alcohol and Silver Shield®/4H® (>8-hr breakthrough)
Coveralls:	DuPont Tychem® BR, LV, Responder®, and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Tetrahydrofuran</i>)
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: GASOLINE

Synonyms: Benzin; Motor Fuel; Petrol CAS No: 86290-81-5 Molecular Formula: C_5H_{12} to C_9H_{20} (Mixture of hydrocarbons which vary by grade) RTK Substance No: 0957 Description: Clear colorless to amber-colored liquid with a petroleum odor

Decomption	I. Clea	r, colorless to amber-colored li	<u> </u>	•	
		н	AZ	ARD DATA	
Hazard Ra	ating	Firefighting			Reactivity
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1 ERG Guide # Hazard Class (Flam	203 #: 128	FLAMMABLE LIQUIDGasUse dry chemical, CO2, alcohol-resistant foam or other foam extinguishing agents, as water may not be effective in fighting fires.AGPOISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.NITUse water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.Gas		Gasoline may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and NITRIC ACID.	
	SP	Flow or agitation may generate elec			PHYSICAL PROPERTIES
SPILL/LEAKS Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Keep Gasoline out of confined spaces, such as sewers, because of the possibility of an explosion. Use only non-sparking tools and equipment, especially when opening and closing containers of Gasoline. DO NOT wash into sewer. Gasoline is harmful to aquatic organisms and is a marine pollutant. EXPOSURE LIMITS ACGIH: 300 ppm, 8-hr TWA; 500 ppm, STEL The Protective Action Criteria values are:			Gloves: Nit	-36°F (-38°C) 1.2% 7.6% remp: 536° to 853°F (280° to 456°C) 3 to 4 (air = 1) e: 38 to 300 mm Hg at 68°F (20°C) y: 0.73 (water = 1) y: Insoluble 140° to 390°F (60° to 199°C) ght: 72 to 100 ROTECTIVE EQUIPMENT rile and Viton (>8-hr breakthrough) chem® BR, LV, Responder® and TK (>8-hr	
PAC-1 = 200 ppm PAC-2 = 1,000 ppm PAC-3 = 4,000 ppm		F		eakthrough) 00 ppm - Supplied air or SCBA	
HEALTH EFFECTS FIRST AID AND DECONTAMINATION		AID AND DECONTAMINATION			
Eyes: Skin: Inhalation: Chronic:	Irritation Nose, th coughin breath Headac blurred passing	and burns and burns proat and lung irritation with g, wheezing and shortness of he, nausea, weakness, dizziness, vision, irregular heartbeat, and out (liver) in animals	F	contact lenses if w Quickly remove co large amounts of s Begin artificial resp	rge amounts of water for at least 15 minutes. Remove vorn. Seek medical attention. ontaminated clothing and wash contaminated skin with



Common Name: GLUTARALDEHYDE

Synonyms: 1,3-Diformylpropane; Glutaral; Cidex®; Procide® CAS No: 111-30-8 Molecular Formula: C₅H₈O₂ RTK Substance No: 0960 Description: Colorless glass-like crystals that are usually in a 2% to 50% water solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Glutaraldehyde itself does not	Glutaraldehyde is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	burn.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG
DOT#: UN 2810	Use water spray to keep fire-exposed containers cool.	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; ALCOHOLS and
ERG Guide #: 153		KETONES.
Hazard Class: 6.1		
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill (Small): 30 meters (100 feet)

(Large): 60 meters (200 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Glutaraldehyde is very toxic to aquatic organisms.

EXPOSURE LIMITS

NIOSH: 0.2 ppm; Ceiling

ACGIH: 0.05 ppm; Ceiling

The Protective Action Criteria values are: PAC-1 = 0.2 ppm PAC-2 = 1 ppm PAC-3 = 5 ppm

HEALTH EFFECTS

Eyes: Skin: Inhalation:	Irritation and burns Irritation and burns Nose, throat and lung irritation with coughing and wheezing and shortness of breath Headache, nausea and vomiting.
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PHYSICAL PROPERTIES

Odor Threshold:	0.04 ppm
Flash Point:	Nonflammable
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	17 mm Hg at 68°F (20°C); <0.1 mm Hg at 68°F (20°C) for <i>solutions</i>
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	369° to 372°F (187° to 189°C)
Freezing Point:	<20°F (<-7°C)
Molecular Weight:	100.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® fabrics (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: GLYCIDALDEHYDE

Synonyms: 2,3-Epoxypropanol; Glycidal CAS No: 765-34-4 Molecular Formula: $C_3H_4O_2$ RTK Substance No: 0961 Description: Colorless liquid with a strong odor

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
3 - Health 3 - Fire 0 - Reactivity DOT#: UN 2622 ERG Guide #: 131P Hazard Class: 3 (Flammable)	Firefighting Glycidaldehyde is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.			Glycidaldehyde is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES). Glycidaldehyde is an <i>Epoxide</i> and an <i>Aldehyde</i> . These
SP	ILL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep Glycidaldehyde out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Bioaccumulation is not significant. Biodegrades rapidly. EXPOSURE LIMITS No occupational exposure limits have been established for Glycidaldehyde.		Odor Thresho Flash Point: Vapor Density Vapor Pressur Specific Gravi Water Solubili Boiling Point: Melting Point: Molecular Wei		:: 88° F (31° C) sity: 2.58 (air = 1) sure: 27 mm Hg at 77°F (25° C) avity: 1.14 (water = 1) bility: Miscible nt: 234° to 235° F (112° to 113° C) nt: -80° F (-62° C)
		1	Respirator:	
HEALTH EFFECTS		ļ		ST AID AND DECONTAMINATION
Skin: Irritatio Inhalation: Nose, coughi (pulmo	n and burns n and burns with itching and rash hroat and lung irritation with ng and severe shortness of breath nary edema) · (skin) in animals		Flush eyes wi contact lenses Quickly remov large amounts Begin artificia Transfer to a	e person from exposure. with large amounts of water for at least 15 minutes. Remove ses if worn. Seek medical attention immediately. hove contaminated clothing and wash contaminated skin with nts of soap and water. Seek medical attention. ial respiration if breathing has stopped and CPR if necessary. a medical facility. servation is recommended as symptoms may be delayed.



Common Name: GLYPHOSATE

Synonyms: Glycine, N-(Phosphonomethyl)-; Glyphosat; Glyphomax; Roundup® CAS No: 1071-83-6 Molecular Formula: $C_3H_8NO_5P$ RTK Substance No: 3139 Description: Odorless, white powder, colorless, crystalline solid or an amber colored liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 0 - Fire 0 - Reactivity DOT#: UN 3077 ERG Guide #: 171 Hazard Class: 9 (Environmentally Hazardous Substance)	Although <i>solid</i> Glyphosate does not burn, it may be dissolved in a liquid carrier that is flammable or combustible. Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Phosphorus Oxides</i> . Use water spray to keep fire-exposed containers cool. <i>Finely dispersed</i> Glyphosate may form explosive mixtures in air.	Glyphosate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). Glyphosate may react with IRON, GALVANIZED STEEL and UNLINED STEEL CONTAINERS to produce flammable and explosive <i>Hydrogen gas</i> .

Boiling Point:

Melting Point:

Molecular Weight:

SPILL/LEAKS

Isolation Distance:

Spill (solid): 25 meters (75 feet) (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Moisten *solid* spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Finely dispersed **Glyphosate** may accumulate static electricity.

DO NOT wash into sewer.

Glyphosate is harmful to aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Glyphosate**.

=	
Odor Threshold:	Odorless
Flash Point:	Flammable/Combustible in solution
Vapor Pressure:	1.94 x 10⁻ ⁷ mm Hg at 113°F (45°C)
Specific Gravity:	1.74 (water = 1)
Water Solubility:	Soluble

169.07

y: Soluble
 Decomposes above 392°F (200°C)
 446°F (230°C)

PHYSICAL PROPERTIES

	PROTECTIVE EQUIPMENT
Gloves:	Butyl and Viton® (>8-hr breakthrough for solid Glyphosate)
Coveralls:	Tyvek® (for <i>solid</i> Glyphosate) Tychem® BR, CSM, TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>solutions</i> containing Glyphosate)
Respirator:	Spills (solid) - full facepiece APR with <i>P100 filter cartridges</i> Spills (liquid) and Fire - SCBA

HEALTH EFFECTS

-	
Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation
	Headache, dizziness, nausea, vomiting, diarrhea, abdominal pain, low blood pressure and convulsions
	 * Glyphosate DOES NOT inhibit cholinesterase activity

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: HELIUM

Synonyms: None CAS No: 7440-59-7 Molecular Formula: He RTK Substance No: 0972 Description: Colorless, odorless gas or liquid

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
3 (liquid) - Health 1 (gas) - Health	Extinguish fire using an agent suitable for type of surrounding fire. Helium itself does not burn.	Protect from HEAT and SUNLIGHT. Water applied directly to leak may cause ice and a		
0 - Fire	CONTAINERS MAY RUPTURE OR BURST IN FIRE.	dense fog or cloud.		
0 - Reactivity	Use water spray to keep fire-exposed containers cool.			
DOT#: UN 1046 (Compressed Gas) UN 1963 (Cryogenic liquid) ERG Guide #: 121 (Compressed Gas) 120 (Cryogenic liquid)				
Hazard Class: 2.2 (Non-flammable Gas)				

SPILL/LEAKS

Isolation Distance: 100 meters (330 feet)

No adverse effect to plant life.

EXPOSURE LIMITS		
OSHA:	Maintain Oxygen Level above 19.5%	
ACGIH:	Simple Asphyxiant	
IDLH LEVEL:	N/A	

	HEALTH EFFECTS
Eyes: Skin:	Contact with liquid - causes frostbite Contact with liquid - causes frostbite
Acute:	Headache, dizziness, lightheadedness, passing out, suffocation from lack of <i>Oxygen</i> , and death

Chronic: No information

PHYSICAL PROPERTIES		
Odor Threshold:	Odorless	
Flash Point:	Non-flammable	
Relative Density:	0.138 (air = 1)	
Vapor Pressure:	No information	
Water Solubility:	Very slightly soluble	
Boiling Point:	-452°F (-269°C)	
Melting Point:	-458°F (-272.2°C)	

PROTECTIVE EQUIPMENT

Gloves:	Resistant to tears and cold
Coveralls:	Insulating materials
Boots:	No information
Respirator:	< 19.5% Oxygen - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- For skin contact, immerse affected part in warm water.

Transfer to a medical facility.



Common Name: HEXACHLOROCYCLOHEXANE (mixed isomers)

Synonyms: BHC/HCH; 1,2,3,4,5,6-Benzenehexachloride CAS No: 608-73-1 Molecular Formula: $C_6H_6CI_6$ RTK Substance No: 3334 Description: White, yellowish or brownish flake or crystalline powder with a musty odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health	Hexachlorocyclohexane does not burn, however, it is often dissolved in a liquid carrier which may be	Hexachlorocyclohexane in contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
0 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	CHLORINE, BROMINE and FLUORINE) may result in fires and explosions.	
DOT#: UN 2761	POISONOUS GASES ARE PRODUCED IN FIRE.	Hexachlorocyclohexane is not compatible with ALKALI	
ERG Guide #: 151	Including Phosgene, Chlorine and Hydrogen	METALS (such as LITHIUM, SODIUM and POTASSIUM); REDUCING AGENTS; STRONG BASES	
Hazard Class: 6.1 (Poison)	Chloride. Use water spray to keep fire-exposed containers cool.	(such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; AZO and DIAZO COMPOUNDS; NITRIDES (such as AMMONIA and CYANOGEN); and EPOXIDES.	

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fires: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Hexachlorocyclohexane (mixed isomers) is toxic to aquatic organisms and bioaccumulates.

EXPOSURE LIMITS

ACGIH: 0.5 mg/m³, 8-hr TWA

IDLH: 50 mg/m³ (All of the above are for *gamma-Hexachlorocyclohexane*)

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea, vomiting, dizziness, muscle weakness and convulsions
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Musty odor
Flash Point:	Noncombustible solid
Vapor Density:	1.85 (air = 1)
Vapor Pressure:	0.5 mm Hg at 140°F (60°C)
Specific Gravity:	1.67 (water = 1)
Water Solubility:	Insoluble
Melting Point:	149°F (65°C)
Molecular Weight:	291

PROTE	CTIVE	EQUIPMENT	

Gloves:	Nitrile, Polyvinyl Alcohol, Silver Shield®/4H® and Viton (>8-hr breakthrough for <i>Halogen compounds, Benzylic</i>)
Coveralls:	DuPont Tyvek®
Respirator:	 >0.5 mg/m³ - full facepiece APR with Organic vapor filter and High efficiency prefilters >5 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility



Common Name: HEXAMETHYLENE DIISOCYANATE

Synonyms: HDI; 1,6-Diisocyanatohexane CAS No: 822-06-0 Molecular Formula: $C_8H_{12}N_2O_2$ RTK Substance No: 0995 Description: Clear, colorless to yellow liquid with a sharp, irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Hexamethylene Diisocyanate is a COMBUSTIBLE LIQUID.	Hexamethylene Diisocyanate may react violently with ALCOHOLS; AMINES; STRONG BASES (such as
1 - Fire	Use dry chemical, CO ₂ , water spray or foam as	SODIUM HYDROXIDE and POTASSIUM
1 - Reactivity	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE.	HYDROXIDE); ORGANOTIN; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 2281	including Nitrogen Oxides and Hydrogen Cyanide.	PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 156	Use water spray to keep fire-exposed containers	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
Hazard Class: 6.1	cool. Hazardous polymerization (self reaction) occurs at	NITRIC); and CARBOXYLIC ACIDS.
(Poison)	temperatures above 392°F (200°C).	Hexamethylene Diisocyanate reacts with WATER to form <i>Carbon Dioxide</i> and decomposes in WATER to form <i>Amine</i> and <i>Polyureas</i> .

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Rapidly degrades in water.

PHYSICAL PROPERTIES

Odor Threshold:	0.001 ppm
Flash Point:	284°F (140°C)
LEL:	0.9%
UEL:	9.5%
Auto Ignition:	849°F (454°C)
Vapor Density:	5.81 (air = 1)
Vapor Pressure:	0.05 mm Hg at 77°F (25°C)
Specific Gravity:	1.04 (water = 1)
Water Solubility:	Reacts/Decomposes
Boiling Point:	415°F (213°C)
Molecular Weight:	168.2

EXPOSURE LIMITS

NIOSH: 0.005 ppm, 10-hr TWA; 0.02 ppm, 10-min Ceiling

- ACGIH: 0.005 ppm, 8-hr TWA
- IDLH: None

The Protective Action Criteria values are:

PAC-1 = 0.015 ppm PAC-2 = 0.2 ppm PAC-3 = 3.5 ppm

HEALTH EFFECTS

Eyes:	Severe irritation
Skin:	Severe irritation and burns, redness, eczema-like rash
Inhalation:	Nose, throat and lung irritation with coughing and shortness of breath Headache, dizziness, nausea and vomiting

breakthrough) Tychem® fabrics and Zytron® 400 (>8-hr breakthrough)

Butyl, Viton/Butyl and Silver Shield®/4H® (>8-hr

PROTECTIVE EQUIPMENT

Coveralls: Respirator:

Gloves:

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

SCBA

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: HEXAMINE

Synonyms: Hexamethylenetetramine; Methenamine CAS No: 100-97-0 Molecular Formula: $C_6H_{12}N_4$ RTK Substance No: 0996 Description: Colorless to white, odorless, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE SOLID	Hexamine reacts violently with SODIUM PEROXIDE; 1-BROMOPENTABORANE; IODINE; and IODOFORM.
1 - Fire	Finely dispersed Hexamine particulate or powdered dust is an explosion hazard.	Hexamine reacts with OXIDIZING AGENTS (such as
0 - Reactivity	Use dry chemical, water spray, sand, earth or foam	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and
DOT#: UN 1328	as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	FLUORINE) and STRONG ACIDS (such as
ERG Guide #: 133	including Nitrogen Oxides.	HYDROCHLORIC, SULFURIC and NITRIC) to form toxic and corrosive gases, such as <i>Formaldehyde</i> .
Hazard Class: 4.1 (Flammable solid)	Use water spray to keep fire-exposed containers cool.	Hexamine is not compatible with METALS (such as ALUMINUM and ZINC) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Hexamine**.

Keep **Hexamine** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 55 \text{ mg/m}^3$
- $PAC-2 = 610 \text{ mg/m}^3$
- $PAC-3 = 3,600 \text{ mg/m}^3$

HEALTH EFFECTS		
Eyes: Skin:	Irritation	
Skin:	Irritation	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Nausea, vomiting, diarrhea and abdominal pain	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
ouor micshola.	04011035
Flash Point:	482°F (250°C)
Auto Ignition Temp:	>700°F (>371°C)
Vapor Density:	4.9 (air = 1)
Vapor Pressure:	4 x 10 ⁻³ mm Hg at 77°F (25°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Sublimes
Melting Point:	505.4°F (263°C)
Ionization Potential:	<8.5 +/- 0.7 eV
Molecular Weight:	140.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Neoprene (>8-hr breakthrough)
Coveralls:	Tyvek®
Respirator:	>55 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: n-HEXANE

Synonyms: Hexyl Hydride; normal Hexane CAS No: 110-54-3 Molecular Formula: C₁₆H₁₄ RTK Substance No: 1340

Description: Colorless liquid with a Gasoline-like odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	n-Hexane is a FLAMMABLE LIQUID. DO NOT attempt to extinguish fire unless flow can be stopped. Shut off supply or let burn.	n-Hexane can react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire 0 - Reactivity	Use dry chemical, CO_2 , water spray or alcohol-resistant foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES, DINITROGEN TETRAOXIDE, CHLORINE,
DOT#: UN 1208	Use water in flooding quantities as fog as solid streams of water may spread fire.	BROMINE and FLUORINE) to cause fires and explosions.
ERG Guide #: 128	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.	n-Hexane attacks some PLASTICS, RUBBER and COATINGS.
Hazard Class: 3 (Flammable)	Use water spray to keep fire-exposed containers cool and to suppress vapors. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back. Flow or agitation may generate electrostatic charges. n-Hexane may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. Ground and bond containers when transferring n-Hexane. Use only non-sparking tools and equipment.

Keep **n-Hexane** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

n-Hexane is toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: 500 ppm, 8-hr TWA NIOSH: 50 ppm, 10-hr TWA ACGIH: 50 ppm, 8-hr TWA IDLH: 1,100 ppm The Protective Action Criteria values are: PAC-1 = 400 ppm PAC-2 = 3,300 ppm PAC-3 = 8,600 ppm **HEALTH EFFECTS**

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing,
	wheezing and shortness of breath Headache, dizziness, lightheadedness and passing out. Higher levels can cause coma and death.

PHYSICAL PROPERTIES

Odor Threshold: $65 to 248 ppm$ Flash Point: $-7^\circ F (-22^\circ C)$ LEL: 1.1% UEL: 7.5% Auto Ignition Temp: $437^\circ F (225^\circ C)$ Vapor Density: $3 (air = 1)$ Vapor Pressure: $124 mm Hg at 68^\circ F (20^\circ C)$ Specific Gravity: $0.7 (water = 1)$ Water Solubility: Insoluble Boiling Point: $156^\circ F (69^\circ C)$ Freezing Point: $-137^\circ F (-94^\circ C)$ Ionization Potential: $10.18 eV$ Molecular Weight: 86.2		
LEL: 1.1% UEL: 7.5% Auto Ignition Temp: $437^{\circ}F(225^{\circ}C)$ Vapor Density: $3 (air = 1)$ Vapor Pressure: $124 \text{ mm Hg at } 68^{\circ}F(20^{\circ}C)$ Specific Gravity: $0.7 (water = 1)$ Water Solubility:InsolubleBoiling Point: $156^{\circ}F(69^{\circ}C)$ Freezing Point: $-137^{\circ}F(-94^{\circ}C)$ Ionization Potential: 10.18 eV	Odor Threshold:	65 to 248 ppm
UEL:7.5%Auto Ignition Temp: $437^{\circ}F(225^{\circ}C)$ Vapor Density:3 (air = 1)Vapor Pressure:124 mm Hg at 68°F (20°C)Specific Gravity:0.7 (water = 1)Water Solubility:InsolubleBoiling Point: $156^{\circ}F(69^{\circ}C)$ Freezing Point: $-137^{\circ}F(-94^{\circ}C)$ Ionization Potential:10.18 eV	Flash Point:	-7°F (-22°C)
Auto Ignition Temp:437°F (225°C)Vapor Density:3 (air = 1)Vapor Pressure:124 mm Hg at 68°F (20°C)Specific Gravity:0.7 (water = 1)Water Solubility:InsolubleBoiling Point:156°F (69°C)Freezing Point:-137°F (-94°C)Ionization Potential:10.18 eV	LEL:	1.1%
Vapor Density: $3 (air = 1)$ Vapor Pressure: $124 mm Hg at 68^{\circ}F (20^{\circ}C)$ Specific Gravity: $0.7 (water = 1)$ Water Solubility:InsolubleBoiling Point: $156^{\circ}F (69^{\circ}C)$ Freezing Point: $-137^{\circ}F (-94^{\circ}C)$ Ionization Potential: $10.18 eV$	UEL:	7.5%
Vapor Pressure:124 mm Hg at $68^{\circ}F(20^{\circ}C)$ Specific Gravity:0.7 (water = 1)Water Solubility:InsolubleBoiling Point:156^{\circ}F(69^{\circ}C)Freezing Point:-137^{\circ}F(-94^{\circ}C)Ionization Potential:10.18 eV	Auto Ignition Temp:	437°F (225°C)
Specific Gravity:0.7 (water = 1)Water Solubility:InsolubleBoiling Point:156°F (69°C)Freezing Point:-137°F (-94°C)Ionization Potential:10.18 eV	Vapor Density:	3 (air = 1)
Water Solubility:InsolubleBoiling Point:156°F (69°C)Freezing Point:-137°F (-94°C)Ionization Potential:10.18 eV	Vapor Pressure:	124 mm Hg at 68°F (20°C)
Boiling Point:156°F (69°C)Freezing Point:-137°F (-94°C)Ionization Potential:10.18 eV	Specific Gravity:	0.7 (water = 1)
Freezing Point:-137°F (-94°C)Ionization Potential:10.18 eV	Water Solubility:	Insoluble
Ionization Potential: 10.18 eV	Boiling Point:	156°F (69°C)
Malaaulan Wainkt	Freezing Point:	-137°F (-94°C)
Molecular Weight: 86.2	Ionization Potential:	10.18 eV
	Molecular Weight:	86.2

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Polyvinyl Alcohol, Silver Shield®/4H®, Viton, Viton/Butyl, and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® F, CPF3, BR, CSM and TK; and Trellchem® HPS and VPS (>8-hr breakthrough) Use turn out gear or flash protection if ignition/fire is the
	greatest hazard.
Respirator:	>50 ppm or fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: HYDRAZINE

Synonyms: Diamine; Nitrogen Hydride CAS No: 302-01-2 Molecular Formula: N_2H_4 RTK Substance No: 1006 Description: Colorless, fuming, oily liquid with an *Ammonia*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Hydrazine is a FLAMMABLE LIQUID that may self-ignite at low temperatures.	Hydrazine is extremely reactive and/or explosive in the presence of OXIDIZING AGENTS (such as PERCHLORATES,
4 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-resistant	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
3 - Reactivity	foam as extinguishing agents. Use water spray to disperse vapors.	CHLORINE, BROMINE and FLUORINE); NITRIC ACID; NITROUS OXIDES; and CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC).
DOT#: UN 2029	POISONOUS GASES ARE PRODUCED IN FIRE,	Hydrazine reacts violently with METALS (such as SILVER.
ERG Guide #: 132	including Ammonia and Nitrogen Oxides. CONTAINERS MAY EXPLODE IN FIRE.	MERCURY, NICKEL, TITANIUM and ZINC); METAL OXIDES; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC
Hazard Class: 8	Use water spray to keep fire-exposed containers cool.	and NITRIC).
(Corrosive)	Hydrazine may form an ignitable vapor/air mixture in closed tanks or containers. Vapors may travel to a source of ignition and flash back.	Hydrazine can spontaneously ignite at low temperatures or on contact with POROUS MATERIALS (such as EARTH, WOOD and CLOTH).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand or an inert absorbent and place into sealed containers for disposal.

DO NOT use earth or combustible absorbents as fires/ explosions may occur.

Keep **Hydrazine** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Hydrazine is very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: 1 ppm, 8-hr TWA NIOSH: 0.03 ppm, 2-hr Ceiling ACGIH: 0.01 ppm, 8-hr TWA IDLH: 50 ppm The Protective Action Criteria values are: PAC-1 = 0.1 ppm PAC-2 = 13 ppm PAC-3 = 35 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and severe shortness of breath (pulmonary edema)
	Headache, dizziness, seizures and convulsions
Chronic:	Cancer (liver, lung, nasal cavity) in animals

PHYSICAL PROPERTIES		
Odor Threshold:	3.7 ppm	
Flash Point:	100°F (38°C)	
LEL:	2.9%	
UEL:	98%	
Auto Ignition Temp:	Varies from 74°F (23°C) to 518°F (270°C)	
Vapor Density:	1.1 (air = 1)	
Vapor Pressure:	10 mm Hg at 68°F (20°C)	
Specific Gravity:	1.01 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	236°F (113°C)	
Freezing Point:	36°F (2.2°C)	
Ionization Potential:	8.93 eV	
Molecular Weight:	32.05	

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene and Polyvinyl Chloride (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	>10% LEL use turn out gear or flash protection SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: HYDROGEN

Synonyms: Molecular Hydrogen; Protium CAS No: 1333-74-0 Molecular Formula: H₂ RTK Substance No: 1010 Description: Colorless, odorless gas that is lighter than air

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Hydrogen is a FLAMMABLE LIQUID and GAS that burns with an almost INVISIBLE FLAME.	Hydrogen is extremely FLAMMABLE and can be ignited by the cylinder valve being opened to AIR and by HEAT,
4 - Fire	Hydrogen fires can be detected by carefully	SPARKS and STATIC ELECTRICITY.
0 - Reactivity	approaching the area with an outstretched straw broom to make the flame visible.	Hydrogen reacts violently and explosively when mixed with OXIDIZING AGENTS (such as PERCHLORATES,
DOT#: UN 1049 (Compressed) UN 1966	Stop flow of gas or use a dry powder extinguisher to get to the place where the flow of Hydrogen can be shut off. Allow fire to burn out.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ACETYLENE; ETHYLENE; and OXYGEN.
(Refrigerated Liquid)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Hydrogen is not compatible with METALS; METAL OXIDES; and METAL SALTS.
ERG Guide #: 115	Hydrogen <i>gas</i> is lighter than air and can accumulate in the upper sections of enclosed spaces.	Protect cylinders from physical damage and do not drag,
Hazard Class: 2.1	Hydrogen may form an ignitable vapor/air mixture in	roll, slide or drop.
(Flammable gas)	closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

should be 19.5%.

Spill: 100 meters (330 feet)

Fire: 1,600 meters (1 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Hydrogen**.

Metal containers involving the transfer of **Hydrogen** should be grounded and bonded.

Keep **Hydrogen** out of confined spaces, such as sewers, because of the possibility of an explosion.

Conduct air monitoring to determine that Oxygen levels are above 19.5% and that the LEL is not being exceeded.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Flammable gas
LEL:	4%
UEL:	75%
Auto Ignition Temp:	932° to 1,060°F (500° to 571°C)
Vapor Density:	0.069 (air = 1)
Vapor Pressure:	1.24 x 10 ⁶ mm Hg at 77°F (25°C)
Specific Gravity:	0.07 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	-423°F (-253°C)
Freezing Point:	-434°F (-259°C)
Molecular Weight:	2.02
Critical Temp:	-400°F (-239.9°C)
Expansion Ratio:	1 to 848 (liquid to gas)

PROTECTIVE EQUIPMENT

Gloves: Insulated Rubber and Leather

Coveralls:	>10% of the LEL use flash protection or turn out gear

Respirator:

r: < 19.5% Oxygen - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

HEALTH EFFECTS

PAC-1 = 65,000 ppm PAC-2 = 230,000 ppm PAC-3 = 400,000 ppm

EXPOSURE LIMITS

Hydrogen is a simple asphyxiant. Oxygen levels

The Protective Action Criteria values are:

Eyes:	Contact with <i>liquefied</i> gas can cause frostbite
Skin:	Contact with <i>liquefied</i> gas can cause frostbite
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Inhalation: Headache, dizziness, weakness, loss of consciousness and death



Common Name: HYDROGEN BROMIDE

Synonyms: Anhydrous Hydrobromic Acid; Hydrogen Monobromide CAS No: 10035-10-6 Molecular Formula: HBr RTK Substance No: 1011

Description: Colorless gas with a strong, irritating odor, which is found as a liquefied compressed gas or in solution

HAZARD DATA Hazard Rating Firefighting Reactivity Extinguish fire using an agent suitable for type of 3 - Health Hydrogen Bromide reacts violently with STRONG surrounding fire. Hydrogen Bromide itself does BASES (such as SODIUM HYDROXIDE and 0 - Fire not burn. POTASSIUM HYDROXIDE); AMINES; OZONE; 0 - Reactivity DO NOT USE WATER directly on Hydrogen OXIDIZING AGENTS (such as PERCHLORATES, DOT#: Bromide but use water to knock down vapors. PEROXIDES, PERMANGANATES, CHLORATES, UN 1048 (Anhydrous) NITRATES, CHLORINE, BROMINE and FLUORINE); POISONOUS GASES ARE PRODUCED IN FIRE. and many ORGANIC COMPOUNDS, causing fires and UN 1788 (Solution) CONTAINERS MAY EXPLODE IN FIRE explosions. Use water spray to keep fire-exposed containers FRG Guide # Hydrogen Bromide will react with METALS (such as COPPER, cool. DO NOT get water inside containers. 125 (UN 1048) BRASS and ZINC) to release flammable and explosive Hydrogen 154 (UN 1788) aas. Hazard Class: 2.3 (Poisonous Gas) SPILL/LEAKS PHYSICAL PROPERTIES Odor Threshold: 2 ppm **Isolation Distance:** Flash Point: Nonflammable Small Spill: 30 meters (100 feet) Large Spill: 300 meters (1,000 feet) >760 mm Hg at 68°F (20°C) Vapor Pressure: Fire: 800 meters (1/2 mile) **Specific Gravity:** 3.5 (gas), 2.7 (solution) Water Solubility: Soluble Cover liquid spill with dry lime, sand or soda ash and place into sealed containers for disposal. **Boiling Point:** -88.2°F (-66.8°C) (gas), 165°F (74°C) (solution) DO NOT wash into sewer. **Freezing Point:** -121°F (-85°C) (gas) Stop flow of gas. If source of leak is a cylinder and the leak 193.6°F (89.8°C) (gas) **Critical Temp:** cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to **Ionization Potential:** 11 62 eV empty. Molecular Weight: 80.92 Turn leaking cylinder with leak up to prevent escape of gas in the liquid state. Neutralize water spills with lime, soda ash or sodium bicarbonate. Hydrogen Bromide is toxic to aquatic life. **EXPOSURE LIMITS PROTECTIVE EQUIPMENT** OSHA: 3 ppm, 8-hr TWA Gloves: Neoprene, Viton and Barrier® (>8-hr breakthrough for Inorganic Acids) NIOSH: 3 ppm, Ceiling Coveralls: Tychem® BR, Responder® and TK® (>8-hr breakthrough) ACGIH: 2 ppm, Ceiling IDLH: 30 ppm **Respirator:** SCBA The Protective Action Criteria values are: PAC-1 = 3.3 ppm PAC-2 = 72.8 ppm PAC-3 = 397 ppm FIRST AID AND DECONTAMINATION HEALTH EFFECTS Severe irritation, burns and possible eye Remove the person from exposure. Eyes: damage Flush eyes with large amounts of water for at least 30 minutes. Remove Skin: Severe irritation and burns. Contact with liquid contact lenses if worn. Seek medical attention immediately may cause frostbite Quickly remove contaminated clothing and wash contaminated skin with Inhalation: Nose, throat and lung irritation, with coughing, large amounts of water. Seek medical attention immediately. and severe shortness of breath (pulmonary For contact with *liquid* Hydrogen Bromide immerse affected part in warm water. edema) Begin artificial respiration if breathing has stopped and CPR if necessary. Headache, nausea and vomiting Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed. September 2009



Common Name: HYDROGEN CHLORIDE

Synonyms: Anhydrous Hydrogen Chloride; Muriatic Acid CAS No: 7647-01-0 Molecular Formula: HCI RTK Substance No: 1012 Description: Colorless gas with a pungent odor that fumes in air, and is often found as a compressed,

	liquefied	gas or in a water solution				
		НА	ZA	RD	DATA	
Hazard R	azard Rating Firefighting			Reactivity		
3 - HealthExtinguish fire using an agent sulfor type of surrounding fire.0 - FireChloride itself does not burn.1 - ReactivityPOISONOUS GASES AREDOT#:POISONOUS GASES AREUN 1050 (Anhydrous)Chlorine.UN 1789 (Solution)Use water spray to keep fire-experienceERG Guide #:containers cool, but DO NOT ge125 (Anhydrous)into containers.157 (Solution)Hazard Class:2.3 (Toxic Gas) (Anhydrous)or the second secon		Iroge osed	 HYDROGEN CYANIDE; POTASSIUM PERMANGANATE; and TETRASELENIUM TETRANITRIDE, and may ignite o FLUORINE; HEXALITHIUM DISILICIDE; METAL ACETYL CARBIDES. Hydrogen Chloride reacts with OXIDIZING AGENTS (such PERCHLORATES, PEROXIDES, PERMANGANATES, CH NITRATES, CHI ORINE, PROMINE and EL LORINE) to for 		ANIDE; POTASSIUM PÉRMANGANATE; SODIUM; ENIUM TETRANITRIDE, and may ignite on contact with XALITHIUM DISILICIDE; METAL ACETYLIDES and ride reacts with OXIDIZING AGENTS (such as ES, PEROXIDES, PERMANGANATES, CHLORATES, LORINE, BROMINE and FLUORINE) to form toxic d reacts violently with STRONG BASES (such as OXIDE and POTASSIUM HYDROXIDE). ride will attack many METALS (such as COPPER, IC) to release flammable and explosive <i>Hydrogen gas</i> .	
8 (Corrosive)	· /	L/LEAKS				Nymerization (self-reaction).
Large Spill: 6 Fire: 800 me Cover Hydro ash and plac Stop flow of g be stopped in the open air, DO NOT SPE	30 meters (100 fe 50 meters (200 fe ters (1/2 mile) gen Chloride in te into sealed con gas. If source of I n place, remove t and repair leak c RAY water on leal cylinder with leak EXPOSU	et) solution with dry lime, sand or soda tainers for disposal. eak is a cylinder and the leak cannot he leaking cylinder to a safe place in r allow cylinder to empty.		Fla Vaj Spo Wa Boi Fre Ion Mo		36.47 DTECTIVE EQUIPMENT
NIOSH: 5 p ACGIH: 2 p IDLH: 50 p The Protectiv	pm, Ceiling pm, Ceiling ppm re Action Criteria	values are: = 22 ppm PAC-3 = 100 ppm		Co	oves: veralls: spirator:	Butyl, Neoprene and Viton (>8-hr breakthrough) Tychem® BR, Responder® and TK; ONESuit®TEC; Trellchem® HPS and VPS (>8- hr breakthrough) >2 ppm - full facepiece APR with <i>Acid gas</i> filters >20 ppm - SCBA
	HEALTI	H EFFECTS			FIRST AI	D AND DECONTAMINATION
Eyes: Skin: Inhalation:	Severe irritation Contact with lice Nose, throat ar	n, burns and possible eye damage n and burns juid causes frostbite nd lung irritation with coughing and ss of breath (pulmonary edema)	r	Flu col Qu lar Imr Beg Tra	ntact lenses if wor ickly remove cont ge amounts of wa merse affected pa gin artificial respira insfer promptly to	e amounts of water for at least 30 minutes. Remove n. Seek medical attention immediately. aminated clothing and wash contaminated skin with ter. Seek medical attention. rt in warm water. Seek medical attention. ation if breathing has stopped and CPR if necessary.



Common Name: HYDROGEN CYANIDE

Synonyms: Formonitrile; Hydrocyanic Acid; Prussic Acid CAS No: 74-90-8 Molecular Formula: HCN RTK Substance No: 1013 Description: Colorless to pale blue liquid below 78°F (26°C), and a colorless gas at higher temperatures, with a distinct bitter almond or stinky sneaker odor

stinky sneaker odor HAZARD DATA						
Hazard Rating	Firefighting		Reactivity			
4 - Health 4 - Fire	FLAMMABLE LIQUID and GAS. Stop flow of gas or allow to burn. DO NOT attempt to extinguish fire unless flow can be stopped. Shut off		Anhydrous and Unstabilized Hydrogen Cyanide are severe explosion hazards and can polymerize violently, resulting in fires and explosions.			
1 - Reactivity DOT#: UN 1051 (Anhydrous; Stabilized) ERG Guide #: 117 Hazard Class: 6.1 (Poison)	supply or let burn. Use dry chemical, CO ₂ , water spray, a foam or other foam as extinguishing a POISONOUS GASES ARE PRODUC including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FI Use water spray to keep fire-exposed to suppress vapors. Vapors may travel to a source of ignit Hydrogen Cyanide may form an igni mixture in closed tanks or containers	agents. CED IN FIRE, RE. I containers cool and ion and flash back. table vapor/air	 Hydrogen Cyanide can polymerize explosively when exposed to ELEVATED TEMPERATURES (over 122°F or 50°C) and STRONG BASES (such as SODIUM HYDROXIDE, CALCIUM HYDROXIDE, AMMONIA, AMINES and SODIUM CARBONATE). Hydrogen Cyanide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). Hydrogen Cyanide solutions containing more than 4 to 5% water are less stable than the anhydrous (dry) form and can self react and/or form explosive mixtures in air. 			
SPI	LL/LEAKS		PHYSICAL PROPERTIES			
cannot be stopped in pla safe place in the open ai empty. Absorb liquids in dry sand place into sealed contain Use foam to suppress va DO NOT wash into sewer Bond and ground all cont Cyanide and use only no	(1,250 feet) e) e of leak is a cylinder and the leak ce, remove the leaking cylinder to a r, and repair leak or allow cylinder to d, earth, or a similar material and ters for disposal. pors.	Odor Threshol Flash Point: LEL: UEL: Auto Ignition T Vapor Density: Vapor Pressur Specific Gravit Water Solubilit Boiling Point: Melting Point: Ionization Pote Molecular Weig	0°F (-18°C) 5.6% 40% Temp: 1,000°F (538°C) 0.94 (gas) (air = 1) e: 630 mm Hg at 68°F (20°C) y: 0.7 (water = 1) y: Soluble 78°F (26°C) 7°F (-13.3°C) ential: 13.6 eV			
EXPOS	SURE LIMITS		PROTECTIVE EQUIPMENT			
OSHA: 10 ppm, 8-h NIOSH: 4.7 ppm, Ce ACGIH: 4.7 ppm, Ce IDLH: 50 ppm The Protective Action Cri	iling iling	Gloves: Coveralls:	Nitrile and Neoprene (>8-hr breakthrough for <i>liquid</i> Hydrogen Cyanide) Tychem® TK (>8-hr breakthrough for <i>gaseous</i> and <i>liquid</i> Hydrogen Cyanide)			
PAC-1 = 2 ppm PAC-2 = 7.1ppm PAC-3 = 15 ppm		Respirator:	SCBA			
HEALTH EFFECTS			T AID AND DECONTAMINATION			
Skin: Irritation a Inhalation: Flushing headache	and burns and burns (skin absorbable) of the face, chest tightness, e, nausea and vomiting, weakness ness of breath	Flush eyes with la contact lenses, if Quickly remove c large amounts of Begin artificial re- necessary. Transfer to a me	on from exposure. arge amounts of water for at least 15 minutes. Remove worn, while rinsing. ontaminated clothing and wash contaminated skin with soap and water. Seek medical attention. spiration if breathing has stopped and CPR if dical facility. capsules if symptoms develop. January 2011			



Common Name: HYDROGEN FLUORIDE

Synonyms: Fluoric Acid; HFA CAS No: 7664-39-3 Molecular Formula: HF RTK Substance No: 3759 Description: Colorless, fuming liquid or gas

HAZARD DATA

/		
Hazard Rating	Firefighting	Reactivity
4 - Health	Hydrogen Fluoride is a noncombustible liquid or gas.	Hydrogen Fluoride reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and many
0 - Fire	Extinguish fire using an agent suitable for	other compounds.
1 - Reactivity	type of surrounding fire. POISONOUS GASES ARE PRODUCED	Hydrogen Fluoride reacts with WATER and STEAM to produce <i>toxic</i> and <i>corrosive gases</i> .
DOT#: UN 1052	IN FIRE, including <i>Fluorine</i> .	Hydrogen Fluoride reacts with METALS (such as IRON
ERG Guide #: 125	Use water spray to keep fire exposed	and STEEL) to produce flammable and explosive Hydrogen gas.
Hazard Class: 8 (Corrosive)	containers cool.	Hydrogen Fluoride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDE, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); AMINES; METAL SALTS; and SILICON COMPOUNDS.

SPILL/LEAKS

Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 1,600 meters (1 mile)

- If a gas leak, evacuate area and stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
- If a liquid spill, allow to vaporize and disperse, or cover with sodium carbonate or an equal mixture of soda ash and slaked lime.

Water spray can be used to absorb **Hydrogen Fluoride** vapors escaping from leaking containers of *anhydrous* **Hydrogen Fluoride**. Use water in flooding quantities.

EXPOSURE LIMITS

ACGIH: 0.5 ppm, 8-hr TWA; 2 ppm, Ceiling IDLH: 30 ppm

The Protective Action Criteria values are:

PAC-1 = 1 ppm; PAC-2 = 24 ppm; PAC-3 = 44 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and severe burns
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema) Headache, dizziness, weakness, and convulsions

PHYSICAL PROPERTIES

Odor Threshold:	0.04 ppm
Flash Point:	Nonflammable
Vapor Density:	0.7 (air = 1)
Vapor Pressure:	760 mm Hg at 68°F (20°C)
Specific Gravity:	0.99 (water = 1)
Water Solubility:	Miscible
Boiling Point:	67°F (19.4°C)
Freezing Point:	-117.4°F (-83°C)
Ionization Potential:	15.98 eV
Molecular Weight:	20.1

PROTECTIVE EQUIPMENT

Gloves:	Barrier® (>8-hr breakthrough)
0.0.00.	Barnere (Ferni Breaktineugri)

Coveralls: Tychem® Responder® and TK; and Trellchem HPS (>8hr breakthrough)

Respirator: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

- **Immediately** flush with large amounts of water. Apply 2.5% *Calcium Gluconate* gel to the affected skin. Seek medical assistance immediately.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.

February 2017



Common Name: HYDROGEN PEROXIDE

Synonyms: Hydrogen Dioxide CAS No: 7722-84-1 Molecular Formula: H₂O₂ RTK Substance No: 1015 Description: Colorless, odorless liquid. Pure **Hydrogen Peroxide** is unstable and an explosion risk so it is usually in a water solution. HAZARD DATA

HAZARD DATA					
Hazard Rating	Firefighting		Reactivity		
3 - Health 0 - Fire 3 - Reactivity DOT#: UN 2015 ERG Guide #: 143 Hazard Class: 5.1 (Oxidizer)	Hydrogen Peroxide is not combustible but it is a STRONG OXIDIZER which enhances the combustion of other substances. Flood with water to extinguish fire. DO NOT USE DRY CHEMICAL extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Hydrogen Peroxide may ignite combustibles (wood, paper and oil).		Concentrated solutions of Hydrogen Peroxide can decompose violently if trace impurities are present. Hydrogen Peroxide reacts violently with FINELY DIVIDIED METALS; REDUCING AGENTS; COMBUSTIBLES; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ORGANICS; ALCOHOLS; ETHERS; KETONES; ALDEHYDES; and METALS (such as COPPER, BRASS, IRON, SILVER and ZINC). Hydrogen Peroxide is not compatible with AMMONIA and AMMONIA CARBONATES; IODIDES; and SULFITES.		
SPI	ILL/LEAKS		PHYSICAL PROPERTIES		
similar material and c Keep Hydrogen Pero such as sewers, beca explosion.	ers (300 feet)		Peroxide solutionint:Not combustibleensity: 1.2 (air = 1)essure:8 mm Hg at 77°F (25°C)Gravity: 1.46 (water = 1)olubility:SolublePoint: $286°F$ (141°C)		
PAC-1 = PAC-2 =	hr TWA	Gloves: Coveralls Respirate	and TK; Kappler Zytron® 200; and Saint-Gobain ONESuit®TEC or equivalent (>8-hr breakthrough)		
	TH EFFECTS	FI	IRST AID AND DECONTAMINATION		
Skin: Irritation blisters Inhalation: Nose ar	n, burns, eye damage n, burns, skin rash, redness and nd throat irritation, coughing, ss of breath (pulmonary edema)	 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. 			



Common Name: HYDROGEN SULFIDE

Synonyms: Dihydrogen Sulfide; Sulfurated Hydrogen; Sewer Gas CAS No: 7783-06-4 Molecular Formula: H₂S RTK Substance No: 1017

Description: Colorless gas with the odor of rotten eggs

		H	AZARD		DATA		
						De diti	
Hazard Rating	Firefighting				Reactivity		
4 - Health 4 - Fire 0 - Reactivity DOT#: UN 1053 ERG Guide #: 117	 FLAMMABLE GAS Stop flow of gas and use water spray, dry chemical or CO₂ to extinguish fire. Use water spray to disperse vapors. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i>. CONTAINERS MAY EXPLODE IN FIRE. 			OXIDIZING A PEROXIDES NITRATES, (METALS; ME STRONG NI Hydrogen Su BASES (sucl	ulfide is not compatible with STRONG h as SODIUM HYDROXIDE and		
Hazard Class: 2.3 (Poisonous)	Use water spray to keep fire-exposed containers cool. POTASSIUM HYDROXID					u lfide may react with rusty iron pipes and s.	
	SPILL/LEAKS					PHYSIC	CAL PROPERTIES
stopped in place, remov air, and repair leak or al Use only non-sparking to closing containers of Hy Turn leaking cylinder with Keep Hydrogen Sulfide of the possibility of an ei DO NOT wash into sewe For water spills, neutraliz sodium bicarbonate.	(1,000 feet) le) ce of leak is a cylinder and the leak car e the leaking cylinder to a safe place ir low cylinder to empty. bols and equipment, especially when op drogen Sulfide . h leak up to prevent escape of gas in lie out of confined spaces, such as sewer xplosion.	n the peni quid rs, b	e open ng and I state. pecause		Vapor De Vapor Pro Specific (Water So Boiling P Freezing	nt: tion Temp: nsity: essure: Gravity: lubility: oint: Point: n Potential:	0.008 to 0.1 ppm (>100 ppm causes olfactory fatigue) Flammable 4% 45% 500°F (260°C) 1.18 (air = 1) 14,000 mm Hg at 68°F (20°C) 0.99 (water = 1) Soluble -76°F (-60°C) -122°F (-86°C) 10.46 eV 34.08
EXPO	SURE LIMITS				PRC	ΤΕCΤΙν	E EQUIPMENT
NIOSH: 10 ppm, 10-m ACGIH: 1 ppm, 8-hr T IDLH: 100 ppm The Protective Action Cr PAC-1 = 0.51 ppm PA	WA; 5 ppm, STEL			Inorgal Coveralls: Tycher Respirator: >1 ppn		ated Neoprene, Viton and Barrier® (>8-hr breakthrough anic gases and vapors) em® BR, Responder® and TK (>8-hr breakthrough) im - full facepiece PAPR with cartridges specific for Hydrogen Sulfide ipm - SCBA	
HEAL	TH EFFECTS			FI	RST AI	D AND D	ECONTAMINATION
Inhalation: Nose, th and seve edema) Nausea,	with liquid causes frostbite roat and lung irritation, with coughing, ere shortness of breath (pulmonary dizziness, headache, iousness and even death	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention. Immerse affected part in warm water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed. 					



Common Name: HYDROQUINONE

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Hydroquinone may burn, but does not readily ignite.	Hydroquinone reacts violently with SODIUM HYDROXIDE.
1- Fire	Use dry chemical, CO ₂ , water spray or alcohol-	Hydroquinone is not compatible with OXIDIZING
0 - Reactivity	resistant foam as extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 2662	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phenol.</i>	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG
ERG Guide #: 153	Use water spray to reduce vapors and to keep	BASES (such as POTASSIUM HYDROXIDE); OXYGEN; and FERRIC SALTS.
Hazard Class: 6.1	containers cool.	
(Poison)	Hydroquinone may form an ignitable dust/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Eliminate all ignition sources.

Moisten *solid* spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Ventilate and wash area after clean-up is complete.

DO NOT wash into sewer.

EXPOSURE LIMITS

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation, rash, burning feeling and change in skin color
Inhalation:	Nose and throat irritation
	Headache, nausea, vomiting, abdominal cramps, dizziness, and muscle twitching
Chronic:	May affect liver and kidneys

PHYSICAL PROPERTIES

Flash Point:	392°F (165°C)
Auto Ignition Temp:	950°F (510°C)
Vapor Density:	3.8 (air = 1)
Vapor Pressure:	1 mm Hg at 270°F (132°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Soluble (Miscible)
Boiling Point:	547°F (286°C)
Melting Point:	338° to 340°F (170° to 171°C)
Ionization Potential:	7.95 eV
Molecular Weight:	110.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene and Silver Shield $^{0}/4H^{0}$ (>4-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for Hydroxyl compounds, aromatic)
Respirator:	>1 mg/m ³ - full facepiece APR with <i>P100 cartridges</i> >50 mg/m ³ or fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 30 minutes. Remove contact lenses. Seek medical attention
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: HYDROXYLAMINE SULFATE

Synonym: Oxammonium Sulfate CAS No: 10039-54-0 Molecular Formula: $H_8N_2SO_6$ RTK Substance No: 1020 Description: Colorless to white, crystalline solid or powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire 3 - Reactivity DOT#: UN 2865 ERG Guide #: 154	COMBUSTIBLE SOLID Hydroxylamine Sulfate is REACTIVE and a DANGEROUS EXPLOSION HAZARD when exposed to HEAT. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. DO NOT USE WATER directly on Hydroxylamine	Hydroxylamine Sulfate may decompose to form extremely unstable <i>Hydroxylamine</i> on exposure to CARBON DIOXIDE; MOIST AIR; and WATER; or in the presence of STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM). Hydroxylamine Sulfate is not compatible with
Hazard Class: 8 (Corrosive)	Sulfate. POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Oxides, Sulfuric Acid, and Nitrogen Oxides. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	METALS; METAL SALTS; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Violent decomposition may occur above 338° (170°C).

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Keep **Hydroxylamine Sulfate** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Hydroxylamine Sulfate is toxic to aquatic organisms.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- $PAC-1 = 10 \text{ mg/m}^3$
- $PAC-2 = 75 \text{ mg/m}^{3}$

 $PAC-3 = 400 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (Pulmonary edema)
	Methemoglobinemia with headache, fatigue and blue color to the skin and lips

PHYSICAL PROPERTIES

Vapor Density: Specific Gravity: Water Solubility: Melting Point: Molecular Weight: 1.9 (air = 1) >1 (water = 1) Soluble 338°F (170°C) 164.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile and Neoprene
Coveralls:	Tyvek®
Respirator:	>10 ma/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: IODINE

Synonyms: Diatomic Iodine CAS No: 7553-56-2 Molecular Formula: 12 RTK Substance No: 1026 Description: Purple to black, crystalline solid with a sharp, strong odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	lodine is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of	Iodine reacts violently or explosively with ACETYLENE; ACETALDEHYDE; METAL AZIDES; METAL HYDRIDES; and
0 - Fire	other substances.	METAL CARBIDES.
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or CO ₂ as extinguishing agents.	Iodine forms explosive or shock-sensitive compounds when mixed with REDUCING AGENTS (such as LITHIUM,
DOT#: UN 3085	POISONOUS GASES ARE PRODUCED IN	SODIUM, ALUMINUM and their HYDRIDES) and <i>liquid</i> AMMONIA.
ERG Guide #: 140	FIRE, including <i>Hydrogen lodide</i> and other	lodine will ignite POWDERED METALS (such as ANTIMONY,
Hazard Class: 5.1	Iodine compounds.	MAGNESIUM and ZINC) in the presence of WATER.
(Oxidizer)	lodine may ignite combustibles (wood, paper	lodine is not compatible with COMBUSTIBLES; STRONG
(Oxidizer)	and oil).	BASES (such as SODIUM HYDROXIDE and POTASSIUM
		HYDROXIDE); HALOGENS (such as CHLORINE, BROMINE
		and CHLORINE TRIFLUORIDE); and ETHANOL.

SPILL/LEAKS	PH	YSICAL PROPERTIES
 Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. DO NOT wash into sewer. Iodine may be hazardous in the environment; especially to fish. 	Odor Threshold: Flash Point: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Ionization Potential: Molecular Weight:	Sharp, strong odor Noncombustible 8.8 (air = 1) 0.3 mm Hg at 77°F (25°C) 4.93 (water = 1) Slightly soluble 365°F (185°C) 236°F (113°C) 9.31 eV 253.8

EXPOSURE LIMITS

OSHA: 0.1 ppm, Ceiling

NIOSH: 0.1 ppm, Ceiling ACGIH: 0.01 ppm, 8-hr TWA; 0.1 ppm, STEL

IDLH: 2 ppm

The Protective Action Criteria values are: PAC-1 = 0.1 ppm; PAC-2 = 0.5 ppm; PAC-3 = 5 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, nausea, vomiting, diarrhea and abdominal pain

Odor Threshold:	Sharp, strong odor
Flash Point:	Noncombustible
Vapor Density:	8.8 (air = 1)
Vapor Pressure:	0.3 mm Hg at 77°F (25°C)
Specific Gravity:	4.93 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	365°F (185°C)
Melting Point:	236°F (113°C)
Ionization Potential:	9.31 eV
Molecular Weight:	253.8

PROTECTIVE EQUIPMENT

Gloves: Coveralls:

Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough) Tychem® BR, Responder® and TK (8-hr breakthrough)

Respirator: > 0.01ppm SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: ISOAMYL ALCOHOL

Synonyms: Isopentyl Alcohol; Isobutylcarbinol CAS No: 123-51-3 Molecular Formula: C₅H₁₂O RTK Substance No: 1039 Description: Colorless liquid with a strong *Alcohol*-like odor

HAZARD DATA

-		
Hazard Rating	Firefighting	Reactivity
1 - Health	Isoamyl Alcohol is a COMBUSTIBLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol-	Isoamyl Alcohol reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
2 - Fire	resistant foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and
DOT#: UN 1105	FIRE. CONTAINERS MAY EXPLODE IN FIRE.	their HYDRIDES); and HYDROGEN TRISULFIDE to cause an explosion hazard.
ERG Guide #: 129	Use water spray to keep fire-exposed containers	Isoamyl Alcohol is not compatible with ACID CHLORIDES;
Hazard Class: 3	cool.	ACID ANHYDRIDES; ALIPHATIC AMINES; CAUSTICS;
(Flammable liquid)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	ISOCYANATES; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).

SPILL/LEAKS

Isolation Distance:

Small Spill: 50 meters (160 feet)

Large Spill: 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

Dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

OSHA:	100 ppm, 8-hr TWA
NIOSH:	100 ppm, 10-hr TWA; 125 ppm, 15-min STEL
ACGIH:	100 ppm, 8-hr TWA; 125 ppm, 15-min STEL
IDLH:	500 ppm

Eyes:	Irritation and burns
Skin:	Irritation, burns, drying and cracking
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/or shortness of breath
	Headache, nausea, vomiting, dizziness and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.042 ppm
Flash Point:	109°F (43°C)
LEL:	1.2%
UEL:	9%
Auto Ignition Temp:	662°F (350°C)
Vapor Density:	3.04 (air = 1)
Vapor Pressure:	2.1 mm Hg at 68°F (20°C)
Specific Gravity:	0.82 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	270°F (132°C)
Molecular Weight:	88.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene and Viton (>8-hr breakthrough)	
Coveralls:	DuPont Tychem® CPF 2, SL, CPF 4, CSM, and Responder®; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough)	
Respirator:	>100 ppm - APR with Organic vapor cartridge or Supplied air >500 ppm - SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn, while rinsing.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: ISOBUTANE

Synonyms: 1,1-Dimethylethane; Trimethylmethane CAS No: 75-28-5 Molecular Formula: C₄H₁₀ RTK Substance No: 1040 Description: Colorless gas or liquid under pressure with a faint gasoline odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
0 - Health	FLAMMABLE GAS	Isobutane reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ACETYLENE; NITROGEN OXIDES; and mixtures of NICKEL CARBONYL and OXYGEN causing fire and explosions.
4 - Fire	Stop flow of gas or let fire burn itself out. POISONOUS GASES ARE PRODUCED IN FIRE.	
0 - Reactivity	CONTAINERS MAY EXPLODE IN FIRE.	
DOT#: UN 1969	Use water spray to disperse gas, keep fire-exposed cylinders cool, and to protect individuals	
ERG Guide #: 115	attempting to stop leak.	
Hazard Class: 2.1 (Flammable gas)	Vapors may travel to a source of ignition and flash back.	
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	

SPILL/LEAKS

Isolation Distance:

Small Spills: 100 meters (330 feet) Large Spills: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

Before entering a confined space where **Isobutane** is present, check to make sure sufficient *Oxygen* (19.5%) exists.

Keep **Isobutane** out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA: None

NIOSH:	800 ppm,	10-hr TWA
--------	----------	-----------

ACGIH: 1,000 ppm, 8-hr TWA (as Aliphatic hydrocarbon gases)

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns	
	Contact with the liquid can cause frostbite.	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Dizziness, irregular heartbeat, convulsions, loss of consciousness, coma and death	

PHI JICAL PROPERTIES			
Odor Threshold:	Gasoline odor		
Flash Point:	-117°F (-83°C)		
LEL:	1.8%		
UEL:	8.4%		
Auto Ignition Temp: 860°F (460°C)			
Vapor Density: 2 (air = 1)			
Vapor Pressure: 2,611 mm Hg at 77°F (25°C)			
Water Solubility: Slightly soluble			
Boiling Point: $11^{\circ}F(-11.7^{\circ}C)$			
Ionization Potential:	10.74 eV		
Molecular Weight: 58.1			

PHYSICAL PROPERTIES

PROTECTIVE EQUIPMENT

Gloves:	Insulated Neoprene or Rubber	
Coveralls:	Clothes designed to prevent freezing of body tissues	
Respirator:	>800 ppm - Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.



Common Name: ISOBUTYL ISOBUTYRATE

Synonyms: 2-Methylpropyl Isobutyrate CAS No: 97-85-8 Molecular Formula: C₈H₁₆O₂ RTK Substance No: 1047 Description: Colorless, clear liquid with a fruity odor

		HA	ZARD DA	ТА
Hazard Rating	Firefighting			Reactivity
0 - Health 3 - Fire 0 - Reactivity DOT#: UN 2528 ERG Guide #: 130 Hazard Class: 3 (Flammable)	Isobutyl Isobutyrate is a FLAMMABLE LIQUID and a DANGEROUS FIRE HAZARD. Use alcohol foam extinguishers in a fire. Water may not be effective in fighting fires or may spread fire. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance). fire. g fires or may CED IN FIRE. IRE. d containers tion and flash ivel a distance	Isobutyl Isobutyrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
SPII	to cause a fire or explosion fa		the source.	PHYSICAL PROPERTIES
similar material and d This chemical floats or DO NOT let this chem	ers (1,000 feet) mile) iculite, dry sand, earth, or a eposit in sealed containers. n water. ical enter the environment. URE LIMITS sure limits have been		Odor Thresho Flash Point: LEL: UEL: Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point: Melting Point Molecular We Gloves: Coveralls:	101°F (38°C) 0.96% 7.59% y: 4.97 (air = 1) are: 10 mm Hg at 68°F (20°C) vity: 0.9 (water = 1) lity: Insoluble : 291° to 304°F (144° to 151°C) : $-112°F$ (-81°C)
HEALTH EFFECTS			Respirator:	ST AID AND DECONTAMINATION
Eyes:IrritationSkin:Irritation	1		Remove the p Flush eyes w Remove conta Remove conta and water.	person from exposure. vith large amounts of water for at least 15 minutes. act lenses if worn. taminated clothing and wash contaminated skin with soap medical facility.



Common Name: ISOOCTYL ALCOHOL

Synonyms: 6-Methyl-1-Heptanol; Oxooctyl Alcohol CAS No: 26952-21-6 Molecular Formula: $C_8H_{18}O$ RTK Substance No: 1063 Description: Clear, colorless liquid with a faint, pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
3 - Health	COMBUSTIBLE LIQUID	Isooctyl Alcohol may react with concentrated		
2 - Fire	Use dry chemical, CO ₂ , or alcohol-resistant foam, as water may not be effective in fighting fires.	SULFURIC ACID; SODIUM PEROXIDE; HYDROGEN PEROXIDE; and OXIDIZING AGENTS (such as		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	PERCHLORATES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to		
DOT#: None	Use water spray to keep fire-exposed containers	cause explosions.		
ERG Guide #: None	cool.	Isooctyl Alcohol is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and		
Hazard Class: None		POTASSIUM HYDROXIDE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); AMINES; ISOCYANATES; and BORANES.		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **Isooctyl Alcohol** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Isooctyl Alcohol is toxic to waterfowl.

EXPOSURE LIMITS

ACGIH: 50 ppm, 8-hr TWA

HEALTH EFFECTS

Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema)	
	Headache, dizziness, lightheadedness, confusion, irregular heartbeat and passing out	

PHYSICAL PROPERTIES

Odor Threshold:	0.14 ppm	
Flash Point:	180°F (82°C)	
LEL:	0.9%	
UEL:	5.7%	
Auto Ignition Temp:	530°F (277°C)	
Vapor Density:	4.5 (air = 1)	
Vapor Pressure:	0.4 mm Hg at 68°F (20°C)	
Specific Gravity:	0.83 (water = 1)	
Water Solubility:	Insoluble	
Boiling Point:	365°F (185°C)	
Freezing Point:	<-105°F (<-76°C)	
Molecular Weight:	130.2	

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, Viton, and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® CPF 3, CPF 4, and Responder® (>8-hr breakthrough for <i>Hydroxyl compounds</i>)
Respirator:	>50 ppm - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.
- Medical observation is recommended as symptoms may be delayed.



Common Name: ISOPENTANE

Synonyms: Ethyldimethylmethane; Isoamyl Hydride; 1,1,2-Trimethylethane CAS No: 78-78-4 Molecular Formula: C_5H_{12} RTK Substance No: 1064

Description: Colorless liquid with an alcohol or gasoline-like odor

	НА	ZARD DATA	
Hazard Rating	Firefighting		Reactivity
1 - Health 4 - Fire 0 - Reactivity DOT#: UN 1265 ERG Guide #: 128 Hazard Class: 3 (Flammable)	FIRETIGNTING FLAMMABLE LIQUID Use dry chemical, CO ₂ , alcohol-resistant foam or other foam extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool and to reduce vapors. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Flow or agitation may generate electrostatic charges.		Isopentane reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
SP	ILL/LEAKS		PHYSICAL PROPERTIES
similar material and p disposal. Use only non-sparking when opening and clo Keep Isopentane out	mile) iculite, dry sand, earth, or a lace into sealed containers for tools and equipment, especially osing containers of Isopentane . of confined spaces, such as he possibility of an explosion.	Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Tem Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Ionization Potenti Molecular Weight	2.5 (air = 1) 595 mm Hg at 70°F (21°C) 0.62 (water = 1) Insoluble 82°F (28°C) -256°F (-124°C) al: 10.2 eV
EXPO	SURE LIMITS	PF	ROTECTIVE EQUIPMENT
OSHA: 1,000 ppm, 8-hr TWA NIOSH: 120 ppm, 10-hr TWA; 610 ppm, 15-min Ceiling ACGIH: 600 ppm, 8-hr TWA IDLH: 1,500 ppm The Protective Action Criteria values are: PAC-1 = 610 ppm PAC-3 = 20,000 ppm PAC-2 = 610 ppm		Coveralls: Tyo ON bre Respirator: >12	rile, Silver Shield®/4H®, Viton and Barrier® (>8-hr eakthrough for <i>n-Pentane</i>) chem® F, BR, LV, Responder®, and TK; Zytron® 300; IESuit®TEC; and Trellchem® HPS and VPS (>8-hr eakthrough for <i>Hydrocarbons, aliphatic, saturated</i>) 20 ppm - Supplied air 10 ppm - SCBA
HEALTH EFFECTS		FIRST /	AID AND DECONTAMINATION
Skin: Irritation Inhalation: Nose, th coughin breath Headac	and burns and burns nroat and lung irritation with g, wheezing and shortness of he, nausea, dizziness, dedness, and passing out	contact lenses if w Quickly remove co large amounts of s Begin artificial resp	n from exposure. rge amounts of water for at least 15 minutes. Remove vorn. Seek medical attention. ontaminated clothing and wash contaminated skin with soap and water. Seek medical attention. oiration if breathing has stopped and CPR if necessary. to a medical facility. January 2009



Common Name: ISOPRENE

Synonyms: beta-Methylbivinyl; 2-Methylbutadiene CAS No: 78-79-5 Molecular Formula: C_5H_8 RTK Substance No: 1069 Description: Colorless, volatile liquid with a mild odor

Description: Colorless, volatile liquid with a mild odor					
HAZARD DATA					DATA
Hazard Rat	ting	Firefighting			Reactivity
2 - Health 4 - Fire 2 - Reactivity DOT#: UN 12 ERG Guide # Hazard Class (Flam	218 : 130P	Firefighting FLAMMABLE AND REACTIVE LIQUID Use dry chemical, CO ₂ , alcohol-resistant foam or other foam as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		tant agents, ting CED IN IRE. tion and vel a	Isoprene can easily form EXPLOSIVE PEROXIDES and can polymerize (uncontrolled reaction) with heating or on contact with many materials, resulting in fires, explosions, and container rupture. Isoprene reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES), OXYGEN; ALKALI METALS (such as POTASSIUM); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE), AMMONIA; CHLORINATED SOLVENTS; ALCOHOLS, ACID CHLORIDES; ACID ANHYDRIDES; AMINES; ETHERS; and PHENOLS.
	SPI	LL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep Isoprene out of confined spaces, such as sewers, because of the possibility of an explosion. This substance is harmful to aquatic organisms.			Flash F LEL: UEL: Auto Ig Vapor I Vapor I Specifi Water S Boiling Melting Ionizati	2% 9% nition Temp: $428^{\circ}F(220^{\circ}C)$ Density: 2.4 (air = 1) Pressure: $550 \text{ mm Hg at } 77^{\circ}F(25^{\circ}C)$ c Gravity: 0.68 (water = 1) Solubility: Slightly soluble Point: $93^{\circ}F(34^{\circ}C)$	
EXPOSURE LIMITS				PROTECTIVE EQUIPMENT	
No occupational exposure limits have been established for Isoprene .			Gloves Covera Respira	IIs: DuPont Tychem® Responder®; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC (>3-hr breakthrough for <i>Hydrocarbons</i> , <i>Polyenes</i>)	
HEALTH EFFECTS			FIRST AID AND DECONTAMINATION		
Eyes: Skin: Inhalation: Chronic:	coughin Headac and pas	nroat and lung irritation with g and wheezing he, dizziness, lightheadedness ssing out (liver, lung, mammary gland) in		Flush e contact Remov and wa Begin a	 e the person from exposure. eyes with large amounts of water for at least 15 minutes. Remove t lenses if worn. e contaminated clothing and wash contaminated skin with soap ater. artificial respiration if breathing has stopped and CPR if necessary. er promptly to a medical facility.



Common Name: ISOPROPYL ALCOHOL

Synonyms: Isopropanol; Methyl Carbinol; 2-Propanol CAS No: 67-63-0Molecular Formula: C₃H₈O RTK Substance No: 1076 Description: Colorless liquid with a sharp, musty odor

HAZARD DATA

Hererd Deting	Firefichting	Departivity
Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-	Isopropyl Alcohol can react with AIR and OXYGEN over time to form unstable <i>peroxides</i> that can explode.
3 - Fire	resistant foam as extinguishing agents.	Isopropyl Alcohol forms explosive mixtures, when heated, with
0 - Reactivity	Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE.	ALUMINUM. Isopropyl Alcohol is not compatible with OXIDIZING AGENTS (such
DOT#: UN 1219	CONTAINERS MAY EXPLODE IN FIRE.	as PERCHLORATES, PEROXIDES, PERMANGANATES,
ERG Guide #: 129	Use water spray to keep fire-exposed containers cool.	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
Hazard Class: 3	Vapor is heavier than air and may travel a	NITRIC); ACID ANHYDRIDES; ALKALI METALS (such as LITHIUM,
(Flammable)	distance to cause a fire or explosion far from the source.	SODIUM and POTASSIUM); ALKALINE EARTH METALS (such as BERYLLIUM, MAGNESIUM and CALCIUM); ETHYLENE OXIDE;
	Isopropyl Alcohol may form an ignitable vapor/air mixture in closed tanks or containers.	PHOSGENE; CROTONALDEHYDE; and ISOCYANATES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

Use nonsparking tools and equipment.

Metal containers involving the transfer of **Isopropyl Alcohol** should be grounded and bonded.

Keep **Isopropyl Alcohol** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

Isopropyl Alcohol is dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

OSHA: 400 ppm, 8-hr TWA

 NIOSH:
 400 ppm, 10-hr TWA; 500 ppm Ceiling

 ACGIH:
 200 ppm, 8-hr TWA; 400 ppm STEL

IDLH: 2,000 ppm

The Protective Action Criteria values are:

PAC-1 = 400 ppm PAC-2 = 2,000 ppm PAC-3 = 12,000 ppm

HEALTH EFFECTS

 Eyes:
 Irritation and burns

 Skin:
 Irritation and burns

 Inhalation:
 Nose and throat irritation with coughing and wheezing

 Headache, dizziness, confusion, loss of coordination, unconsciousness, and death

PHYSICAL PROPERTIES

Odor Threshold:	22 ppm
Flash Point:	53 ° to 57 °F (12 ° to 14 °C) (88% Isopropyl Alcohol)
LEL:	2%
UEL:	12.7%
Auto Ignition Temp:	750 °F (339 °C)
Vapor Density:	2.1 (air = 1)
Vapor Pressure:	33 mm Hg at 68 °F (20 °C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Soluble
Boiling Point:	181 °F (83 °C)
Freezing Point:	-127 °F (-88 °C)
Critical Temp:	455 °F (235 °C)
Ionization Potential:	10.1 eV
Molecular Weight:	60.1

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Nitrile, Neoprene, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® F, C3, BR, CSM and TK (>8-hr breakthrough) Use turn out gear or flash protection if ignition/fire is the greatest hazard!
Respirator:	>200 ppm - full facepiece APR with <i>Organic Vapor Cartridges</i> >2,000 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: KEROSENE

Synonyms: Fuel Oil #1; Jet Fuel (Aviation Kerosene); Range Oil CAS No: 8008-20-6 Molecular Formula: Varies RTK Substance No: 1091 Description: Colorless to vellowish, oily liquid with a strong odor

		HAZARD DA	ТА	
Hazard Rating	Firefighting		Reactivity	
2 - Health 2 - Fire 0 - Reactivity DOT#: UN 1223 ERG Guide #: 128 Hazard Class: 3 (Flammable	Firefighting COMBUSTIBLE Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Flow or agitation may generate electrostatic charges. Kerosene may form an ignitable vapor/air mixture in closed tanks or containers.		Kerosene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and NITRIC ACID.	
SI	PILL/LEAKS		PHYSICAL PROPERTIES	
 Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. Use only non-sparking tools and equipment. DO NOT wash into sewer. Kerosene is dangerous to aquatic life at high concentrations. 		Odor Threshold Flash Point: LEL: UEL: Auto Ignition Te Vapor Density: Vapor Pressure: Specific Gravity Water Solubility Boiling Point: Freezing Point: Molecular Weig	$100^{\circ} \text{ to } 162^{\circ}\text{F} (38^{\circ} \text{ to } 72^{\circ}\text{C})$ 0.7% 5% mp: 351^{\circ} \text{ to } 624^{\circ}\text{F} (177^{\circ} \text{ to } 329^{\circ}\text{C}) $4.5 (\text{air} = 1)$ $2 \text{ to } 5 \text{ mm Hg at } 68^{\circ}\text{F} (20^{\circ}\text{C})$ $0.81 \text{ to } 0.95 (\text{water} = 1)$ 1 Insoluble $304^{\circ} \text{ to } 574^{\circ}\text{F} (151^{\circ} \text{ to } 301^{\circ}\text{C})$ $-30^{\circ}\text{F} (-34^{\circ}\text{C})$	
EXPO	DSURE LIMITS		PROTECTIVE EQUIPMENT	
	8-hr TWA	Gloves: Coveralls: Respirator:	Nitrile, Viton, Viton/Butyl, Barrier® (>8-hr breakthrough) DuPont Tychem® F, BR, CSM and TK (>8-hr breakthrough) Use turnout gear or flash protection if ignition/fire is the greatest hazard. >100 mg/m ³ - full-facepiece APR with <i>Organic vapor cartridge</i> >290 mg/m ³ or fire - SCBA	
HEA	LTH EFFECTS	FIRS	T AID AND DECONTAMINATION	
and w Heada vomiti disorio Convu	-	Flush eyes with contact lenses Quickly remov large amounts Begin artificial	erson from exposure. In large amounts of water for at least 15 minutes. Remove e contaminated clothing and wash contaminated skin with of soap and water. respiration if breathing has stopped and CPR if necessary. otly to a medical facility.	



Common Name: **KETENE**

Synonyms: Carbomethene; Ethenone; Keten CAS No: 463-51-4 Molecular Formula: CH₂=CO RTK Substance No: 1092 Description: Colorless gas with a sharp, irritating odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health	FLAMMABLE GAS Ketene can POLYMERIZE resulting in uncontrolled	Ketene can readily polymerize and may react violently with many ORGANIC COMPOUNDS.		
3 - Fire 1 - Reactivity	reactions. These reactions may be explosive. Use dry chemical or CO_2 as extinguishing agents.	Ketene reacts with WATER to form <i>Acetic Acid</i> and decomposes in ALCOHOLS and		
DOT#: None	USE WATER carefully as Ketene reacts with WATER. POISONOUS GASES ARE PRODUCED IN FIRE.	AMMONIA. Ketene reacts with HYDROGEN PEROXIDE to		
ERG Guide #: 131	CONTAINERS MAY EXPLODE IN FIRE.	form explosive <i>Diacetyl Peroxide.</i> Ketene can not be stored or shipped.		
Hazard Class: None	Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Ketene may form an ignitable vapor/air mixture in closed tanks or containers.			

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Use only non-sparking tools and equipment.

Metal containers involving the transfer of Ketene should be grounded and bonded.

Keep Ketene out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA: 0.5 ppm, 8-hr TWA

- NIOSH: 0.5 ppm, 10-hr TWA; 1.5 ppm, 15-min STEL
- ACGIH: 0.5 ppm, 8-hr TWA; 1.5 ppm, 15-min STEL

IDLH: 5 ppm

The Protective Action Criteria values are:

PAC-1 = 0.0057ppm; PAC-2 = 0.063 ppm; PAC-3 = 0.2 ppm

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation Inhalation: Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold: Flash Point: Vapor Density: Vapor Pressure: Water Solubility: **Boiling Point: Freezing Point: Ionization Potential: Molecular Weight:**

Sharp, penetrating odor Flammable Gas 1.45 (air = 1) 1.04 x 10⁴ mm Hg at 77°F (25°C) Reacts -69°F (-56°C) -238°F (-150°C) 9.61 eV 42

PROTECTIVE EQUIPMENT

Gloves: Silver Shield®/4H® and Barrier® (>4-hr breakthrough) **Coveralls:** Tychem® F, C3, BR, CSM and TK (>8-hr breakthrough) Use turn out gear or flash protection if ignition/fire is the greatest hazard! >0.5 ppm - SCBA

Respirator:

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: LEAD

Synonym: Metallic Lead CAS No: 7439-92-1 Molecular Formula: Pb₂ RTK Substance No: 1096 Description: Heavy, soft, silvery-gray metal

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
4 - Health 0 - Fire 0 - Reactivity DOT#: UN 3077 ERG Guide #: 171 Hazard Class: 9 (Environmentally Hazardous Substance)	 Firefighting Extinguish fire using an agent suitable for type of surrounding fire. Lead itself does not burn. POISONOUS FUMES ARE PRODUCED IN FIRE, including Lead Oxides. Use water spray to keep fire-exposed containers cool. 		ot burn. CED IN FIRE,	Lead reacts violently with HYDROGEN PEROXIDE; AMMONIUM NITRATE; ZIRCONIUM; SODIUM AZIDE; SODIUM ACETYLIDE; and CHLORINE TRIFLUORIDE. Lead is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
SPI	LL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Use a HEPA-filter va Toxic to aquatic orga Hazardous to the env environment.	(30 to 80 feet) cuum for clean-up.		Odor Threshold: Flash Point: LEL: UEL: Specific Gravity: Vapor Pressure: Water Solubility: Boiling Point: Melting Point:	Not combustible N/A N/A 11.35 at 68°F (20°C) 0 mm Hg at 68°F (20°C)
EXPO		1	-	ROTECTIVE EQUIPMENT
NIOSH: 0.09 ACGIH: 0.09 IDLH LEVEL: 100 PAC LEVEL: PAG PAC PAG	5 mg/m ³ , 8-hr TWA 5 mg/m ³ , 10-hr TWA 5 mg/m ³ , 8-hr TWA mg/m ³ C-1 = 0.15 mg/m ³ ; C-2 = 120 mg/m ³ ; C-3 = 700 mg/m ³		Coveralls:DuBoots:LaRespirator:<0	trile, Latex, Rubber uPont <i>Tyvek</i> ® atex, Butyl, Neoprene 0.5 mg/m ³ - N100 0.5 mg/m ³ - full facepiece APR with High Efficiency ilters 50 mg/m ³ but <u><</u> 100 mg/m ³ Supplied Air
HEAL	TH EFFECTS		FIRST	AID AND DECONTAMINATION
and wea Chronic: Lead ma and kidr	mation ne, irritability, upset stomach,		contact lenses if	rge amounts of water for at least 15 minutes. Remove worn. ated clothing and wash contaminated skin with soap



Right to Know Hazardous Substance Fact Sheet

Common Name: LEAD ACETATE

Synonyms: Dibasic Lead Acetate; Lead Diacetate; Salt of Saturn; Sugar of Lead CAS No: 301-04-2Molecular Formula: C₄H₆O₄Pb RTK Substance No: 1097 Description: White to gray-colored flakes, crystalline powder or solid

HAZARD DATA

lazard Rating	Firefighting	Reactivity
- Eiro	Extinguish fire using an agent suitable for type of surrounding fire. Lead Acetate itself	Reacts violently with BROMATES; PHOSPHATES; CARBONATES; and PHENOLS.
- Reactivity	does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> and <i>Acetic</i> <i>Acid</i> .	Lead Acetate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMMONIA; AMINES; CRESOLS; ISOCYANATES, CHLORAL HYDRATE; SULFIDES; SALICYLIC ACID; TANNIN; CITRATES; EPICHLOROHYDRIN; SULFITES; RESORCINOL; and TARTRATES.
	Use water spray to keep fire-exposed containers cool.	
RG Guide #: 151 azard Class: 6.1	Use water spray to keep fire-exposed	SODIUM HYDROXIDE and POTASSIUM HYI AMMONIA; AMINES; CRESOLS; ISOCYANA HYDRATE; SULFIDES; SALICYLIC ACID; TA EPICHLOROHYDRIN; SULFITES; RESORCI

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

OSHA:	0.05 mg/m ³ , 8-hr TWA (as <i>Lead</i>)
NIOSH:	0.01 mg/m ³ , 10-hr TWA (as <i>Lead</i>)
ACGIH:	0.05 mg/m ³ , 8-hr TWA (as <i>Lead</i>)
IDLH LEVEL:	100 mg/m ³
PAC	PAC-1 = 5 mg/m ³ ;
LEVELS:	PAC-2 = 55 mg/m ³ ;
	$PAC-3 = 330 \text{ mg/m}^3$

HEALTH EFFECTS

B	
Eyes:	Irritation
Skin:	No Information
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	Cancer - Inorganic <i>Lead</i> compounds may cause lung, brain, stomach, and kidney cancer in humans. Other effects may include: metallic taste, colic, weight loss, muscle cramps and damage to the nervous system

rtoop uway		
Pł	IYSICAL PROPERTIES	
Odor Threshold:	Odor of Acetic Acid	
Flash Point:	Not combustible	
LEL:	N/A	
UEL:	N/A	
Relative Density:	3.3 (water = 1)	
Water Solubility:	Soluble	
pH:	5.5 - 6.5	
Melting Point:	167 ^o F (75 ^o C)	
PROTECTIVE EQUIPMENT		

Gloves:	Nitrile, Latex, Rubber
Gloves.	Nillie, Lalex, Nubbei
Coveralls:	DuPont <i>Tyvek</i> ®
Boots:	Latex, Butyl, Neoprene
Respirator:	<0.5 mg/m ³ - N100
	>0.5 mg/m ³ - full facepiece APR with High Efficiency
	filters
	>50mg/m ³ but <u><</u> 100 mg/m ³ supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Transfer** to a medical facility.



Common Name: LEAD ARSENATE

Synonyms: Acid Lead Arsenate CAS No: 7784-40-9 Molecular Formula: PbHAsO₄ RTK Substance No: 1098 Description: Odorless, heavy white powder

HAZARD DATA					
Firefighting			Reactivity		
 Firefighting Extinguish fire using an agent suitable for type of surrounding fire. Lead Arsenate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE including Lead Oxides and Arsenic Oxides. Use water spray to keep fire-exposed containers cool. 			Lead Arsenate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); BROMINE AZIDE; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ALKALI; and SULFIDES. <i>Inorganic Arsenic</i> can react with HYDROGEN to release highly toxic <i>Arsenie gas</i> . Keep water solutions containing <i>Arsenic compounds</i> away from ACTIVE METALS (such as IRON, ALUMINUM, and ZINC) as highly toxic <i>Arsenic compounds</i> such as <i>Arsine gas</i> may be released.		
.L/LEAKS			PHYSICAL PROPERTIES		
 Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Lead Arsenate is a marine pollutant and is harmful to aquatic organisms. 		Odor Threshold:OdorlessFlash Point:Non-combustibleVapor Density:5.79 (water =1)Water Solubility:InsolubleMelting Point:536°F (280°C) (decomposes)			
EXPOSURE LIMITS			PROTECTIVE EQUIPMENT		
2 mg/m ³ , 15 minutes (as enic) mg/m ³ , 8-hr TWA (as <i>Lead</i> enate)		Gloves: Coveralls: Boots: Respirator:	Nitrile, Latex, Rubber DuPont Tyvek® and Tychem®, Polycoat; QC, CPF-1, SL and CPF-2 Butyl, Neoprene <0.1 mg/m ³ - APR with High Efficiency filters <10 mg/m ³ - PAPR with High Efficiency filters ≥10 mg/m ³ but <20 mg/m ³ - Supplied Air		
			≥20 mg/m ³ - SCBA		
H EFFECTS		FIR	ST AID AND DECONTAMINATION		
nd burns throat irritation e, irritability, upset stomach, ness <i>Arsenic compound</i> s cause		 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with soat and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. 			
	Extinguish fire using an agent surrounding fire. Lead Arsen burn. POISONOUS GASES ARE PF FIRE including <i>Lead Oxides a</i> <i>Oxides</i> . Use water spray to keep fire-e cool. L/LEAKS 25 to 50 meters 80 to 160 feet) al first or use a HEPA-filter arine pollutant and is harmful URE LIMITS mg/m ³ , 8-hr TWA (as <i>Arsenic</i>) 2 mg/m ³ , 15 minutes (as <i>enic</i>) mg/m ³ , 8-hr TWA (as <i>Lead</i> <i>enate</i>) /m ³ (as <i>Arsenic</i>) THEFFECTS and burns and burns throat irritation e, irritability, upset stomach, ness <i>Arsenic compounds</i> cause ung cancer in humans.	Firefighting Extinguish fire using an agent suitable surrounding fire. Lead Arsenate its burn. POISONOUS GASES ARE PRODUCT FIRE including Lead Oxides and Arse Oxides. Use water spray to keep fire-exposed cool. L/LEAKS 25 to 50 meters 80 to 160 feet) al first or use a HEPA-filter arine pollutant and is harmful URE LIMITS mg/m ³ , 8-hr TWA (as Arsenic) 2 mg/m ³ , 15 minutes (as enic) mg/m ³ , 8-hr TWA (as Lead enate) /m ³ (as Arsenic) TH EFFECTS and burns throat irritation e, irritability, upset stomach, iness Arsenic compounds cause ung cancer in humans.	Firefighting Extinguish fire using an agent suitable for type of surrounding fire. Lead Arsenate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE including Lead Oxides and Arsenic Oxides. Use water spray to keep fire-exposed containers cool. L/LEAKS 25 to 50 meters 80 to 160 feet) al first or use a HEPA-filter al first or use a HEPA-filter arine pollutant and is harmful URE LIMMITS mg/m³, 8-hr TWA (as Arsenic) 2 mg/m³, 8-hr TWA (as Lead mate) /m³ (as Arsenic) TH EFFECTS and burns and burns Arsenic compounds cause ung cancer in humans.		



Common Name: LEAD ARSENITE

Synonyms: Lead Metaarsenite CAS No: 10031-13-7 Molecular Formula: As₂O₄Pb RTK Substance No: 1099 Description: White powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of	Lead Arsenite will react violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
0 - Fire 0 - Reactivity	surrounding fire. Lead Arsenite itself does not burn. POISONOUS FUMES ARE PRODUCED IN	Lead Arsenite is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
DOT#: UN 1618 ERG Guide #: 151 Hazard Class: 6.1	FIRE, including <i>Lead Oxides</i> and <i>Arsenic Oxides</i>.Use water spray to keep fire-exposed containers cool.	CHLORINE, BROMINE and FLUORINE). Inorganic Arsenic can react with HYDROGEN to release highly toxic Arsine gas.
(Poison)		Keep water solutions containing <i>Arsenic compounds</i> away from ACTIVE METALS (such as IRON, ALUMINUM, and ZINC) as highly toxic <i>Arsenic compounds</i> Such as <i>Arsine gas</i> may be released.

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

OSHA:	0.01 mg/m ³ , 8-hr TWA (as <i>Arsenic</i>)
NIOSH:	0.002 mg/m ³ , 15 minutes (as
	Arsenic)
ACGIH:	0.01 mg/m ³ , 8-hr TWA (as <i>Arsenic</i>)
ACGIH:	0.15 mg/m ³ , 8-hr TWA (as <i>Lead</i>
	Arsenate)
IDLH LEVEL:	5 mg/m ³

	HEALTH EFFECTS
Eyes:	Irritation and burns
Skin:	Irritation and burns
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	Inorganic Lead compounds may cause lung, brain, stomach, and kidney cancer in humans. Metallic taste, colic, and muscle cramps. Damage to the nervous system.

. . _ . . _ . . _ _ _ _

PHYSICAL PROPERTIES

Odor Threshold:	00
Flash Point:	No
LEL:	N/
UEL:	N/
Relative Density:	5.8
Water Solubility:	Ins

Odorless Non-combustible N/A N/A 5.85 (water = 1) Insoluble

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	Nitrile, Latex, Rubber DuPont Tyvek®, Tychem® Polycoat, QC, CPF-1, SL and CPF-2
Boots:	Butyl, Neoprene
Respirator	<0.1 mg/m ³ - APR with High Efficiency filters
(for	<10 mg/m ³ - PAPR with High Efficiency filters
Arsenic):	≥10 mg/m ³ but <20 mg/m ³ - Supplied Air
	≥ 20 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Transfer** to a medical facility.



Common Name: LEAD CHLORIDE

Synonyms: Lead (II) Chloride; Lead Dichloride CAS No: 7758-95-4 Molecular Formula: PbCl₂ RTK Substance No: 1101 Description: White crystalline powder

			HA	ZARD	DATA	
Hazard R	ating	Firefighting			Reactivity	
3 - Health 0 - Fire 0 - Reactivi DOT#: UN	-	Extinguish fire using an agent suitable for type of surrounding fire. Lead Chloride itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including Lead Oxides and Hydrogen Chloride.		ide CED IN	Lead Chloride is not compatible with CALCIUM; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).	
ERG Guide Hazard Clas	-	CONTAINERS MAY EXPLOD Use water spray to keep fire-ex containers cool.				
	SPIL	L/LEAKS			PHYSICAL PROPERTIES	
Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms. Hazardous to the environment and persists in the environment.			Flash F Vapor I Vapor S Water S Boiling Melting	Density: 9.6 (air = 1) Pressure: 1 mm Hg at 1,017°F (547°C) Solubility: Slightly soluble Point: 1,742°F (950°C)		
E	EXPOS	URE LIMITS			PROTECTIVE EQUIPMENT	
OSHA: NIOSH: ACGIH: IDLH LEVE PAC LEVELS:	0.05 0.05 L: 100 r PAC PAC	mg/m ³ , 8-hr TWA (as <i>Lead</i>) mg/m ³ , 10-hr TWA (as <i>Lead</i>) mg/m ³ , 8-hr TWA (as <i>Lead</i>) ng/m ³ (as <i>Lead</i>) $1 = 0.2 mg/m^3;$ $2 = 160 mg/m^3;$ $3 = 940 mg/m^3$		Gloves Covera Boots: Respira	Is: DuPont <i>Tyvek</i> ® Latex, Butyl, Neoprene	
l	HEALT	H EFFECTS			FIRST AID AND DECONTAMINATION	
Eyes: Skin: Acute: Chronic:	and weak Inorganic lung, brai in human Metallic ta	e, irritability, upset stomach, ness <i>Lead</i> compounds may cause n, stomach and kidney cancer	1	Flush e contact Remov	e the person from exposure. yes with large amounts of water for at least 15 minutes. Remove lenses if worn. e contaminated clothing and wash contaminated skin with water. r to a medical facility.	



Common Name: LEAD CHROMATE

Synonyms: Chrome Yellow; Paris Yellow; Chrome Green CAS No: 7758-97-6 Molecular Formula: PbCrO₄ RTK Substance No: 1102 Description: Odorless, yellow to orange, sand-like powder.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of	Lead Chromate reacts violently with AZO DYES, FERRIC FERROCYANIDE and
0 - Fire	surrounding fire. Lead Chromate itself does not burn.	DINITRONAPHTHALENE.
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Lead Oxides and Chromium Oxides.	Lead Chromate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 3288	CONTAINERS MAY EXPLODE IN FIRE.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
ERG Guide #: 151	Use water spray to keep fire-exposed containers cool.	HYDRAZINE; SULFUR; TANTALUM; STRONG
Hazard Class: 6.1	Lead Chromate may ignite combustibles (wood,	REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM, and their HYDRIDES);
(Toxic)	paper and oil).	COMBUSTIBLES; and ORGANIC MATERIALS.

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms. Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS OSHA: 0.005 mg/m³, 8-hr TWA (as Chromium) NIOSH: 0.001 mg/m³, 10-hr TWA (as Chromium) ACGIH: 0.012 mg/m³, 8-hr TWA (as Chromium) IDLH LEVEL: 15 mg/m³ (as Chromium)

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation. Prolonged contact may cause blisters and deep ulcers
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	Inorganic Lead compounds may cause lung, brain, stomach and kidney cancer in humans. Metallic taste, colic and muscle cramps Damage to the nervous system, and skin allergy

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	No Information
Specific Gravity:	6.3
Water Solubility:	Insoluble
Melting Point:	1,551°F (844°C)

PROTECTIVE EQUIPMENT

Gloves:	Rubber
Coveralls:	DuPont Tyvek®
Boots:	Butyl, Neoprene
Respirator (for Chromium):	 >0.001 mg/m³ - N100 >0.1 mg/m³ - full facepiece APR with High Efficiency filters >1 mg/m³ - Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

- $\ensuremath{\textbf{Remove}}$ contaminated clothing and wash contaminated skin with soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.
- Transfer to a medical facility.



Common Name: LEAD CYANIDE

Synonyms: Pigment Yellow CAS No: 592-05-2 Molecular Formula: Pb(CN)₂ RTK Substance No: 1103 Description: White to yellowish powder

			НА	ZARD DA	ГА	
Hazard Ra	ating	Firefighting			Reactivity	
3 - Health 0 - Fire 0 - Reactivit DOT#: UN 1 ERG Guide : Hazard Clas	1620 #: 151	 Extinguish fire using an agent surrounding fire. Lead Cyan POISONOUS GASES ARE PF including <i>Lead Oxides, Cyan Oxides.</i> Use water spray to keep fire-e cool. DO NOT USE WATER itself. 	ide itse RODU(ides ar	elf does not burn CED IN FIRE, <i>nd Nitrogen</i> d containers	Lead Cyanide reacts violently with MAGNESIUM. Lead Cyanide is decomposed by STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and WATER to form toxic and flammable <i>Hydrogen</i> <i>Cyanide gas.</i> Lead Cyanide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE), METAL CHLORATES; and METALS.	
	SPIL	.L/LEAKS			PHYSICAL PROPERTIES	
Moisten spille vacuum for o Toxic to aqua	(8 ed materia clean-up. atic organi o the envir	5 to 50 meters 30 to 160 feet) al first or use a HEPA-filter sms. onment and persists in the		Odor Thresho Flash Point: LEL: UEL: Vapor Density Vapor Pressu Water Solubil Boiling Point:	Non-combustible N/A N/A V: No information re: No information ity: Slightly soluble	
E	XPOS	URE LIMITS			PROTECTIVE EQUIPMENT	
OSHA: NIOSH: ACGIH: IDLH LEVEL	0.05 r 0.05 r _: 25 mg	mg/m ³ , 8-hr TWA (as <i>Lead</i>) mg/m ³ , 10-hr TWA (as <i>Lead</i>) mg/m ³ , 8-hr TWA (as <i>Lead</i>) g/m ³ (as <i>Cyanide</i>) ng/m ³ (as <i>Lead</i>)	ŗ	Gloves: Coveralls: Boots: Respirator:	Nitrile, Latex, Rubber DuPont Tyvek®, DuPont Tychem® Polycoat, QC, CPF-1, SL and CPF-2 Butyl, Neoprene <0.5 mg/m ³ - N100 >0.5 mg/m ³ - full facepiece APR with High Efficiency filters >50 mg/m ³ but ≤100 mg/m ³ - Supplied Air	
ŀ	IEALT	H EFFECTS		FIRS	T AID AND DECONTAMINATION	
Eyes: Skin: Acute: Chronic:	No Inform No Inform Headache stomach, exposure DEATH, s Inorganic lung, brair in humans	ation ation e, irritability, and upset and weakness. High to <i>Cyanide</i> can cause ometimes without warning Lead compounds may cause n, stomach, and kidney cancer	I	Remove the p Flush eyes wit contact lenses Remove conta and water. Begin artificia necessary. Transfer to a	erson from exposure. th large amounts of water for at least 15 minutes. Remove	



Common Name: LEAD DIOXIDE

Synonyms: Lead Brown; Lead Peroxide CAS No: 1309-60-0 Molecular Formula: PbO₂ RTK Substance No: 1104 Description: Odorless, brown crystals or powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Noncombustible	Lead Dioxide is a STRONG OXIDIZER which may react
0 - Fire	Flood fire with water. DO NOT USE CO ₂ , dry	with ORGANICS, COMBUSTIBLES or REDUCING AGENTS to produce enough heat to cause a fire.
1 - Reactivity	chemicals or halogenated extinguishing agents. POISONOUS FUMES ARE PRODUCED IN	Lead Dioxide is not compatible with FINELY POWDERED
DOT#: UN 1872	FIRE, including <i>Lead Oxides</i> .	METALS; METAL CARBIDES; SULFUR COMPOUNDS;
ERG Guide #: 141	CONTAINERS MAY EXPLODE IN FIRE.	POTASSIUM; SODIUM; PHOSPHORUS; MAGNESIUM; CHLORINE TRIFLUORIDE; ZINC: NITROGEN; CESIUM
Hazard Class: 5.1	Use water spray to keep fire-exposed containers cool.	ACETYLIDE; HYDROXYLAMINE; HYDROGEN
(Oxidizer)		PEROXIDE; HALOGENS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and AMINES.

SPILL/LEAKS

Isolation Distance: 10 to 25 meters (30 to 80 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

OSHA: NIOSH:

IDLH LEVEL:

ACGIH:

0.05 mg/m³, 8-hr TWA (as *Lead*) 0.05 mg/m³, 10-hr TWA (as *Lead*) 0.05 mg/m³, 8-hr TWA (as *Lead*) 100 mg/m³ (as *Lead*)

	HEALTH EFFECTS
Eyes: Skin:	Irritation Irritation
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	<i>Inorganic Lead compound</i> s may cause lung, brain, stomach, and kidney cancer in humans.
	Metallic taste, colic and muscle cramps. Damage to the nervous system.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Relative Density:	9.38 g/cm ³
Water Solubility:	Insoluble
Vapor Density:	8.2 (air = 1)
Melting Point:	Decomposes at 554°F (290°C)

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	Nitrile, Latex, Rubber DuPont Tyvek® and Tychem® Polycoat, QC, CPF-1, SL
coronalion	and CPF-2
Boots:	Butyl, Neoprene
Respirator:	<0.5 mg/m ³ - N100
	>0.5 mg/m ³ - full facepiece APR with High Efficiency filters
	>50 mg/m ³ but <u><</u> 100 mg/m ³ - Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: LEAD FLUOBORATE

Synonyms: Lead Boron Fluoride CAS No: 13814-96-5 Molecular Formula: Pb(BF₄)₂ RTK Substance No: 1105 Description: A crystalline powder mostly used in a water solution

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 2291 ERG Guide #: 151 Hazard Class: 6.1 (Poison)	Firefighting Use dry chemical, CO ₂ or foam as extinguiagents. DO NOT USE water steam directly on matter poisonous GASES ARE PRODUCED I including Lead Oxides, Boron Oxides, Fluct Hydrogen Fluoride. CONTAINERS MAY EXPLODE IN FIRE Use water spray to keep fire-exposed conterposed cont		n material itself. CED IN FIRE, s, <i>Fluorine</i> and IRE	Liquid solutions of Lead Fluoborate, in contact with METALS, may generate explosive <i>Hydrogen gas</i> . Lead Fluoborate is not compatible with CYANIDES; CALCIUM CARBIDE; WATER-REACTIVE MATERIALS; SULFITES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
× 7	LL/LEAKS			PHYSICAL PROPERTIES
Moisten powdered ma vacuum for clean-up. For liquid spills, conta Neutralize with an alka Mop or pump into a co Toxic to aquatic organ	(80 to 160 feet) aterial first or use a HEPA-filter in spill with earth, sand, etc. ali such as <i>Sodium Carbonate</i> . ontainer. Keep out of sewers.	1	Odor Threshold: Flash Point: Specific Gravity: Boiling Point: Water Solubility: Melting Point: ph:	Noncombustible 1.70 – 1.75 (liquid) >212°F (100°C) (liquid)
EXPOS	URE LIMITS		P	ROTECTIVE EQUIPMENT
NIOSH: 0.05 ACGIH: 0.05 IDLH LEVEL: 100	mg/m ³ , 8-hr TWA (as <i>Lead</i>) mg/m ³ , 10-hr TWA (as <i>Lead</i>) mg/m ³ , 8-hr TWA (as <i>Lead</i>) opm, 8-hr TWA (<i>Hydrogen</i> <i>Fluoride</i>) mg/m ³ (as <i>Lead</i>) om (as <i>Hydrogen Fluoride)</i>)		Coveralls: D TI Boots: N Respirator: <(A fc >{	aminate, Nitrile or Natural Rubber uPont Tyvek® (solid) and Tychem® Responder® and K or Zytron® 100 for <i>Hydrogen Fluoride</i> (HF) eoprene 0.5 mg/m ³ - N100 (for solid) 0.5 mg/m ³ (as <i>Lead</i>) or 0.5 ppm (as HF) - full facepiece PR with High Efficiency prefilters and cartridge specific or HF 50 mg/m ³ but \leq 100 mg/m ³ (as <i>Lead</i>) or 30 ppm (as <i>Hydrogen Fluoride</i>) -Supplied air
HEALT	TH EFFECTS		r	AID AND DECONTAMINATION
and weak Chronic: Inorganic lung, brai in human Metallic t	burns e, irritability, upset stomach cness <i>Lead compounds</i> may cause n, stomach and kidney cancer		Flush eyes with la contact lenses if v Remove contamin	nated clothing and wash contaminated skin with water. spiration if breathing has stopped and CPR if



Common Name: LEAD FLUORIDE

Synonyms: Lead Difluoride CAS No: 7783-46-2 Molecular Formula: PbF₂ RTK Substance No: 1106 Description: Odorless white powder or a beige or gray crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Lead Fluoride itself does not burn.	Lead Fluoride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS FUMES ARE PRODUCED IN FIRE, including <i>Hydrogen Fluoride</i> and <i>Lead</i> <i>Oxides</i> .	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); POTASSIUM; and CALCIUM CARBIDE. Contact with METALS may produce flammable and explosive <i>Hydrogen gas</i> .
ERG Guide #: 154	Use water spray to keep fire-exposed containers cool.	
Hazard Class: 9	DO NOT get water inside containers.	
(Miscellaneous Hazardous Material)		

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter

vacuum for clean-up.

Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

OSHA: NIOSH: ACGIH:

IDLH LEVEL:

0.05 mg/m³, 8-hr TWA (as *Lead*) 0.05 mg/m³, 10-hr TWA (as *Lead*) 0.05 mg/m³, 8-hr TWA (as *Lead*) 100 mg/m³ (as *Lead*)

HEALTH EFFECTS

- Eyes:Irritation and burnsSkin:Irritation and burns
- Acute: Headache, irritability, upset stomach, and weakness
- Chronic: Inorganic Lead compounds may cause lung, brain, stomach and kidney cancer in humans. Metallic taste, colic, and muscle cramps Damage to the nervous system

PHYSICAL PROPERTIES Odor Threshold: Odorless

Flash Point: Reactive Density: Boiling Point: Water Solubility: Melting Point: Odorless Non-combustible 8.45 g/cm³ 2,359°F (1,293°C) Slightly soluble 1,515°F (824°C)

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	Nitrile, Latex, Rubber DuPont Tyvek® and Tychem® Polycoat, QC, CPF-1, SL and CPF-2
Boots:	Butyl, Neoprene
Respirator:	<0.5 mg/m ³ - N100
	≥0.5 mg/m ³ - full facepiece APR with High Efficiency filters
	>50 mg/m ³ but <u><</u> 100 mg/m ³ - Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

- **Remove** contaminated clothing and wash contaminated skin with soap and water.
- Transfer to a medical facility.



Common Name: LEAD IODIDE

Synonyms: Lead II lodide CAS No: 10101-63-0 Molecular Formula: PbI₂ RTK Substance No: 1107 Description: Bright yellow powder

HAZARD DATA

1				
Hazard Rating	Firefighting	Reactivity		
3 - Health 0 - Fire 0 - Reactivity DOT ID #: UN 3077 ERG Guide #: 171 Hazard Class: 9 (Environmentally Hazardous Material)	 Extinguish fire using an agent suitable for type of surrounding fire. Lead lodide itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i>. Use water spray to keep fire-exposed containers cool. 	Lead lodide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).		

SPILL/LEAKS

Isolation Distance: 10 to 25 meters (30 to 80 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Toxic to aquatic organisms

EXPOSURE LIMITS

OSHA: NIOSH:

IDLH LEVEL:

ACGIH:

0.05 mg/m³, 8-hr TWA (as *Lead*) 0.05 mg/m³, 10-hr TWA (as *Lead*) 0.05 mg/m³, 8-hr TWA (as *Lead*) 100 mg/m³ (as *Lead*)

HEALTH EFFECTS

Eyes:	Irritation
Skin:	No information
Acute:	Headache, irritability, upset stomach, and weakness.
Chronic:	Inorganic <i>Lead</i> compounds may cause lung, brain, stomach and kidney cancer in humans.
	Metallic taste, colic, muscle cramps Damage to the nervous system

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Not combustible
LEL:	N/A
UEL:	N/A
Specific Gravity:	6.16 (water = 1)
Vapor Pressure:	No information
Water Solubility: Melting Point:	Very slightly soluble in boiling water $756^{\circ}F$ ($402^{\circ}C$)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Latex, Rubber
Coverall:	DuPont <i>Tyvek</i> ®
Boot:	Latex, Butyl, Neoprene
Respirator:	<0.5 mg/m ³ - N100
	>0.5 mg/m ³ - full facepiece APR with High Efficiency filters
	>50 mg ³ but <u><</u> 100 mg/m ³ Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: LEAD NITRATE

Synonyms: Lead Dinitrate; Plumbous Nitrate CAS No: 10099-74-8 Molecular Formula: Pb(NO₃)₂ RTK Substance No: 1108 Description: White or colorless, sand-like solid

HAZARD DATA					
Hazard Rating	Firefighting			Reactivity	
3 - Health 0 - Fire 0 - Reactivity	Chemical or CO ₂ extinguish POISONOUS FUMES ARE	JSE WATER ONLY. DO NOT USE Chemical or CO ₂ extinguishing agents. POISONOUS FUMES ARE PRODUCED N FIRE, including <i>Lead Oxides</i> and		Lead Nitrate reacts with HYDROGEN PEROXIDE; REDUCING AGENTS; POWDERED CARBON; LEAD HYPOPHOSPHITE; AMMONIUM THIOCYANATE; POTASSIUM ACETATE; and POWDERED METALS. Lead Nitrate is an OXIDIZER which may ignite ORGANICS and COMBUSTIBLE MATERIALS.	
DOT#: UN 1469 ERG Guide #: 141 Hazard Class: 5.1	Use water spray to keep fire containers cool.				
(Oxidizer)					
SPIL	L/LEAKS			PHYSICAL PROPERTIES	
Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms. Hazardous to the environment and persists in the environment.			Odor Threshold:No informationFlash Point: $554^{\circ}F(290^{\circ}C)$ LEL:N/AUEL:N/AVapor Density:11.0 (air = 1)Water Solubility:SolublepH:3 to 4Melting Point: $878^{\circ}F(470^{\circ}C)$		
EXPOSI	JRE LIMITS		PROTECTIVE EQUIPMENT		
NIOSH: 0.05 m ACGIH: 0.05 m	ng/m ³ , 8-hr TWA (as <i>Lead</i>) ng/m ³ , 10-hr TWA (as <i>Lead</i>) ng/m ³ , 8-hr TWA (as <i>Lead</i>) g/m ³ (as <i>Lead</i>)		Gloves Covera Boots: Respira	Ills: DuPont Tyvek® and Tychem® Polycoat, QC, CPF-1, SL and CPF-2 Butyl, Neoprene	
HEALTI	H EFFECTS		[I	FIRST AID AND DECONTAMINATION	
and weakn Chronic: Inorganic L lung, brain in humans. humans. Metallic tas	<i>ead compounds</i> may cause stomach, and kidney cancer May be a teratogen in ste, colic, muscle cramps	,	Flush e contact Remov	e the person from exposure. eyes with large amounts of water for at least 15 minutes. Remove lenses if worn. e contaminated clothing and wash contaminated skin with water. er to a medical facility.	
Damage to	the nervous system			September 2007	



COMMON NAME: LEAD PHOSPHATE

Synonyms: Lead Orthophosphate; Plumbous Phosphate; Trilead Phosphate; Perlex Paste CAS No: 7446-27-7 Molecular Formula: Pb₃P₂O₈ RTK Substance No: 1110 Description: White or colorless powder

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of	Lead Phosphate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
0 - Fire	surrounding fire. Lead Phosphate itself does not burn.	PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lead Oxides</i> and <i>Phosphorus Oxides</i> .	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and CHEMICALLY ACTIVE METALS (such	
DOT#: UN 2291	Use water spray to keep fire-exposed containers	as POTASSIUM, SODIUM, MAGNESIUM and ZINC).	
ERG Guide #: 151	cool.		
Hazard Class: 6.1			
(Poison)			

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

- OSHA: NIOSH: ACGIH: IDLH LEVEL:
- 0.05 mg/m³, 8-hr TWA (as *Lead*) 0.05 mg/m³, 10-hr TWA (as *Lead*) 0.05 mg/m³, 8-hr TWA (as *Lead*) 100 mg/m³ (as *Lead*)

Odor Threshold: Flash Point: Water Solubility: Melting Point: N/A Not combustible Insoluble 1,857^oF (1,014^oC)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Latex, Rubber	
Coveralls:	DuPont <i>Tyvek</i> ®	
Boots:	Latex, Butyl, Neoprene	
Respirator:	Latex, Butyl, Neoprene <0.5 mg/m ³ - N100	
	>0.5 mg/m ³ - full facepiece APR with High Efficiency filters	
	>50 mg/m ³ but <u><</u> 100 mg/m ³ Supplied Air	

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	No Information
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	Inorganic <i>Lead</i> compounds may cause lung, brain, stomach and kidney cancer in humans.
	Metallic taste, colic, muscle cramps Damage to the nervous system

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Remove contaminated clothing. Wash contaminated skin with soap and water.



Common Name: LEAD STEARATE

Synonyms: Stearic Acid, Lead Salt CAS No: 7428-48-0 Molecular Formula: Pb $(C_{18}H_{35}O_2)_2$ RTK Substance No: 1111 Description: White powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	Lead Stearate is not compatible with POTASSIUM; STRONG BASES (such as SODIUM HYDROXIDE
1 - Fire	POISONOUS FUMES ARE PRODUCED IN FIRE.	and POTASSIUM HYDROXIDE); and OXIDIZING
0 - Reactivity	including Lead Oxides.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
DOT#: UN 3077	Use water spray to keep fire-exposed containers cool.	CHLORINE, BROMINE and FLUORINE).
ERG Guide #: 171		
Hazard Class: 9		
(Miscellaneous		
Hazardous Material)		

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

OSHA:0.05 mg/m³, 8-hr TWA (as Lead)NIOSH:0.05 mg/m³, 10-hr TWA (as Lead)ACGIH:0.05 mg/m³, 8-hr TWA (as Lead)IDLH LEVEL:100 mg/m³ (as Lead)

HEAL	ТН Е	FFEC	CTS

Eyes:	No Information
Skin:	No Information
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	Inorganic Lead compounds may cause lung, brain, stomach, and kidney cancer in humans. Metallic taste, colic, muscle cramps Damage to the nervous system

Odor Threshold:	Slightly fatty odor	
Flash Point:	>450°F (232°C)	
LEL:	N/A	
UEL:	N/A	
Vapor Pressure:	1 mm Hg at 1,783°F (973°C)	
Relative Vapor Density:	26.7 (calculated) (air = 1)	
Specific Gravity:	1.3 to 1.4	
Water Solubility:	Very slightly soluble	
Melting Point:	240°F (116°C)	

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Latex, Rubber
Coveralls:	DuPont Tyvek® and Tychem® Polycoat, QC, CPF-1, SL, and CPF-2
Boots:	Butyl, Neoprene
Respirator:	<0.5 mg/m ³ - N100
	>0.5 mg/m ³ - full facepiece APR with High Efficiency filters
	>50 mg/m ³ but <u><</u> 100 mg/m ³ - Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: LEAD SUBACETATE

Synonyms: Basic Lead Acetate; BLA CAS No: 1335-32-6 Molecular Formula: $C_4H_{10}O_8Pb_3$ RTK Substance No: 2999 Description: White, heavy powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of	Lead Subacetate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC);	
0 - Fire	surrounding fire. Lead Subacetate itself does not burn.	OXIDIZING AGENTS (such as PERCHLORATES,	
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);	
DOT#: UN 1616	including Lead Oxides and Acetic Acid.	STRONG BASES (such as SODIUM HYDROXIDE and	
ERG Guide #: 151	Use water spray to keep fire-exposed containers	POTASSIUM HYDROXIDE); AMMONIA; AMINES; CRESOLS; ISOCYANATES; CHLORAL HYDRATE;	
Hazard Class: 6.1	cool.	SULFIDES; SALICYLIC ACID; TANNIN; CITRATES;	
(Poison)		EPICHLOROHYDRIN; SULFITES; RESORCINOL; and TARTRATES.	

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

ACGIH: OSHA: NIOSH: IDLH LEVEL: 0.05 mg/m³, 8-hr TWA (as *Lead*) 0.05 mg/m³, 10-hr TWA (as *Lead*) 0.05 mg/m³, 8-hr TWA (as *Lead*) 100 mg/m³ (as *Lead*)

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	No Information
Acute:	Headache, irritability, upset stomach and weakenss
Chronic:	Inorganic <i>Lead</i> compounds may cause lung, brain, stomach and kidney cancer in humans.
	Metallic taste, colic, muscle cramps
	Damage to the nervous system

PHYSICAL PROPERTIES		
Odor Threshold:	Odorless	
Flash Point:	Not combustible	
LEL:	N/A	
UEL:	N/A	
Vapor Density:	No Information	
Vapor Pressure:	No Information	
Water Solubility:	Slightly soluble	
Boiling Point:	Decomposes at 392°F (200°C)	
Melting Point:	167 [°] F (75 [°] C)	

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile, Latex, Rubber
Coveralls:	DuPont <i>Tyvek</i> ®
Boots:	Latex, Butyl, Neoprene
Respirator:	<0.5 mg/m ³ - N100
	>0.5 mg/m ³ - full facepiece APR with High Efficiency filters
	>50 mg/m ³ but <u><</u> 100 mg/m ³ Supplied Air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Remove** contaminated clothing and wash contaminated skin with soap and water.
- Transfer to a medical facility.



Common Name: LEAD SULFIDE

Synonyms: Plumbous Sulfide; Galena CAS No: 1314-87-0 Molecular Formula: PbS RTK Substance No: 1113 Description: Silvery metallic, crystalline material or a black powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of	Lead Sulfide is incompatible with HYDROGEN
0 - Fire	surrounding fire. Lead Sulfide itself does not burn. DO NOT USE water jet, use water spray or fog.	PEROXIDE and IODINE CHLORIDE.
0 - Reactivity	POISONOUS FUMES ARE PRODUCED IN FIRE.	
DOT#: UN 3077	including Lead Oxides and Sulfur Oxides.	
ERG Guide #: 171	CONTAINERS MAY EXPLODE IN FIRE.	
Hazard Class: 9	Use water spray to keep fire-exposed containers cool.	
(Miscelleaneous		
Hazardous Material)		

Odor Threshold:

Vapor Pressure:

Specific Gravity:

Water Solubility:

Boiling Point:

Flash Point:

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

OSHA: NIOSH: ACGIH:

IDLH LEVEL:

0.05 mg/m³, 8-hr TWA (as *Lead*) 0.05 mg/m³, 10-hr TWA (as *Lead*) 0.05 mg/m³, 8-hr TWA (as *Lead*) 100 mg/m³

Melting Point	t: 2,037°F (1,114°C)
	PROTECTIVE EQUIPMENT
Gloves: Coveralls: Boots:	Nitrile, Latex, Rubber DuPont Tyvek® and Tychem® Polycoat, QC, CPF-1, SL and CPF-2
Respirator:	Butyl, Neoprene <0.5 mg/m ³ - N100 >0.5 mg/m ³ - full facepiece APR with High Efficiency

PHYSICAL PROPERTIES

1 mm Hg at 1,565°F (852°C)

No information

7.5 (air = 1)

Insoluble

Noncombustible

2,338°F (1,281°C)

	HEALTH EFFECTS
Eyes:	No information
Skin:	No information
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	Inorganic Lead compounds may cause lung, brain, stomach and kidney cancer in humans.
	Metallic taste, colic, and muscle cramps Damage to the nervous system

FIRST AID AND DECONTAMINATION

>50 mg/m³ but <100 mg/m³ - Supplied Air

Remove the person from exposure.

filters

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: LEAD SULPHATE

Synonyms: Lead Monosulfate; Fast White CAS No: 7446-14-2 Molecular Formula: PbSO₄ RTK Substance No: 1114 Description: Odorless, white, crystalline powder

		НА	ZARD	DATA
Hazard Rat	ing Firefighting	Firefighting		Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1 ERG Guide # Hazard Class	 Extinguish fire using an agent type of surrounding fire. Lea itself does not burn. POISONOUS FUMES ARE P FIRE, including <i>Lead Oxides</i>. 794 Use water spray to keep fire-e containers cool. 	Extinguish fire using an agent suitable for type of surrounding fire. Lead Sulphate itself does not burn. POISONOUS FUMES ARE PRODUCED IN FIRE, including Lead Oxides and Sulfur Oxides. Use water spray to keep fire-exposed		Lead Sulphate react with METALS (such as POTASSIUM, MAGNESIUM and ALUMINUM) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
	SPILL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: 25 to 50 meters (80 to 160 feet) Moisten spilled material first or use a HEPA-filter vacuum for clean-up. Toxic to aquatic organisms. Hazardous to the environment and persists in the environment. EXPOSURE LIMITS OSHA: 0.05 mg/m ³ , 8-hr TWA (as <i>Lead</i>) NIOSH: 0.05 mg/m ³ , 8-hr TWA (as <i>Lead</i>) ACGIH: 0.05 mg/m ³ (as <i>Lead</i>) IDLH LEVEL: 100 mg/m ³ (as <i>Lead</i>)			Flash Po LEL: UEL: Specific	N/A N/A Gravity: 6.2 olubility: Slightly soluble Point: 2,138°F (1,170°C) PROTECTIVE EQUIPMENT Nitrile, Latex, Rubber Is: DuPont Tyvek® and Tychem® Polycoat, QC, CPF-1, SL and CPF-2 tor: Butyl, Neoprene <0.5 mg/m ³ - N100 >0.5 mg/m ³ - full facepiece APR with High Efficiency filters
н	EALTH EFFECTS		F	>50 mg/m ³ but <100 mg/m ³ - Supplied Air
_	evere irritation and burns			the person from exposure.
Skin: Ir Acute: H a Chronic: Ir Iu Iu N Chronic: Chronic: Ir	ritation, burns, rash, pigment changes leadache, irritability, upset stomach, nd weakness norganic Lead compounds may cause ing, brain, stomach, and kidney cancer i humans. letallic taste, colic, and muscle ramps. lamage to the nervous system		Flush ey contact Quickly large an	ves with large amounts of water for at least 15 minutes. Remove lenses if worn. remove contaminated clothing and wash contaminated skin with nounts of soap and water. Seek medical attention immediately. r to a medical facility.



Common Name: LEAD THIOCYANATE

Synonyms: Lead Dithiocyanate; Lead Sulfocyanate CAS No: 592-87-0 Molecular Formula: Pb (SCN)₂ RTK Substance No: 1115 Description: White to yellow crystalline powder

HAZARD DATA

Hazard Rating Firefighting		Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of	Lead Thiocyanate may react explosively with OXIDIZING AGENTS (such as PERCHLORATES,	
0 - Fire	surrounding fire. Lead Thiocyanate itself does not burn.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Lead Thiocyanate is not comptabile with STRONG	
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Lead Oxides, Sulfur Dioxides, Nitrogen		
DOT#: UN 2291	Oxides and Cyanides.	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG REDUCING AGENTS (such as	
ERG Guide #: 151	Use water spray to keep fire-exposed containers cool.	SODIUM, MAGNESIUM, and ALUMINUM); METAL	
Hazard Class: 6.1		HYDRIDES; and FINELY POWDERED METALS.	
(Poison)			

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXPOSURE LIMITS

OSHA: NIOSH: ACGIH:

IDLH LEVEL:

0.05 mg/m³, 8-hr TWA (as *Lead*) 0.05 mg/m³, 10-hr TWA (as *Lead*) 0.05 mg/m³, 8-hr TWA (as *Lead*) 100 mg/m³ (as *Lead*)

HEALTH EFFECTS Eyes: Irritation Skin: No Information

Acute: Headache, irritability, upset stomach, and weakness
 Chronic: Inorganic *Lead* compounds may cause lung, brain, stomach, and kidney cancer in humans. Metallic taste, colic, muscle cramps Damage to the nervous system

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Not combustible
LEL:	N/A
UEL:	N/A
Specific Gravity:	3.82 at 68 [°] F (20 [°] C)
Melting Point:	374 ^o F (190 ^o C) Decomposes
Water Solubility:	Slightly soluble

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Latex, Rubber
Coveralls:	DuPont <i>Tyvek</i> ®
Boots: Respirator:	Latex, Butyl, Neoprene <0.5 mg/m ³ - N100 >0.5 mg/m ³ - full facepiece APR with High Efficiency filters >50 mg/m ³ but <u><100 mg/m³ Supplied Air</u>

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing. Wash contaminated skin with soap and water.



Inhalation:

Headache, dizziness, weakness, nausea, vomiting, loss of coordination

and judgment, coma and death

Common Name: LIQUEFIED PETROLEUM GAS

Synonyms: Autogas; Bottled Gas; L.P.G.; Liquefied Hydrocarbon Gas CAS No: 68476-85-7 Molecular Formula: C₃H₈/C₃H₆/C₄H₁₀/C₄H₈ RTK Substance No: 1118 Description: Colorless, odorless gas when pure, commonly used and shipped as a liquefied, compressed gas with an odorant (Methyl Mercaptan) HAZARD DATA **Hazard Rating** Reactivity Firefighting FLAMMABLE GAS 2 - Health Liquefied Petroleum Gas is not compatible with

4 - Fire 0 - Reactivity DOT#: UN 1075 ERG Guide #: 115 Hazard Class: 2	Stop flow of gas (the gas cloud is POISONOUS GASES ARE PROI CONTAINERS MAY EXPLODE II Use water spray to keep fire-expo Vapors may travel to a source of or cause a fire or explosion far fr Flow, agitation, low humidity and	DUCED IN FIRE. N FIRE. psed containers cool ignition and flash ba om the source.	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). ack
(Flammable gas)	electrostatic charges resulting in Liquefied Petroleum Gas may for	fire and/or explosion	
	vapor/air mixture in closed tanks	or containers.	
SPI	LL/LEAKS		PHYSICAL PROPERTIES
Isolation Distance: Spill: 100 meters (330 feet) Fire: 1,600 meters (1 mile) Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty. Conduct air monitoring to determine that <i>Oxygen</i> levels are above 19.5% and the Lower Explosive Limit (LEL) is not being exceeded. Use only non-sparking tools and equipment, especially when opening and closing containers of Liquefied Petroleum Gas. Keep Liquefied Petroleum Gas out of confined spaces, such as sewers, because of the possibility of an explosion. Turn leaking cylinder with leak up to prevent escape of gas in liquid state.		Odor Threshold Flash Point: LEL: UEL: Auto Ignition To Vapor Density: Vapor Pressure Specific Gravity Water Solubility Boiling Point: Ionization Pote Molecular Weig	-155°F (-104°C) Propane; -105°F (-76°C) Butane 1.9% to 2.1% 8.5% to 9.5% Temp: 761° to 871°F (405° to 466°C) 1.4 (air = 1) e: >760 mm Hg at 68°F (20°C) y: 0.51 to 0.58 (water = 1) y: Insoluble >-44°F (-42°C) ential: 10.95 eV
EXPOS	SURE LIMITS		PROTECTIVE EQUIPMENT
OSHA: 1,000 ppm, 8-hr TWA NIOSH: 1,000 ppm, 10-hr TWA ACGIH: 1,000 ppm, 8-hr TWA IDLH: 2,000 ppm The Protective Action Criteria values are: PAC-1 = 2,000 ppm PAC-3 = 2,000 ppm PAC-3 = 2,000 ppm		Gloves: Coveralls: Respirator:	Insulated Nitrile (>8-hr breakthrough for Propane) Use turn out gear or flash protection if ignition/fire is the greatest hazard! Tychem® Responder® (>8-hr breakthrough for Propane) >1,000 ppm or <19.5% Oxygen - SCBA
HEAL	TH EFFECTS	FIRS	T AID AND DECONTAMINATION
Eyes: Contact with liquid or gas causes frostbite Skin: Contact with liquid or gas causes frostbite		Flush eyes with contact lenses i	rson from exposure. I large amounts of water for at least 15 minutes. Remove if worn. Seek medical attention. ed part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Hazard Rating

3 - Health

2 - Fire

Common Name: LITHIUM

Synonym: None CAS No: 7439-93-2 Molecular Formula: Li RTK Substance No: 1119

Description: Soft, silver to grayish-white (or yellow if exposed to air), odorless metal, crystalline mass or powder

HAZARD DATA Firefighting Reactivity Lithium is a COMBUSTIBLE SOLID which is WATER REACTIVE and the powder or dust may SPONTANEOUSLY IGNITE in AIR. Finely divided Lithium particles, powder or dust may IGNITE SPONTANEOUSLY in AIR. Lithium reacts violently with MOISTURE, WATER or

Use a Class D, dry sand, Met-L-X powder, STEAM to produce heat and flammable and explosive 2-W - Reactivity graphite, or Lith-X powder as extinguishing agents. Hydrogen gas and toxic Lithium Hydroxide. DOT#: UN 1415 DO NOT USE WATER, foam, CO2, or halogenated Lithium reacts violently with OXIDIZING AGENTS (such extinguishing agents. ERG Guide #: 138 as PERCHLORATES, PEROXIDES, POISONOUS GASES ARE PRODUCED IN FIRE. PERMANGANATES, CHLORATES, NITRATES, Hazard Class: 4.3 including Lithium Dioxide and Lithium Hydroxide. CHLORINE, BROMINE and FLUORINE); (Water Reactive/ CONTAINERS MAY EXPLODE IN FIRE. COMBUSTIBLES; HALOGENATED HYDROCARBONS; Dangerous when ALCOHOLS; METALS; METAL ALLOYS; METAL wet) Use water spray to keep fire-exposed containers SALTS: STRONG ACIDS (such as HYDROCHLORIC. cool. SULFURIC and NITRIC): REDUCING AGENTS (such as DO NOT get water inside containers. SODIUM, ALUMINUM and their HYDRIDES) and many FIRE MAY RESTART AFTER IT HAS BEEN other substances. EXTINGUISHED.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Keep Lithium out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Lithium**.

HEALTH EFFECTS

Eyes: Skin:	Severe irritation and burns Severe irritation and burns	
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)	
	Headache, muscle weakness, confusion and seizures	

PHYSICAL PROPERTIES

Odorless

Odor Threshold:
Flash Point:
Auto Ignition Temp:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

354°F (179°C) 354°F (179°C) 1 mm Hg at 1,333°F (723°C) 0.53 (water = 1) Reactive 2,448°F (1,342°C) 357°F (181°C) 6.94

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene, and Silver Shield®/4H®
Coveralls:	DuPont Tyvek®
Respirator:	Low levels - APR with High efficiency filter

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Quickly brush off excess chemical from the face. Immediately flush with large amounts of water for at least 60 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. DO NOT INTERRUPT FLUSHING. Seek medical attention immediately.
 Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash gently with large amounts of water for at least 60 minutes. DO NOT INTERRUPT WASHING. Seek medical attention immediately.
 Begin artificial respiration if breathing has stopped and CPR if necessary.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: LITHIUM CARBONATE

Synonyms: Dilithium Carbonate; Carbolith CAS No: 554-13-2 Molecular Formula: Li₂CO₃ RTK Substance No: 1124 Description: White, light, odorless powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 0 - Fire 0 - Reactivity DOT#: None ERG Guide #: None Hazard Class: None	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE including <i>Lithium Oxides</i> . Use water spray to keep fire-exposed containers cool. May ignite combustibles (wood, paper and oil).	Lithium Carbonate reacts violently with FLUORINE. Lithium Carbonate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); REDUCING AGENTS; COMBUSTIBLES; ORGANICS; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and CALCIUM HYDROXIDE.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers.

Can harm the aquatic environment.

EXPOSURE LIMITS

No occupational exposure limits have been established.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	2.1 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	2,390°F (1,310°C)
Melting Point:	1,144°F (618°C)
pH:	11.2
Molecular Weight:	73.89

	PROTECTIVE EQUIPMENT
Gloves:	Rubber
Coveralls:	DuPont Tychem® Polycoat, QC, CPF 1, SL and CPF 2 or equivalent for <i>dry pharmaceutical chemicals</i>
Respirator:	APR with High efficiency filters, or Supplied air

NATION

minutes. Remove

taminated skin with

d CPR if

nay be delayed.

Inhalation:Nose, throat and lung irritation with coughing and shortness of breath (pulmonary edema) Headache, muscle twitching, confusion and seizurescontact lenses if worn. Quickly remove contaminated clothing and wash cor large amounts of soap and water. Begin artificial respiration if breathing has stopped ar necessary. Transfer to a medical facility.	HEALTH EFFECTS		FIRST AID AND DECONTAMI
	Skin:	Irritation, itching and rash Nose, throat and lung irritation with coughing and shortness of breath (pulmonary edema) Headache, muscle twitching, confusion	 Flush eyes with large amounts of water for at least 15 contact lenses if worn. Quickly remove contaminated clothing and wash conta large amounts of soap and water. Begin artificial respiration if breathing has stopped and necessary.



Common Name: LITHIUM CHROMATE

Synonyms: Dilithium Chromate; Chromium Lithium Oxide CAS No: 14307-35-8 Molecular Formula: Li_2CrO_4 RTK Substance No: 1125 Description: Yellow, odorless powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Lithium Chromate itself does	Lithium Chromate is an OXIDIZER which can react with ORGANICS; COMBUSTIBLES; REDUCING AGENTS
0 - Fire	not burn.	(such as LITHIUM, SODIUM, ALUMINUM and their
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lithium Oxides and Chromium Oxides</i> .	HYDRIDES); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
DOT#: UN 3077	Use water spray to keep fire-exposed containers	Mixtures of <i>Chromate</i> and ZIRCONIUM can be explosive.
ERG Guide #: 171	cool.	
Hazard Class: 5.1	Lithium Chromate may ignite combustibles (wood, paper and oil).	
(Oxidizer)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)Fire: 800 meters (1/2 mile)Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.DO NOT wash into sewer.

May be detrimental to aquatic life.

EXPOSURE LIMITS

OSHA: 0.005 mg/m³, 8-hr TWA NIOSH: 0.001 mg/m³, 10-hr TWA ACGIH: 0.05 mg/m³, 8-hr TWA IDLH: 15 mg/m³ (as *Chromates*) All of the above are for *hexavalent Chromium* (*Cr VI*)

HEALTH EFFECTS

Eyes: Skin:	Severe irritation and burns Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and wheezing
	Nausea, muscle cramps and convulsions
Chronic:	Hexavalent Chromium or Chromium VI compounds cause lung cancer in humans

PHYSICAL PROPERTIES

Odorless
Nonflammable
5.72 (air = 1)
2.2 (water = 1)
Soluble
166°F (75°C)
130

PROTECTIVE EQUIPMENT

Gloves:	Neoprene and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	>0.001 mg/m ³ - APR with High efficiency filters >0.01 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: LITHIUM HYPOCHLORITE

Synonyms: Lithium Chloride Oxide; Lithium Oxychloride CAS No: 13840-33-0 Molecular Formula: LiOCI RTK Substance No: 1129 Description: White, granular solid or tablet with a *Chlorine* odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 2 - Reactivity DOT#: UN 1471 ERG Guide #: 140 Hazard Class: 5.1 (Oxidizer)	 Lithium Hypochlorite is REACTIVE and a DANGEROUS EXPLOSION HAZARD. Lithium Hypochlorite is not combustible but is a STRONG OXIDIZER which enhances the combustion of other substances. Use water in flooding quantities only. DO NOT USE CHEMICAL or CO₂ as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Lithium Oxides</i> and <i>Chlorine</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Lithium Hypochlorite may ignite combustibles (wood, paper and oil). 	Lithium Hypochlorite decomposes in WATER and HEAT, and reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC), to form toxic <i>Chlorine gas</i> . Lithium Hypochlorite reacts explosively with HYDROCARBONS (such as FUELS and GASOLINE). Lithium Hypochlorite reacts with AMMONIA and UREA to produce flammable and explosive <i>Nitrogen Trichloride</i> . Lithium Hypochlorite is not compatible with METALS and COMBUSTIBLES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Lithium Hypochlorite is highly toxic to fish and the aquatic environment.

EXPOSURE LIMITS

No occupational exposure limits have been established for Lithium Hypochlorite.

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, muscle twitching, confusion and seizures

PHYSICAL PROPERTIES

Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Melting Point: Molecular Weight: *Chlorine* odor Noncombustible 0.9 to 1 (water = 1) Soluble Decomposes at 275°F (135°C) 58.4

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Natural Rubber and Polyethylene
Coveralls:	Tyvek®
Respirator:	Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.
- Transfer promptly to a medical facility.



Common Name: LITHIUM NITRATE

Synonyms: Nitric Acid, Lithium Salt CAS No: 7790-69-4 Molecular Formula: LiNO₃ RTK Substance No: 1130 Description: Colorless or white, crystalline powder or granule

Hazard Rating	Firefighting	Reactivity
2 - Health	Lithium Nitrate is not combustible but is a STRONG OXIDIZER which enhances the	Lithium Nitrate reacts violently or explosively with REDUCING AGENTS (such as LITHIUM, SODIUM,
0 - Fire	combustion of other substances.	ALUMINUM and PHOSPHORUS) and OXIDIZING
0 - Reactivity	May explode with HEAT, SHOCK, FRICTION or IMPACT.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
DOT#: UN 2722	Use water only. DO NOT USE CHEMICAL or	CHLORINE, BROMINE and FLUORINE).
ERG Guide #: 140	CO ₂ extinguishing agents.	Lithium Nitrate reacts with COMBUSTIBLES and ORGANIC MATERIALS to cause fires and explosions.
Hazard Class: 5.1 (Oxidizer)	EIDE including Nitrogon Oxidos	Mixtures of Lithium Nitrate with ALKYL ESTERS form explosive ALKYL NITRATES.
	CONTAINERS MAY EXPLODE IN FIRE.	Lithium Nitrate is not compatible with STRONG ACIDS
	Use water spray to keep fire-exposed containers cool.	(such as HYDROCHLORIC, SULFURIC and NITRIC); CYANIDE COMPOUNDS; HYPOPHOSPHITES; and TIN
	Lithium Nitrate may ignite combustibles (wood, paper and oil).	CHLORIDE.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Use only non-sparking tools and equipment, especially when opening and closing containers of Lithium Nitrate.

EXPOSURE LIMITS

No occupational exposure limits have been established for Lithium Nitrate.

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, muscle twitching, confusion and seizures

PHYSICAL PROPERTIES

Flash Point:	Nonflammable
Specific Gravity:	2.5 (water = 1)
Water Solubility:	Soluble
Boiling Point:	1,112°F (600°C)
Melting Point:	491°F (255°C)
Molecular Weight:	68.9
pH:	7

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: MAGNESIUM

Synonyms: None CAS No: 7439-95-4 Molecular Formula: Mg RTK Substance No: 1136 Description: Light, silvery-white metal which can be in the form of a gray powder, thin sheet or chip

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 1 - Fire 1 - Reactivity DOT#: UN 1869 UN 1418 (powder) ERG Guide #: 138 Hazard Class: 4.1 and 4.3 UN 1869 (Flammable) UN 1418 (Water Reactive)	 Magnesium POWDER, SHEETS and CHIPS MAY SPONTANEOUSLY IGNITE on contact with AIR or MOISTURE. Use Class D fire extinguishers or dry sand, clay, graphite, or limestone to fight fires. DO NOT USE WATER, CO₂, foam or halogenated extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. FIRE MAY RESTART AFTER IT HAS BEEN EXTINGUISHED. 	 Finely divided Magnesium reacts with WATER, MOISTURE, STEAM and ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to release flammable and explosive Hydrogen gas. Finely divided Magnesium ignites on contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and AMMONIA; and reacts vigorously or explosively (and may form explosive compounds) with ACETYLENIC COMPOUNDS (such as ACETYLENE and ETHYLENE OXIDE); HALOCARBONS (such as CHLOROFORM and CHLOROMETHANE); AMMONIA NITRATE; CARBONATES; ARSENIC; METAL OXIDES; METAL SULFATES; OXYGEN; METAL CYANIDES; PHOSPHATES, and many other substances. Magnesium is AIR and MOISTURE sensitive.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fires: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner, or use a HEPA-filter vacuum, and deposit in sealed containers.

DO NOT wash into sewer.

EXPOSURE LIMITS

	15 mg/m ³ , 8-hr TWA
NIOSH:	
	10 mg/m ³ , 8-hr TWA
IDLH:	750 mg/m ³
	All of the above are for Magnesium Oxide

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and difficulty in breathing
	Headache, fever and chills, chest tightness

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Auto Ignition Temp:
Vapor Density:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Molecular Weight:

Odorless Flammable powder 883°F (473°C) 1.7 (air = 1) 1 mm Hg at 1,149°F (621°C) 1.74 (water = 1) Insoluble, Reactive 2,012°F (1,100°C) 24.3

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber	
Coveralls:	DuPont Tyvek®	
Respirator:	>10 mg/m ³ - APR with High efficiency filter >100 mg/m ³ - Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: MAGNESIUM NITRATE

Synonyms: Magnesium Dinitrate; Nitromagnesite CAS No: 10377-60-3 Molecular Formula: MgN₂O₆ RTK Substance No: 1143 Description: Odorless, colorless or white, crystalline solid

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
2 - Health 0 - Fire	Magnesium Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.	Magnesium Nitrate may react violently with COMBUSTIBLES; ORGANIC MATERIALS; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
1 - Reactivity	Flood with water. POISONOUS GASES ARE PRODUCED IN FIRE,	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and	
DOT#: UN 1474 ERG Guide #: 140	including <i>Nitrogen Oxides</i> and <i>Magnesium Oxides</i> . Use water spray to keep fire-exposed containers	their HYDRIDES); and DIMETHYLFORMAMIDE, causing fires and explosions.	
Hazard Class: 5.1 (Oxidizer)	 cool. Magnesium Nitrate may ignite combustibles (wood, paper and oil). May be sensitive to impact when contaminated with Organic Material. 	Magnesium Nitrate is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); METAL POWDERS; CYANIDES; TIN CHLORIDE; NITRILES; and PHOSPHORUS COMPOUNDS.	
		Protect from HEAT, SPARKS, SHOCK and FRICTION.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Magnesium Nitrate**.

The Protective Action Criteria values are: PAC-1 = 30 mg/m^3

 $PAC-2 = 50 \text{ mg/m}^3$

PAC-3 = 250 mg/m³

HEALTH EFFECTS

Eyes:Irritation and burnsIrritation and burnsSkin:Nose and throat irritation with coughing
and wheezing.Inhalation:Headache, fatigue and blue color to the
skin and lips (methemoglobinemia)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	0.5 mm Hg at 77°F (25°C)
Specific Gravity:	1.46 (water = 1)
Water Solubility:	Soluble
Boiling Point:	626°F (330°C) (Decomposes)
Melting Point:	192°F (89°C)
Molecular Weight:	148.3

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with P100 filters

>30 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: MALEIC ANHYDRIDE

Headache, dizziness, nausea and

vomiting

Synonyms: cis-Butenedioic Anhydride; Maleic Acid Anhydride CAS No: 108-31-6 Molecular Formula: C₄H₂O₃ RTK Substance No: 1152 Description: Colorless, needle-like, crystalline, flake, pellet or lumpy, fused mass with a strong, irritating odor

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	ŀ	HAZARD [DATA	
Hazard Rating	Firefighting		Reactivit	v
3 - Health 1 - Fire 1 - Reactivity DOT#: UN 2215 ERG Guide #: 156 Hazard Class: 8 (Corrosive)	COMBUSTIBLE SOLID Use CO ₂ , water spray or alcohol-r foam as extinguishing agents. DO NOT USE DRY CHEMICAL C STREAMS OF WATER. POISONOUS GASES ARE PROE FIRE. CONTAINERS MAY EXPLODE IN	OMBUSTIBLE SOLIDSee CO2, water spray or alcohol-resistant pam as extinguishing agents.O NOT USE DRY CHEMICAL OR SOLID TREAMS OF WATER.DISONOUS GASES ARE PRODUCED IN IRE.ONTAINERS MAY EXPLODE IN FIRE.Se water spray to keep fire-exposedMaleic Anhydride reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) may cause fires and explosions.Maleic Anhydride reacts with WATER to release HEAT and Maleic Acid.Maleic Anhydride is not compatible with ALKALI		
SP	ILL/LEAKS			SICAL PROPERTIES
vacuum for clean-up for disposal. Use only non-sparkir	2 mile) rial first or use a HEPA-filter and place into sealed containers of tools and equipment, especially losing containers of Maleic	Vapor De Vapor Pro Specific (Water So Boiling P Melting P	int: nsity: essure: Gravity: lubility: oint: Point: n Potential:	0.32 ppm 218°F (103°C) 1.4% 7.1% 890°F (477°C) 3.4 (air = 1) 0.2 mm Hg at 68°F (20°C) 1.5 (water = 1) Soluble/Reactive 396°F (202°C) 127°F (53°C) 9.9 eV 98.1
EXPO	SURE LIMITS			
OSHA: 0.25 ppm, 3 NIOSH: 0.25 ppm, 3 ACGIH: 0.0025 ppm IDLH: 2.5 ppm The Protective Action PAC-1 = 0.2 ppm;	10-hr TWA n, 8-hr TWA	Gloves: Coveralls Respirato	: DuPo	Shield®/4H® (>4-hr breakthrough) nt Tychem® Responder® (>8-hr breakthrough) 25 ppm - SCBA
HEAL	.TH EFFECTS	F	IRST AID	AND DECONTAMINATION
Skin: Irritatio Inhalation: Nose, coughi	n and burns n and burns throat and lung irritation with ng and severe shortness of breath nary edema)	Flush eye contact le Quickly re large amo	enses if worn. emove contan ounts of water	mounts of water for at least 15 minutes. Remove Seek medical attention immediately. ninated clothing and wash contaminated skin with

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.

June 2016



Common Name: MANGANESE

Synonyms: Colloidal Manganese CAS No: 7439-96-5 Molecular Formula: Mn RTK Substance No: 1155 Description: Pure **Manganese** is a silver or grey-white, brittle solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2- Health	Manganese powder and dust are FLAMMABLE and DANGEROUS FIRE HAZARDS.	<i>Finely divided</i> Manganese <i>dust</i> can ignite spontaneously in AIR.
3 (powder)- Fire	Use sand or dry chemicals appropriate for	Manganese reacts with STRONG ACIDS (such as
1- Reactivity	extinguishing metal fires.	HYDROCHLORIC, SULFURIC and NITRIC), and slowly
DOT#: UN 3089	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Manganese Oxides</i> .	with WATER or STEAM, to produce flammable and explosive <i>Hydrogen gas</i> .
ERG Guide #: 170	Manganese powder and dust may form an	Manganese may react with OXIDIZING AGENTS (such
Hazard Class: 4.1 (Flammable solid)	ignitable vapor/air mixture in closed tanks or containers. Use water spray to keep fire-exposed containers cool.	as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); NITROGEN DIOXIDE; PHOSPHORUS; and SULFUR DIOXIDE to cause ignition and/or violent decomposition.

PHYSICAL PROPERTIES

 Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal. Ground and bond containers when transferring Manganese powder. Use only non-sparking tools and equipment. DO NOT wash into sewer. Manganese may be hazardous to the environment, especially to aquatic organisms. 	Flash Point:Flammable powder and dustAuto Ignition Temp: $842^{\circ}F (450^{\circ}C) (Dust)$ Vapor Pressure:0 mm Hg at $68^{\circ}F (20^{\circ}C)$ Specific Gravity:7.2 (water = 1)Water Solubility:InsolubleBoiling Point: $3,564^{\circ}F (1,962^{\circ}C)$ Melting Point: $2,271^{\circ}F (1,244^{\circ}C)$ Molecular Weight:54.9
EXPOSURE LIMITS	PROTECTIVE EQUIPMENT
OSHA: 5 mg/m ³ , Ceiling NIOSH: 1 mg/m ³ , 8-hr TWA; 3 mg/m ³ , STEL ACGIH: 0.2 mg/m ³ (<i>inhalable</i>); 0.02 mg/m ³ (<i>respirable</i>), 8-hr TWA	Gloves: Nitrile and Neoprene Coveralls: Tyvek® Use turn out gear or flash protection if ignit

IDLH: 500 mg/m³ The Protective Action Criteria values are:

PAC-1 = 3 mg/m³ PAC-2 = 5 mg/m³ PAC-3 = 500 mg/m³

SPILL/LEAKS

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, fever and chills, aches, chest tightness and cough ("metal fume fever")

Gloves:	Nitrile and Neoprene
Coveralls:	Tyvek® Use turn out gear or flash protection if ignition/fire is the greatest hazard.
Respirator:	Spill - full facepiece APR with <i>P100 filters</i> Fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: MERCURIC CHLORIDE

Synonyms: Mercury Dichloride; Perchloride of Mercury CAS No: 7487-94-7 Molecular Formula: HgCl₂ RTK Substance No: 1170

Description: Odorless, white crystal or powder

HAZARD DATA					
Hazard Rating	Firefighting			Reac	tivity
3 - Health 0 - Fire 1 - Reactivity DOT#: UN 1624 ERG Guide #: 154 Hazard Class: 6.1 (Poison)	 Mercuric Chloride itself does not burn but may explode if exposed to heat, shock or friction. Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine</i>, <i>Hydrogen Chloride</i>, <i>Mercury</i> and <i>Mercury Oxides</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. 		SHOC LITHI ACET Mercu AGEN PERN BROM HYDF BASE HYDF ANTII Mercu when	ric Chloride may explode with HEAT, FRICTION, CK or on contact with ALKALI METALS (such as JM, SODIUM and POTASSIUM); SULFIDES; YLENE; AMMONIA; and OXALIC ACID. ric Chloride is not compatible with OXIDIZING ITS (such as PERCHLORATES, PEROXIDES, IANGANATES, CHLORATES, NITRATES, CHLORINE, MINE and FLUORINE); STRONG ACIDS (such as COCHLORIC, SULFURIC and NITRIC); STRONG S (such as SODIUM HYDROXIDE and POTASSIUM COXIDE); FORMATES; PHOSPHATES; CARBONATES; MONY; BROMIDES; and BORAX. ric Chloride is decomposed by SUNLIGHT and reacts in solution with STAINLESS and CARBON STEELS, S and BRONZE.	
SP	ILL/LEAKS	Π		F	PHYSICAL PROPERTIES
Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) For clean-up, use a specialized charcoal-filtered vacuum. DO NOT wash into sewer. Mercuric Chloride is very toxic to aquatic organisms.			Odor Three Flash Poin Vapor Pres Specific Ge Water Solu Boiling Po Melting Po Molecular pH:	t: ssure: ravity: ibility: int: int:	Odorless Nonflammable 1 mm Hg at 277°F (136°C) 5.4 (water = 1) Soluble 576°F (302°C) 529°F (276°C) 271.5 4.7
EXPC	SURE LIMITS			P	ROTECTIVE EQUIPMENT
NIOSH: 0.05 mg/m^3 , 10-hr TWA (as Mercury vapor) 0.1 mg/m^3 , Ceiling (as Mercury)ACGIH: 0.025 mg/m^3 , 8-hr TWA (as Mercury)IDLH: 10 mg/m^3 (as Mercury)The Protective Action Criteria values are: PAC-1 = 2 mg/m^3PAC-3 = 13.5 mg/m^3PAC-2 = 13.5 mg/m^3			Gloves: Coveralls: Respirator	bi T <u>:</u> : >(fo	utyl, Nitrile, Neoprene, PVC, Silver Shield®/4H® (>8-hr eakthrough for <i>Mercury</i>) /chem® fabrics 0.025 mg/m ³ - full facepiece APR with cartridges specific r <i>Mercury</i> 2 mg/m ³ - SCBA
HEALTH EFFECTS			FI	RST	AID AND DECONTAMINATION
Eyes:Irritation and burnsSkin:Irritation and burns, skin rash, itching and gray skin colorInhalation:Nose, throat and lung irritation with coughing, wheezing and shortness of breath Nausea, vomiting and tremorsChronic:Cancer (thyroid) in animals			Flush eyes contact len Quickly rer large amou Begin artifi	with lar ses if w nove co unts of s cial resp	n from exposure. ge amounts of water for at least 15 minutes. Remove orn. Seek medical attention. ntaminated clothing and wash contaminated skin with oap and water. iration if breathing has stopped and CPR if necessary. to a medical facility.



Common Name: MERCURIC CYANIDE

Synonyms: Dicyanomercury; Mercury Cyanide CAS No: 592-04-1 Molecular Formula: C₂HgN₂ RTK Substance No: 1171

Description: Odorless, clear or white, crystalline powder

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Mercuric Cyanide itself does	Mercuric Cyanide is slowly decomposed by WATER and LIGHT, and reacts rapidly with STRONG ACIDS (such as		
0 - Fire	not burn.	HYDROCHLORIC, SULFURIC and NITRIC), to form		
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Mercury</i> , <i>Mercury Oxides</i> , <i>Hydrogen</i> <i>Cyanide</i> and <i>Nitrogen Oxides</i> .	flammable and poisonous <i>Hydrogen Cyanide gas</i> . Mercuric Cyanide reacts violently or explosively with OXIDIZING AGENTS (such as PERCHLORATES,		
DOT#: UN 1636				
ERG Guide #: 154	Use water spray to keep fire-exposed containers	PEROXIDES, PERMANGANATES, CHLORATES,		
Hazard Class: 6.1	cool.	NITRATES, CHLORINE, BROMINE and FLUORINE); MAGNESIUM; LIQUID HYDROGEN CYANIDE; SODIUM		
(Poison)		NITRATE; and SODIUM NITRITE.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

For clean-up, use a specialized charcoal-filtered vacuum. Do not disturb spilled material.

DO NOT wash into sewer.

Mercuric Cyanide is harmful to aquatic life at low concentrations.

EXPOSURE LIMITS

- NIOSH: 0.05 mg/m³, 10-hr TWA (as *Mercury vapor*) 0.1 mg/m³, Ceiling (as *Mercury*) 5 mg/m³ (4.7 ppm), 15-min STEL (as *Hydrogen Cyanide*)
- IDLH: 10 mg/m³ (as *Mercury*); 50 ppm (as *Hydrogen Cyanide*)

The Protective Action Criteria values for Mercuric Cyanide are:

PAC-1 = 1.5 mg/m^3 PAC-3 = 12.6 mg/m^3

PAC-2 = 12.6 mg/m³

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns, skin rash, itching and gray skin color
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Nausea, vomiting and tremors

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	4 (water = 1)
Water Solubility:	Slightly soluble (mixes slowly)
Boiling Point:	Decomposes
Melting Point:	Decomposes
Ionization Potential:	11.6 eV (for Hydrogen Cyanide)
Molecular Weight:	252.6

PROTECTIVE EQUIPMENT

Gloves:	Neoprene, Nitrile, Barrier® and Silver Shield®/4H® (>8-hr breakthrough for <i>Mercury</i> and <i>Hydrogen Cyanide</i>)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for <i>Mercury</i> and <i>Hydrogen Cyanide</i>)
Respirator:	>1.5 mg/m ³ - SCBA (for <i>solid</i> Mercuric Cyanide) Use SCBA for fires or if Mercuric Cyanide is heated

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Use** *Amyl Nitrite* capsules if symptoms of *Cyanide* poisoning develop. **Transfer** promptly to a medical facility.



Common Name: MERCURIC OXIDE

Synonyms: Yellow Oxide of Mercury; Mercury Monoxide CAS No: 21908-53-2 Molecular Formula: HgO RTK Substance No: 2537 Description: Yellow to orange-yellow, odorless, crystalline powder

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Mercuric	Mercuric Oxide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,	
0 - Fire	Oxide itself does not burn but may	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);	
0 - Reactivity DOT#: UN 1641	intensify a fire. POISONOUS GASES ARE PRODUCED IN FIRE, including	COMBUSTIBLES; PETROLEUM HYDROCARBONS; HYDROGEN PEROXIDE; DISULFUR DICHLORIDE; HYDROGEN TRISULFIDE; ACETYL NITRATE; and DIBORON	
ERG Guide #: 151	Mercury vapor. Use water spray to keep fire-exposed	TETRAFLUORIDE. Mercuric Oxide forms shock-sensitive compounds with METALS	
Hazard Class: 6.1 containers cool.	containers cool.	(such as POTASSIUM, SODIUM, MAGNESIUM and ZINC). Mercuric Oxide is not compatible with STRONG ACIDS (such as	
	Mercuric Oxide may ignite combustibles (wood, paper and oil).	HYDROCHLORIC, SULFURIC and NITRIC); ETHANOL; and HYDRAZINE HYDRATE.	

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile)	
Use special <i>Mercury vapor</i> suppressants or special vacuums for spill collection.	
DO NOT wash into sewer.	
Will accumulate in aquatic organisms.	
Severe marine pollutant.	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Specific Gravity:	11.1 (water =1)
Water Solubility:	Very slightly soluble
Boiling Point:	Decomposes
Melting Point:	Decomposes at 932°F (500°C)
Molecular Weight:	216.54

EXPOSURE LIMITS

OSHA:	0.1 mg/m³, 8-hr TWA	
NIOSH:	0.05 mg/m ³ , 10-hr TWA; 0.1 mg/m ³ , Ceiling	
ACGIH:	0.025 mg/m ³ , 8-hr TWA	
IDLH:	10 mg/m ³	
PAC	PAC-1 = 1.5 mg/m ³ ; PAC-2 = 16 mg/m ³ ;	
LEVELS:	$PAC-3 = 30 \text{ mg/m}^3$	

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns, skin rash, itching and gray skin color
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath Nausea, vomiting and tremors

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H®	
Coveralls:	DuPont Tychem® Polycoat, QC, CPF 1, SL and CPF 2; Kappler® Zytron® 300; and Saint-Gobain OneSUIT® TEC	
Respirator:	>0.05 mg/m ³ - APR with filter specific for <i>Mercury</i> >0.5 mg/m ³ - Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. **Transfer** to a medical facility.



Common Name: MERCURIC SULFATE

Synonyms: Mercury Bisulfate; Mercury Persulfate CAS No: 7783-35-9 Molecular Formula: HgSO₄ RTK Substance No: 1177 Description: Odorless, white, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Mercuric Sulfate itself does	Mercuric Sulfate decomposes when exposed to WATER to form corrosive Sulfuric Acid.		
0 - Fire	not burn.	Mercuric Sulfate reacts violently with HYDROGEN CHLORIDE.		
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Mercury Oxides</i> and <i>Sulfur</i>	Mercuric Sulfate is not compatible with ACETYLENE; AMMONIA; ORGANIC MATERIALS; REDUCING AGENTS (such as LITHIUM,		
DOT#: UN 1645	Oxides.	SODIUM, ALUMINUM and their HYDRIDES); STRONG ACIDS		
ERG Guide #: 151	CONTAINERS MAY EXPLODE IN FIRE.	(such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); NITROMETHANE; and		
(Foison)		BUTYNEDIOL. Mercuric Sulfate is corrosive to METALS (such as IRON, MAGNESIUM, ZINC, LEAD and COPPER).		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Use special Mercury vapor suppressants or charcoal-filtered vacuum for spill collection.

DO NOT wash into sewer.

Mercuric Sulfate is harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

0.1 mg/m³, 8-hr TWA OSHA:

- NIOSH: 0.05 mg/m³, 10-hr TWA 0.1 mg/m³, Ceiling
- ACGIH: 0.025 mg/m³, 8-hr TWA

 10 mg/m^3 IDLH:

The Protective Action Criteria values are: $PAC-1 = 0.037 \text{ mg/m}^3$ $PAC-2 = 0.148 \text{ mg/m}^3$ $PAC-3 = 14.8 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns, rash, and itching
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Nausea, vomiting and metallic taste in the mouth

PHYSICAL PROPERTIES			
Odor Threshold:	Odorless		
Flash Point:	Nonflammable		
Specific Gravity:	6.47 (water = 1)		
Water Solubility:	Decomposes/Reacts		
Boiling Point:	Decomposes		
Molecular Weight:	296.6		

PR	ΟΤΕСΤ	IVE	EQUIPME	ENT

Gloves:	Butyl, Nitrile, Neoprene, Natural Rubber, PVC, Silver Shield®/4H® and Viton (>8-hr breakthrough for <i>Mercury</i>)
Coveralls:	Tychem® SL, CPF 3, BR, Responder® and TK (>8-hr breakthrough for <i>Mercury</i>)
Respirator:	 >0.025 mg/m³ - Full facepiece APR with filters specific for Mercury >2.5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: MERCURY, ELEMENTAL AND INORGANIC COMPOUNDS

Synonyms: Colloidal Mercury; Quicksilver CAS No: 7439-97-6 Molecular Formula: Hg RTK Substance No: 1183 Description: Heavy, silvery, liquid metal

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Mercury itself	Mercury reacts with ACETYLENE to form explosive <i>Acetylide</i> . Mercury can form explosive compounds with AMMONIA and will	
0 - Fire	does not burn.	explode when mixed with CHLORINE DIOXIDE; OXIDIZING	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE,	
DOT#: UN 2809	Use water spray to keep fire-exposed	BROMINE and FLUORINE); STRONG ACIDS (such as	
ERG Guide #: 172	containers cool.	HYDROCHLORIC, SULFURIC and NITRIC); and METHYL AZIDE.	
Hazard Class: 8 (Corrosive)		Mercury is not compatible with COMBUSTIBLE MATERIALS; METALS (such as ALUMINUM and COPPER); CALCIUM; SODIUM CARBIDE; AMINES; LITHIUM; and RUBIDIUM.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 500 meters (1/3 mile)

Cover spill with a *Sulfur compound* to prevent vaporization and collect with a charcoal filter vacuum.

Use *Zinc* or *Copper flakes* and a flashlight to check for remaining **Mercury** after clean-up.

Mercury is very toxic to aquatic life and bioaccumulates.

EXPOSURE LIMITS

NIOSH:0.05 mg/m³, 10-hr TWA (as Mercury vapor)
0.1 mg/m³, Ceiling (as Mercury)ACGIH:0.025 mg/m³, 8-hr TWA (as Mercury)IDLH:10 mg/m³ (as Mercury)

The Protective Action Criteria values are:

PAC-1 = 0.3 mg/m^3

PAC-2 = 2.05 mg/m^3

PAC-3 = 4.1 mg/m^3

HEALTH EFFECTS

Eyes: Skin: Inhalation:	Irritation Irritation Nose, throat and lung irritation with coughing, wheezing and/or shortness of breath
	Nausea, vomiting and abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Density:	6.9 (air = 1)
Vapor Pressure:	0.002 mm Hg at 77°F (25°C)
Specific Gravity:	13.6 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	674°F (357°C)
Melting Point:	-38°F (-39°C)
Ionization Potential:	10.4 eV
Molecular Weight:	200.6

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Neoprene, Polyvinyl Chloride, Silver Shield®/4H® and Viton (>8-hr breakthrough)
Coveralls:	Tychem® fabrics (>8-hr breakthrough)
Respirator:	 >0.025 mg/m³ - full facepiece APR with cartridges specific for Mercury >0.3 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: METHANE

Synonyms: Biogas; Fire Damp; Marsh Gas; Methyl Hydride CAS No: 74-82-8 Molecular Formula: CH₄ RTK Substance No: 1202

Description: Colorless and odorless gas or a liquid under pressure

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
2 - Health	FLAMMABLE GAS Stop flow of gas or allow to burn.	Methane reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
4 - Fire	Methane is an explosion hazard in enclosed areas.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).		
0 - Reactivity DOT#: UN 1971	<i>Liquefied</i> Methane floats on water and boils. The vapor cloud produced is FLAMMABLE.	Methane can react violently with <i>boiling</i> WATER and <i>cold</i> WATER.		
ERG Guide #: 115	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.	<i>Liquefied</i> Methane combined with <i>liquefied</i> OXYGEN can form an explosive mixture.		
Hazard Class: 2.1 (Flammable gas)	Use water spray to keep fire-exposed containers cool.			
(1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Vapors may travel to a source of ignition and flash back.			

SPILL/LEAKS

Isolation Distance:

Spill: 100 meters (330 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Ground and bond all metal containers when transferring **Methane** and use non-sparking tools and equipment.

Turn leaking cylinder with leak up to prevent escape of gas in liquid state.

Keep **Methane** out of confined spaces, such as sewers, because of the possibility of an explosion.

Methane is NOT harmful to aquatic life.

EXPOSURE LIMITS

ACGIH: Maintain 19.5% Oxygen content

The Protective Action Criteria values are: PAC-1 = 65,000 ppm PAC-2 = 230,000 ppm PAC-3 = 400,000 ppm

HEALTH EFFECTS

- **Eyes:** No information available
- Skin: Contact with *liquefied* gas can cause frostbite
- Inhalation: Headache, dizziness, weakness, nausea, vomiting, loss of coordination, increased breathing rate and loss of consciousness (ASPHYXIANT)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	-306 °F (-188 °C)
LEL:	5%
UEL:	15%
Auto Ignition Temp:	999 °F (537 °C)
Vapor Density:	0.55 (air = 1)
Vapor Pressure:	>760 mm Hg at 68 °F (20 °C)
Specific Gravity:	0.42 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	-259 °F (-162 °C)
Freezing Point:	-296.5 °F (-183 °C)
Critical Temp:	-116.5 °F (-82.5 °C)
Ionization Potential:	12.51 eV
Molecular Weight:	16.04

PROTECTIVE EQUIPMENT		
Gloves:	Insulated materials	
Coveralls:	Tychem® CSM (>8-hr breakthrough) Use turn out gear or flash protection if ignition/fire is the greatest hazard!	
Respirator:	< 19.5% Oxygen - SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes.

Immerse affected part in warm water. Seek medical attention.



Common Name: METHIDATHION

Synonyms: DMTP; Supracide CAS No: 950-37-8 Molecular Formula: C₆H₁₁N₂O₄PS₃ RTK Substance No: 1206 Description: Colorless, odorless, crystalline solid which is often dissolved in a flammable or combustible liquid carrier

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Solid Methidathion does not burn, however it is often dissolved in a liquid carrier which may be	Methidathion is not compatible with WATER as it may decompose.
1 - Fire	flammable or combustible.	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> , <i>Sulfur Oxides</i> and	
DOT#: UN 2783	Phosphorus Oxides.	
ERG Guide #: 152	Use water spray to keep fire-exposed containers	
Hazard Class: 6.1	cool.	
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill (solid): 25 meters (75 feet)

Spill (liquid): 60 meters (200 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit into sealed containers. Moisten spilled *solid* material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Very toxic to aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Methidathion**.

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation
Inhalation:	Headache, dizziness, constriction of the pupils (miosis) with blurred vision, muscle twitching, loss of coordination, convulsions and death
	Nausea, vomiting and abdominal pain
Chronic:	Cancer (lung) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible (solid)
Vapor Pressure:	1 x 10 ⁻⁶ mm Hg at 68°F (20°C)
Specific Gravity:	1. 5 (water = 1)
Water Solubility:	Soluble (degrades)
Freezing Point:	102° to 104°F (39° to 40°C)
Molecular Weight:	302.3

	PROTECTIVE EQUIPMENT
Gloves:	Polyvinyl Alcohol, Polyvinyl Chloride, Silver Shield $@/4H$ and Viton (>4-hr breakthrough)
Coveralls:	DuPont Tychem® BR, LV, Responder® and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Organophosphorus compounds</i>)
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.



Common Name: 2-METHOXYETHYL ACETATE

Synonyms: EGMEA; Methyl Cellosolve® Acetate CAS No: 110-49-6 Molecular Formula: $C_5H_{10}O_3$ RTK Substance No: 1212 Description: Colorless liquid with a pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray, alcohol-	2-Methoxyethyl Acetate reacts slowly with WATER to form Acetic Acid and Methyl Alcohol.
2 - Fire 0 - Reactivity	resistant foam or other foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE.	2-Methoxyethyl Acetate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
DOT#: UN 1189 ERG Guide #: 129 Hazard Class: 3	Use water spray to keep fire-exposed containers cool.	NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and STRONG ACIDS (such
(Flammable)		as HYDROCHLORIC, SULFURIC and NITRIC).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep 2-Methoxyethyl Acetate out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

2-Methoxyethyl Acetate is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA:	25 ppm, 8-hr	TWA
NIOSH:	0.1 ppm, 10-	hr TWA
ACGIH:	0.1 ppm, 8-h	r TWA
IDLH:	200 ppm	
The Prote	ective Action C	riteria values are:
PAC-1	= 0.3 ppm	PAC-3 = 200 ppm

PAC-1 = 0.3 ppm

PAC-2 = 20 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
	Initation
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, vomiting, dizziness, confusion, lightheadedness, and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.64 ppm
Flash Point:	120°F (49°C)
LEL:	1.5%
UEL:	12.3 %
Auto Ignition Temp:	740°F (393°C)
Vapor Density:	4.1 (air = 1)
Vapor Pressure:	2 mm Hg at 68°F (20°C)
Specific Gravity:	1.01 (water = 1)
Water Solubility:	Soluble
Boiling Point:	293°F (145°C)
Freezing Point:	-85°F (-65°C)
Molecular Weight:	118.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H®, and Barrier® (>4-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>8-hr breakthrough)
Respirator:	>0.1 ppm - Supplied air >0.3 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.
- Medical observation is recommended as symptoms may be delayed.



Common Name: METHYL ALCOHOL

Synonyms: Carbinol; Methanol; Wood Alcohol CAS No: 67-56-1 Molecular Formula: CH₃OH RTK Substance No: 1222 Description: Colorless liquid with a slightly sweet, strong odor

	HAZARD DA	ТА
Hazard Rating	Firefighting	Reactivity
1 - Health 3 - Fire	Methyl Alcohol is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , water spray or alcohol-resistant	Methyl Alcohol reacts violently or explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE,
0 - Reactivity	foam as extinguishing agents. Water may not be effective in fighting fires.	BROMINE and FLUORINE); ALKYL ALUMINUM SALTS; ACETYL BROMIDE; CHROMIC ANHYDRIDE; MIXTURES of
DOT#: UN 1268 ERG Guide #: 131	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	CHLOROFORM and SODIUM HYDROXIDE; PHOSPHORUS TRIOXIDE; MIXTURES of SULFURIC ACID and HYDROGEN PEROXIDE; ISOCYANATES; METALS (such as LEAD,
Hazard Class: 3 (Flammable liquid)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source and flash back.	MAGNESIUM and POTASSIUM); and NITRIC ACID. Methyl Alcohol attacks some PLASTICS, RUBBERS and COATINGS.
	Methyl Alcohol may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment.

Metal containers involving the transfer of **Methyl Alcohol** should be grounded and bonded.

Keep **Methyl Alcohol** out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

 OSHA:
 200 ppm, 8-hr TWA

 NIOSH:
 200 ppm, 10-hr TWA; 250 ppm Ceiling

ACGIH: 200 ppm, 8-hr TWA; 250 ppm Ceiling IDLH: 6,000 ppm

The Protective Action Criteria values are: PAC-1 = 530 ppm PAC-2 = 2,100 ppm

PAC-1 = 550 ppm PAC-2 = 2,100 ppm PAC-3 = 7,200 ppm

HEALTH EFFECTS

Eyes:	Irritation, blurred vision and blindness.
	Irritation
Skin:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Inhalation:	Headache, dizziness, drowsiness, loss of consciousness and death

PHYSICAL PROPERTIES

Odor Threshold:	100 to 1,500 ppm
Flash Point:	52°F (11°C)
LEL:	6%
UEL:	36%
Auto Ignition Temp:	867°F (464°C)
Vapor Density:	1.1 (air = 1)
Vapor Pressure:	96 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Soluble
Boiling Point:	147°F (64°C)
Melting Point:	-144°F (-97.8°C)
Ionization Potential:	10.84 eV
Molecular Weight:	32.04

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® SL, CSM and TK; Trellchem® HPS and VPS (>8-hr breakthrough) Use turn out gear or flash protection if ignition/fire is the greatest hazard.
Respirator:	>200 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

 $\ensuremath{\text{Begin}}$ artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: METHYL AMYL ALCOHOL

Synonyms: Methyl Isobutyl Carbinol; 4-Methyl-2-Pentanol CAS No: 108-11-2 Molecular Formula: $C_6H_{14}O$ RTK Substance No: 1228 Description: Clear, colorless liquid with a mild odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-	Methyl Amyl Alcohol reacts violently with POTASSIUM BUTOXIDE. Methyl Amyl Alcohol is not compatible with OXIDIZING AGENTS
2 - Fire	resistant foam as extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); CTRONG 40092 (such as LIVED 2014) (SUCH FUEL 2014);
DOT#: UN 2053	cool and to disperse vapors.	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID CHLORIDES; NITROGEN COMPOUNDS; and
ERG Guide #: 129	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	HALOGENATED HYDROCARBONS (such as METHYLENE CHLORIDE and 1,1,1-TRICHLOROETHANE).
Hazard Class: 3	Methyl Amyl Alcohol may form an ignitable	Methyl Amyl Alcohol may form <i>explosive peroxides</i> when distilled,
(Flammable)	vapor/air mixture in closed tanks or containers.	evaporated or concentrated. Methyl Amyl Alcohol may accumulate static electricity.

SPILL/LEAKS

Isolation Distance:

OSHA:

NIOSH:

ACGIH:

IDLH:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Amyl Alcohol**.

Keep **Methyl Amyl Alcohol** out of confined spaces, such as sewers, because of the possibility of an explosion.

n.		Molecular We		102.
EXPOSURE LIMITS	ור		PRO	TEC
25 ppm, 8-hr TWA		Gloves:	Butyl, I (>8-hr	•
25 ppm, 10-hr TWA; 40 ppm, STEL 25 ppm, 8-hr TWA; 40 ppm, STEL		Coveralls:	Tycher	

HEALTH EFFECTS

400 ppm

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, lightheadedness, and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.07 ppm
Flash Point:	106°F (41°C)
LEL:	1%
UEL:	5.5%
Auto Ignition Temp:	858°F (459°C)
Vapor Density:	3.5 (air = 1)
Vapor Pressure:	3 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	266° to 271°F (130° to 133°C)
Freezing Point:	-130°F (-90°C)
Molecular Weight:	102.2

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Neoprene, SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>25 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

April 2010



Common Name: METHYL BENZOATE

Synonyms: Methyl Benzenecarboxylate; Niobe Oil CAS No: 93-58-3 Molecular Formula: $C_8H_8O_2$ RTK Substance No: 1230 Description: Colorless, oily liquid with a pleasant, fruity odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ or foam as extinguishing	Methyl Benzoate may react with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM
2 - Fire 0 - Reactivity	agents. Water spray may be used to blanket fire. DO NOT USE solid water jets.	HYDROXIDE) and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to form flammable and explosive <i>Hydrogen gas</i> .
DOT#: UN 2938 ERG Guide #: 152	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers	Methyl Benzoate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
Hazard Class: 6.1 (Poison)	cool.	CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
		Methyl Benzoate decomposes slowly on contact with WATER.

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Benzoate**.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- PAC-1 = 6 ppm
- PAC-2 = 40 ppm
- PAC-3 = 75 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Pleasant, fruity odor
Flash Point:	181°F (83°C)
Vapor Density:	4.7 (air = 1)
Vapor Pressure:	1 mm Hg at 102°F (39°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	302°F (150°C)
Freezing Point:	10°F (-12°C)
Ionization Potential:	9.3 +/- 2 eV
Molecular Weight:	136.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile, Polyvinyl Alcohol, and Viton (>8-hr breakthrough for <i>Esters, Carboxylic</i>)
Coveralls:	Tychem® F, BR, LV, Responder®, and TK (>8-hr breakthrough for <i>Esters, Carboxylic</i>)
Respirator:	>6 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: METHYL n-BUTYL KETONE

Synonyms: Butyl Methyl Ketone; MBK; Propylacetone CAS No: 591-78-6 Molecular Formula: $C_6H_{12}O$ RTK Substance No: 1280 Description: Colorless liquid with an *Acetone*-like odor

HAZA	ΑΤΑ

Hazard Rating	Firefighting	Reactivity	
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1224	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. Water may not be effective in fighting fires and solid streams of water may spread fire.	Methyl n-Butyl Ketone reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Methyl n-Butyl Ketone is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and	
ERG Guide #: 127 Hazard Class: 3	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers	POTASSIUM HYDROXIDE) and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).	
(Flammable)	cool. Methyl n-Butyl Ketone may form an ignitable vapor/air mixture in closed tanks or containers.	-,	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl n-Butyl Ketone**.

Keep **Methyl n-Butyl Ketone** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 1 ppm, 10-hr TWA

ACGIH: 5 ppm, 8-hr TWA; 10 ppm, STEL IDLH: 1,600 ppm

The Protective Action Criteria values are: PAC-1 = 10 ppm PAC-2 = 1,500 ppm PAC-3 = 1,600 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezingHeadache, dizziness, lightheadedness,
and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.076 to 3 ppm
Flash Point:	77°F (25°C)
LEL:	1.2%
UEL:	8%
Auto Ignition Temp:	795°F (423°C)
Vapor Density:	3.5 (air = 1)
Vapor Pressure:	3.8 mm Hg at 77°F (25°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	262°F (128°C)
Freezing Point:	-70.4 (-56.9°C)
Ionization Potential:	9.34 eV
Molecular Weight:	100.18

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Polyvinyl Alcohol, Silver Shield®/4H®, and Barrier® (>8-hr breakthrough for <i>Ketones</i>)
Coveralls:	Tychem® F, BR, Responder®, and TK; Trellchem® HPS and VPS (>8-hr breakthrough for <i>Ketones</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: METHYL CHLOROFORM

Synonyms: Methyltrichloromethane; 1,1,1-Trichloroethane CAS No: 71-55-6 Molecular Formula: $C_2H_3Cl_3$ RTK Substance No: 1237 Description: Colorless liquid with an *Ether*-like odor

HAZARD DATA			
Firefighting	Reactivity		
Methyl Chloroform is nonflammable, but Methyl Chloroform <i>vapors</i> in containers can explode. Jse dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phosgene</i> and <i>Hydrogen Chloride</i> . CONTAINERS MAY EXPLODE IN FIRE. Jse water spray to keep fire-exposed containers cool.	Methyl Chloroform reacts violently with CHEMICALLY ACTIVE METALS and their ALLOYS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); DINITROGEN TETRAOXIDE; OXYGEN; and LIQUID OXYGEN. Methyl Chloroform reacts slowly with WATER to form toxic and corrosive Hydrogen Chloride gas. Methyl Chloroform is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and ACETONE. Keep Methyl Chloroform away from high energy sources, open flames or are welding as extremely toxic <i>Phosgene</i> and		
	ethyl Chloroform is nonflammable, but Methyl chloroform vapors in containers can explode. se dry chemical, CO ₂ , water spray or foam as xtinguishing agents. DISONOUS GASES ARE PRODUCED IN FIRE, icluding <i>Phosgene</i> and <i>Hydrogen Chloride</i> . ONTAINERS MAY EXPLODE IN FIRE. se water spray to keep fire-exposed containers		

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Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Methyl Chloroform is harmful to aquatic life.

EXPOSURE LIMITS

 OSHA:
 350 ppm, 8-hr TWA

 NIOSH:
 350 ppm, 15-min Ceiling

 ACGIH:
 350 ppm, 8-hr TWA; 450 ppm, Ceiling

 IDLH:
 700 ppm

The Protective Action Criteria values are:

PAC-1 = 230 ppm PAC-2 = 600 ppm

PAC-3 = 4,200 ppm

HEALTH EFFECTS

- Eyes:Irritation and burnsSkin:Irritation and burns
- Inhalation: Nose and throat irritation, headache, dizziness, lightheadedness and passing out. Higher levels can cause coma and death.

PHYSICAL PROPERTIES

Odor Threshold:	120 ppm
Flash Point:	>200°F (93.3°C)
LEL:	7%
UEL:	16%
Auto Ignition Temp:	932°F (500°C)
Vapor Density:	4.6 (air = 1)
Vapor Pressure:	100 mm Hg at 68°F (20°C)
Specific Gravity:	1.34 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	165°F (74°C)
Freezing Point:	-22°F (-30°C)
Ionization Potential:	11.0 eV
Molecular Weight:	133.42

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol, SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® CPF3, BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>230 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.





Common Name: METHYL CHLOROSILANE

Synonym: Chloromethylsilane CAS No: 993-00-0 Molecular Formula: CH₅ClSi RTK Substance No: 1240

Description: Colorless gas with a distinctive odor

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health	FLAMMABLE AND REACTIVE GAS Extinguish fire only if flow can be stopped.	Methyl Chlorosilane may react violently with WATER; MOIST AIR; OXIDIZING AGENTS (such as		
4 - Fire	Use dry chemical, CO_2 , alcohol-resistant foam or	PERCHLORATES, PEROXIDES, PERMANGANATES,		
2-W - Reactivity	other foam extinguishing agents, as water may not	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM		
DOT#: UN 2534	be effective in fighting fires. Water may form flammable and toxic gases.	HYDROXIDE and POTASSIUM HYDROXIDE); STRONG		
ERG Guide #: 119	POISONOUS GASES ARE PRODUCED IN FIRE,	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and ORGANIC ACIDS (such as ACETIC ACID)		
Hazard Class: 2.3	including Hydrogen Chloride and Phosgene.	to form flammable and toxic Hydrogen Chloride and		
(Toxic gas)	CONTAINERS MAY EXPLODE IN FIRE.	Hydrogen gases.		
	Vapors may travel to a source of ignition and flash back.	Methyl Chlorosilane attacks many METALS in the presence of WATER and MOISTURE.		

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)

- Large Spill: 300 meters (1,000 feet)
- Fire: 1,600 meters (1 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Chlorosilane**.

Keep **Methyl Chlorosilane** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

The Protective Action Criteria values are:

- PAC-1 = 1.8 ppm
- PAC-2 = 22 ppm

PAC-3 = 100 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose, throat and lung irritation, with
coughing, wheezing and shortness of
breath

PHYSICAL PROPERTIES

Odor Threshold:	Distinctive odor
Flash Point:	16° to 55°F (-9° to 13°C)
Vapor Pressure:	137 mm Hg at 68°F (20°C)
Water Solubility:	Insoluble/Reactive
Molecular Weight:	80.6

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H®, Viton and Barrier® (>4-hr breakthrough for <i>Organo-Silicon compound</i> s)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>8-hr breakthrough for <i>Organo-Silicon compound</i> s)
Respirator:	>1.8 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: 4,4'-METHYLENEBIS(2-CHLOROANILINE)

Synonyms: Benzenamine, 4,4'-Methylenebis[2-Chloro-; MBOCA; MOCA CAS No: 101-14-4 Molecular Formula: $C_{13}H_{12}Cl_2N_2$ RTK Substance No: 1250 Description: Colorless to light brown crystalline solid or pellet with a faint odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
3 - Health	4,4'-Methylenebis(2-Chloroaniline) may burn, but does not readily ignite.	4,4'-Methylenebis(2-Chloroaniline) is not compatible with CHEMICALLY ACTIVE METALS (such as		
1 - Fire	Use dry chemical, CO ₂ , water spray or foam as	POTASSIUM, SODIUM, MAGNESIUM and ZINC).		
0 - Reactivity	extinguishing agents.			
DOT#: None	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Nitrogen Oxides</i> .			
ERG Guide #: 152	CONTAINERS MAY EXPLODE IN FIRE.			
Hazard Class: None	Use water spray to keep fire-exposed containers cool.			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 0.003 mg/m³, 10-hr TWA

ACGIH: 0.11 mg/m³, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 12.5 mg/m³

 $PAC-2 = 75 \text{ mg/m}^{3}$

PAC-3 = 500 mg/m³

HEALTH EFFECTS	
Irritation and burns	

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)
Chronic:	Cancer (bladder) in humans

PHYSICAL PROPERTIES

Odor Threshold:	Faint amine-like odor
Flash Point:	Combustible
Vapor Pressure:	2.86 x 10 ⁻⁷ mm Hg at 77°F (25°C)
Specific Gravity:	1.44 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	396°F (202°C)
Melting Point:	210° to 225°F (99° to 107°C)
Molecular Weight:	267.2

PROTECTIVE EQUIPMENT Gloves: Silver Shield®/4H® (>8 hr breakthrough in solution) Coveralls: Tyvek (solids) and Tychem® SL, BR, CSM and TK (>8-hr breakthrough in solution) Respirator: Spill: full facepiece APR with P100 filters for solids Fire: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. R	emove
contact lenses if worn.	

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 4,4'-METHYLENEBIS(N,N-DIMETHYLBENZENAMINE)

Synonyms: 4,4'-Bis(Dimethylamino)Diphenylmethane; Michler's Base CAS No: 101-61-1 Molecular Formula: $C_{17}H_{22}N_2$ RTK Substance No: 1252 Description: Odorless, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	4,4'-Methylenebis(N,N-Dimethylbenzenamine) is not compatible with OXIDIZING AGENTS (such as
1 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Reactivity	including Nitrogen Oxides.	CHLORATES, NITRATES, CHLORINE, BROMINE and
DOT#: None	Use water spray to keep fire-exposed containers cool.	FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID
ERG Guide #: None		CHLORIDES; and ACID ANHYDRIDES.
Hazard Class: None		

SPILL/LEAKS

Isolation Distance:

Spill: 30 meters (100 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

No information about affects on aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established for **4**,**4**'-**Methylenebis(N,N-Dimethylbenzenamine)**.

HEALTH EFFECTS		
Eyes: Skin:	Irritation Irritation	
Inhalation:	Nose and throat irritation	
	Headache, fatigue, dizziness and a blue color to the skin and lips (methemoglobinemia)	
Chronic:	Cancer (liver and thyroid) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	411°F (211°C)
Vapor Density:	8.8 (air = 1)
Vapor Pressure:	0.000075 mm Hg at 68°F (20°C)
Water Solubility:	Insoluble
Boiling Point:	734°F (390°C)
Melting Point:	194° to 196°F (90° to 91°C)
Molecular Weight:	254.4

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	Full facepiece APR with High efficiency filter or Supplied air

FIRST AID AND DECONTAMINATION

 $\label{eq:resonance} \textbf{Remove} \text{ the person from exposure}.$

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

September 2008



September 2016

Common Name: METHYLENE CHLORIDE

Synonyms: Dichloromethane; Methylene Dichloride CAS No: 75-09-2 Molecular Formula: CH₂Cl₂ RTK Substance No: 1255 Description: Colorless, volatile liquid with a sweet odor

HAZARD DATA						
Hazard Ra	ting	Firefighting			React	ivity
Initial ConstraintPrincing filling2 - HealthMethylene Chloride may burn, burreadily ignite.1 - FireUse dry chemical, CO2, water spratering ishing agents.0 - ReactivityPOISONOUS GASES ARE PRODErincluding Hydrogen Chloride and Use water spray to keep fire-export cool.Hazard Class: 6.1(Poison)		oray o DU(d <i>Ph</i>	or foam as CED IN FIRE, <i>losgene.</i>	AGEN PERM CHLOI ACTIV MAGN (such a HYDR Methyl	ene Chloride reacts violently with OXIDIZING TS (such as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE); CHEMICALLY E METALS (such as POTASSIUM, SODIUM, IESIUM and ALUMINUM); and STRONG BASES as SODIUM HYDROXIDE and POTASSIUM OXIDE). ene Chloride is not compatible with LIQUID EN; TITANIUM; and AMINES.	
	SPI	LL/LEAKS			PH	SICAL PROPERTIES
similar mater DO NOT was Methylene C	30 meters 50 meters eters (1/2 r s in vermi rial and pla sh into sev chloride m . Special	(200 feet) nile) culite, dry sand, earth, or a ace into sealed containers. ver. hay be hazardous in the attention should be given to	*	Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point Melting Point Ionization Poi Molecular We	Temp: /: re: ity: ity: : tential:	25 to 150 ppm Nonflammable 13% 23% 1,033°F (556°C) 2.9 (air = 1) 440 mm Hg at 77°F (25°C) 1.3 (water = 1) Very slightly soluble 104°F (40°C) -142°F (-97°C) 11.32 eV 85
E	EXPOS				PRO	TECTIVE EQUIPMENT
NIOSH: Lo ACGIH: 50 IDLH: 2,3 PAC: PA	west feas ppm, 8-h 300 ppm	ppm; PAC-2 560 ppm;		Gloves: Coveralls: Respirator:	breakth Tychen TEC; a	yl Alcohol and Silver Shield®/4H® (>8-hr hrough) n® Responder® and TK; Zytron® 500; ONESuit® nd Trellchem® HPS and VPS (>8-hr breakthrough) m - Supplied air
HEALTH EFFECTS			FIRS		O AND DECONTAMINATION	
Eyes: Skin: Inhalation: Chronic:	Irritation Nose, the coughing breath Headach lightheac	and burns and burns roat and lung irritation with g, wheezing and shortness of ne, nausea, fatigue, dizziness, ledness, and unconsciousness liver and lung) in animals		contact lenses Quickly removing large amounts Begin artificial	th large a s if worn. /e contar s of soap respirati	amounts of water for at least 30 minutes. Remove Seek medical attention. minated clothing and wash contaminated skin with





Common Name: METHYL ETHYL KETONE PEROXIDE

Synonyms: 2-Butanone Peroxide; MEKP; MEK Peroxide CAS No: 1338-23-4 Molecular Formula: C₈H₁₆O₄ RTK Substance No: 1259 Description: Colorless to yellow liquid with a fragrant, mint-like odor, usually sold in 60% solution (with a *Phthalate* diluent) to prevent explosions

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
3 - Health	Methyl Ethyl Ketone Peroxide is a COMBUSTIBLE and REACTIVE LIQUID that may burn slowly at first, and	Methyl Ethyl Ketone Peroxide (not in solution or diluted) decomposes explosively at temperatures above 230°F (110°C)	
2 - Fire	after heating can burn violently and explosively.	or if exposed to SHOCK or FRICTION.	
4 - Reactivity DOT#: UN 3101 ERG Guide #: 146 Hazard Class: 5.2	Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Methyl Ethyl Ketone Peroxide is a STRONG OXIDIZER that may ignite or explode on contact with other substances.	Methyl Ethyl Ketone Peroxide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); COMBUSTIBLES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such as	
(Organic Peroxide)		LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); ORGANICS; METALS (such as IRON, STEEL, COPPER and ALUMINUM, and their ALLOYS). Methyl Ethyl Ketone Peroxide is not compatible with MINERAL ACIDS; COBALT COMPOUNDS; AMINES; and ACETONE.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquid with fly ash, cement powder or commercial sorbents and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Ethyl Ketone Peroxide**.

Keep **Methyl Ethyl Ketone Peroxide** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 0.2 ppm, Ceiling

ACGIH: 0.2 ppm, Ceiling

The Protective Action Criteria values are:

PAC-1 = 3 ppm PAC-3 = 20 ppm

PAC-2 = 20 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, and burns with possible damage
Skin: Inhalation:	Severe irritation and burns Nose, throat and lung irritation, with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Fragrant, min
Flash Point:	125° to 200°F
Auto Ignition Temp:	1,051°F (566
Vapor Density:	6.7 (air = 1)
Vapor Pressure:	<0.01 mm Hg
Specific Gravity:	1.12 (water =
Water Solubility:	Soluble
Boiling Point:	244°F (1 18°0
	(110°C)
Molecular Weight:	176.2

Fragrant, mint-like odor 125° to 200°F (52° to 93°C) 1,051°F (566°C) 6.7 (air = 1) <0.01 mm Hg at 68°F (20°C) 1.12 (water = 1) Soluble 244°F (1 18°C), violent d ecomposition at 2 30°F (110°C) 176.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene and Viton (>4-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>8-hr breakthrough for <i>Peroxides</i>)
Respirator:	>0.2 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: METHYL ISOAMYL KETONE

Synonyms: Isopentyl Methyl Ketone; MIAK; 5-Methylhexan-2-one CAS No: 110-12-3 Molecular Formula: $C_7H_{14}O$ RTK Substance No: 1267 Description: Clear, colorless liquid with a pleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ or alcohol-resistant foam	Methyl Isoamyl Ketone reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire	extinguishing agents, as water may not be	PERMANGANATES, CHLORATES, NITRATES, CHLORINE,
0 - Reactivity	effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE.	BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE);
DOT#: UN 2302	CONTAINERS MAY EXPLODE IN FIRE.	AMINES; ALDEHYDES; and ISOCYANATES to cause fires and explosions.
ERG Guide #: 127	Use water spray to keep fire-exposed containers cool.	Methyl Isoamyl Ketone is not compatible with REDUCING
Hazard Class: 3 (Flammable)	Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and NITRIDES.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

- Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.
- Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Isoamyl Ketone**.
- Keep **Methyl Isoamyl Ketone** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA:	100 ppm, 8-hr TWA
NIOSH:	50 ppm, 10-hr TWA
ACGIH:	50 ppm, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 150 ppm	PAC-3 = 1,500 ppm

PAC-2 = 1,500 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, lightheadedness,
and passing out

PHYSICAL PROPERTIES

Odor Threshold:	0.012 ppm
Flash Point:	97°F (36°C)
LEL:	1%
UEL:	8.2%
Auto Ignition Temp:	375°F (191°C)
Vapor Density:	3.9 (air = 1)
Vapor Pressure:	5.8 mm Hg at 77°F (25°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	294°F (146°C)
Freezing Point:	-101°F (-74°C)
Ionization Potential:	9.28 eV
Molecular Weight:	114.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl (1 to 4-hrs breakthrough); Silver Shield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder®, and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Ketones</i>)
Respirator:	>50 ppm - Full facepiece APR with Organic vapor cartridges >150 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: N-METHYL-N-NITROSOETHYLCARBAMATE

Synonyms: N-Nitroso-N-Methylurethane CAS No: 615-53-2

CAS No: 615-53-2 Molecular Formula: $C_4H_8N_2O_3$ RTK Substance No: 1297 Description: Extremely volatile, light colored, yellow to pink oil with a sweet odor

HAZARD DATA

2		
Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID	N-Methyl-N-Nitrosoethylcarbamate reacts with ACTIVE METALS (such as LITHIUM, POTASSIUM and SODIUM)
2 - Fire	Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing	and NITRIDES to form flammable and explosive <i>Hydrogen</i>
1 - Reactivity	agents.	gas.
DOT#: UN 3082	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	N-Methyl-N-Nitrosoethylcarbamate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
ERG Guide #: 171	CONTAINERS MAY EXPLODE IN FIRE.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
Hazard Class: 9 (Environmentally Hazardous Material)	Use water spray to keep fire-exposed containers cool.	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
		N-Methyl-N-Nitrosoethylcarbamate is unstable and sensitive to LIGHT and HEAT.

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

Bioaccumulation in aquatic life is low.

EXPOSURE LIMITS

No occupational exposure limits have been established for **N-Methyl-N-Nitrosoethylcarbamate**.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Chronic:	Cancer (esophagus, skin, and lung) in animals

PHYSICAL PROPERTIES

Flash Point: Specific Gravity: Vapor Pressure: Water Solubility: Boiling Point:
Vapor Pressure: Water Solubility:
Water Solubility:
-
Boiling Point:
•
Molecular Weight:

Sweet odor Combustible 1.1 (water = 1) 1.18 mm Hg at 77°F (25°C) Slightly soluble 144° to 147°F (62° to 64°C) 132.1

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Silver Shield®/4H® (>8-hr breakthrough)
Coveralls:	DuPont Tychem® Responder®, CSM and TK (>8-hr breakthrough for <i>known carcinogens</i>)
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: METHYL PROPYL KETONE

Synonyms: Ethyl Acetone; MPK CAS No: 107-87-9 Molecular Formula: C₅H₁₀O RTK Substance No: 1292 Description: Clear, colorless, liquid with a strong fruity odor

HAZARD DATA				
Hazard Rating	Firefighting		Reactivity	
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1249 ERG Guide #: 127 Hazard Class: 3 (Flammable)	 Firefighting Use dry chemical, CO₂, alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapors may travel to a source of ignition and flash back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. 		Methyl Propyl Ketone reacts explosively with BROMINE TRIFLUORIDE and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Methyl Propyl Ketone is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); AMINES; ISOCYANATES; HYDROGEN PEROXIDE; ALDEHYDES; NITRIC ACID; and PERCHLORIC ACID.	
SPI	LL/LEAKS	F	PHYSICAL PROPERTIES	
similar material and d Keep Methyl Propyl k	ers (900 feet) mile) iculite, dry sand, earth, or a eposit in sealed containers. Ketone out of confined spaces, suse of the possibility of an wer.	Odor Threshold: Flash Point: LEL: UEL: Auto Ignition: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Ionization Potenti Molecular Weight		
EXPO	SURE LIMITS	PI	PROTECTIVE EQUIPMENT	
OSHA: 200 ppm, 8 NIOSH: 150 ppm, 1 ACGIH: 150 ppm, S IDLH: 1,500 ppm	0-hr TWA	Coveralls: Du Ka (> Respirator: >1: ca	tyl (<5-hr breakthrough) or Silver Shield®/4H® (>8-hr eakthrough) Pont Tychem® CPF 4, BR, LV, Responder®, TK; appler® Zytron® 300; and Saint-Gobain ONESuit® TEC 8-hr breakthrough for <i>Acetone</i>) 50 ppm - Full facepiece APR with Organic vapor irtridge ,000 ppm - Supplied air	
HEAL	TH EFFECTS	FIRST	AID AND DECONTAMINATION	
Inhalation: Nose, the coughing breath Headact	, rash, dryness and redness nroat and lung irritation with g, wheezing and shortness of he, dizziness, lightheadedness sing out	lifting upper and lo rinsing. Quickly remove co skin with large am	with large amounts of water for at least 15 minutes, ower lids. Remove contact lenses, if worn, while ontaminated clothing. Immediately wash contaminated ounts of soap and water. piration if breathing has stopped and CPR if	



Common Name: 1-METHYL-2-PYRROLIDONE

Synonyms: N-Methyl-2-Pyrrolidone CAS No: 872-50-4 Molecular Formula: C₅H₉NO RTK Substance No: 3716 Description: Colorless liquid with a mild, fishy odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	1-Methyl-2-Pyrrolidone is a COMBUSTIBLE LIQUID.	1-Methyl-2-Pyrrolidone is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
2 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-resistant	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	foam as extinguishing agents.	NITRATES, CHLORINE, BROMINE and
DOT#: UN 1993	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC);
ERG Guide #: 128	Use water spray to keep fire-exposed containers cool.	REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and
Hazard Class: 3	Vapors may travel to a source of ignition and flash back.	STRONG BASES (such as SODIUM HYDROXIDE
(Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	and POTASSIUM HYDROXIDE).

Gloves:

Coveralls:

Respirator:

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)
Large Spill: 300 meters (1,000 feet)
Fire: 800 meters (1/2 mile)
Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
DO NOT wash into sewer.
Potential for bioconcentration is low.

PHYSICAL PROPERTIES

Odor Threshold:	Mild fishy or amine odor
Flash Point:	204°F (96°C)
LEL:	1%
UEL:	9.5%
Auto Ignition Temp:	518°F (270°C)
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	0.5 mm Hg at 77°F (25°C)
Specific Gravity:	1.03 (water = 1)
Water Solubility:	Soluble
Boiling Point:	396°F (202°C)
Melting Point:	-13°F (-25°C)
Molecular Weight:	99.1

PROTECTIVE EQUIPMENT

Butyl, Neoprene over Natural Rubber, and Silver

DuPont Tychem ® fabrics; Kappler Zytron® 400; Saint-

>10 ppm - Full facepiece APR with Organic vapor filter

Gobain ONESuit® TEC for Amides (>8-hr breakthrough)

EXPOSURE LIMITS

AIHA WEEL: 10 ppm, 8-hr TWA (American Industrial Hygiene Association Workplace Environmental Exposure Level) May be absorbed through the skin.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, rash, blisters, dryness and redness
Inhalation:	Nose and throat irritation with coughing and wheezing Headache, stomach pain, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Shield®/4H®

>100 ppm - Supplied air

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.
- Transfer promptly to a medical facility.



Common Name: 2-METHYL VALERALDEHYDE

Synonyms: 2-Formyl Pentane; 2-Methyl Pentaldehyde; 2-Methyl Pentanal CAS No: 123-15-9 Molecular Formula: C₆H₁₂O RTK Substance No: 1299 Description: Colorless liquid with a strong odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 3 - Fire 1W - Reactivity DOT#: UN 2367 ERG Guide #: 130 Hazard Class: 3 (Flammable)	 FLAMMABLE AND WATER REACTIVE Use dry chemical, CO₂, water spray or foam as extinguishing agents. Solid streams of water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion and flashback far from the source. 2-Methyl Valeraldehyde may form an ignitable vapor/air mixture in closed tanks or containers. 	2-Methyl Valeraldehyde is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); AMINES; and WATER.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of 2-Methyl Valeraldehyde.

Metal containers involving the transfer of 2-Methyl Valeraldehyde should be grounded and bonded.

Keep 2-Methyl Valeraldehyde out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

No occupational exposure limits have been established for 2-Methyl Valeraldehyde.

HEALTH EFFECTS

Irritation and burns Eves: Skin: Irritation and burns Inhalation: Nose, throat and lung irritation, with coughing, wheezing and shortness of breath Headache and dizziness

PHYSICAL PROPERTIES Flash Point: 50° to 68°F (10° to 20°C)

LEL:	1.6%
UEL:	6.6%
Auto Ignition Temp:	347°F (175°C)
Vapor Density:	3.5 (air = 1)
Vapor Pressure:	9.75 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	243° to 248°F (117° to 120°C)
Freezing Point:	-148°F (-100°C)
Molecular Weight:	100.1

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Silver Shield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® F, BR, Responder®, and TK; Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: METOLACHLOR

Synonyms: Codal; Dual; Milocep; Primextra CAS No: 51218-45-2 Molecular Formula: C₁₅H₂₂CINO₂ RTK Substance No: 3374 Description: Odorless, off-white to colorless liquid when pure, and a white to tan or brown, oily liquid, with a sweet smell, in formulation

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
2 - Health	COMBUSTIBLE LIQUID Commercial formulations of Metolachlor may be	Metolachlor is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
1 - Fire	dissolved in a liquid carrier that is flammable or	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG	
0 - Reactivity	combustible. Use dry chemical, CO ₂ or foam as extinguishing	ACIDS (such as HYDROCHLORIC, SULFURIC and	
DOT#: None	agents.	NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and AZO	
ERG Guide #: 171	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Hydrogen</i>	COMPOUNDS (such as DINITROANILINE).	
Hazard Class: None	Chloride.		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Metolachlor is toxic to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for Metolachlor.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless to sweet
Flash Point:	>230°F (>110°C)
Auto Ignition Temp:	510°F (266°C)
Vapor Pressure:	1.3 x 10 ⁻⁵ mm Hg at 68°F (20°C)
Specific Gravity:	1.12 (water = 1)
Water Solubility:	Soluble
Boiling Point:	212°F (100°C)
Melting Point:	-79.8°F (-62.1°C)
Molecular Weight:	283.81

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Viton and Barrier®
Coveralls:	Tychem® F, CPF3, and TK; Trellchem® HPS and VPS (for <i>Halogen compounds, aromatic</i>)
Respirator:	Small Spill - full facepeice APR with <i>Organic vapor</i> <i>cartridge</i> Large Spill - SCBA

		FFF	готе
HEF	1 L I H	EFF	ECTS

Eyes: Irritation

Skin:

Irritation Inhalation: Nose and throat irritation with coughing and shortness of breath Headache, sweating, nausea and

vomiting, diarrhea, dizziness, tremors and convulsions

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.
- Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.
- Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: MIREX

Synonyms: Dechlorane; Ferriamicide CAS No: 2385-85-5 Molecular Formula: C₁₀Cl₁₂ RTK Substance No: 1306 Description: Odorless, white, crystalline solid

HA	ZAR	d da	TA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Mirex itself does not burn.	Mirex reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	CHLORATES, NITRATES, CHLORINE, BROMINE and
0 - Reactivity	including Hydrogen Chloride, Chlorine, Phosgene and Carbon Tetrachloride.	FLUORINE); LITHIUM; and TERTIARY BUTYL ALCOHOL.
DOT#: UN 2761	Use water spray to keep fire-exposed containers	ALCOHOL.
ERG Guide #: 151	cool.	
Hazard Class: 6.1		
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

Mirex does not degrade and will bioaccumulate.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Mirex**.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	8 x 10 ⁻⁷ mm Hg at 77°F (25°C)
Water Solubility:	Insoluble
Boiling Point:	905°F (485°C) Decomposes
Molecular Weight:	546

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield/4H® and Viton (>8-hr breakthrough for Aromatic Halogen compounds)
Coveralls:	DuPont Tychem® BR, LV, Responder® and TK; Kappler® Zytron® 500; and Saint-Gobain ONESuit®TEC (>8-hr breakthrough for <i>Aromatic Halogen compounds</i>)
Respirator:	Outside or Low Exposure - APR with Organic vapor/acid gas cartridges and High efficiency prefilters Inside or High Exposure - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

|--|

Eyes:	Irritation
Skin:	Irritation, burns with rash and redness
Inhalation:	Nose and throat irritation
	Nausea, vomiting, headache, dizziness, weakness, convulsions and passing out
Chronic:	Cancer (lung and thyroid) in animals



Common Name: MOLYBDENUM

Synonyms: None CAS No: 7439-98-7 Molecular Formula: Mo RTK Substance No: 1309 Description: Silver-white metal or a dark gray or black powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
1 - Health	Molybdenum <i>powder</i> or <i>dust</i> may be FLAMMABLE.	Molybdenum reacts violently with OXIDIZING AGENTS
0 - Fire (Solid)	Molybdenum powder or dust is an explosion	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
3 - Fire (Powder	hazard when mixed in air.	CHLORINE, BROMINE and FLUORINE) and STRONG
or Dust)	For solid Molybdenum, extinguish fire using an	ACIDS (such as HYDROCHLORIC, SULFURIC and
0 - Reactivity	agent suitable for type of surrounding fire as Molybdenum itself does not burn.	NITRIC).
DOT#: UN 3089 (Powder)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Molybdenum Oxides</i> .	
ERG Guide #: 170	CONTAINERS MAY EXPLODE IN FIRE.	
Hazard Class: 4.1 (Flammable solids)	Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

For **Molybdenum** *powder* use only non-sparking tools and equipment,

Keep **Molybdenum** *powder* and *dust* out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer as **Molybdenum** is toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

EXPOSURE LIMITS

OSHA: 15 mg/m³, 8-hr TWA (as *total dust*)

ACGIH: 3 mg/m³, 8-hr TWA (as the *respirable fraction*)

IDLH: 5,000 mg/m³

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation with coughing
and wheezing

PHYSICAL PROPERTIES

No
~0
10
In
8,
4,
95

SICAL PROPERTIES
Nonflammable solid, Flammable powder or dust
~0 mm Hg at 68°F (20°C)
10.28 (water = 1)
Insoluble
8,717°F (4,825°C)
4,752°F (2,622°C)
95.9

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >3 mg/m³ - full facepiece APR with *High efficiency filters* >30 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: MOLYBDENUM PENTACHLORIDE

Synonyms: Molybdenum Chloride CAS No: 10241-05-1 Molecular Formula: MoCl₅ RTK Substance No: 1311 Description: Green, blue, gray or black, odorless solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Molybdenum Pentachloride	Molybdenum Pentachloride reacts with WATER, STEAM, and MOISTURE to produce corrosive <i>Hydrogen</i>
0 - Fire	itself does not burn.	Chloride gas.
1 - Reactivity	DO NOT USE WATER DIRECTLY on Molybdenum Pentachloride.	Molybdenum Pentachloride reacts violently with OXIDIZING AGENTS (such as PERCHLORATES,
DOT#: UN 2508	POISONOUS GASES ARE PRODUCED IN FIRE,	PEROXIDES, PERMANGANATES, CHLORATES,
ERG Guide #: 156	including Hydrogen Chloride and Chlorine gas.	NITRATES, CHLORINE, BROMINE and FLUORINE) and concentrated NITRIC ACID.
Hazard Class: 8 (Corrosive)	Use water spray to keep fire-exposed containers cool. Molybdenum Pentachloride may be an explosion	
	hazard.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Keep dry and use a HEPA-filter vacuum or collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

PHYSICAL PROPERTIESOdor Threshold:OdorlessFlash Point:NonflammableVapor Pressure:1.75 mm Hg at 77°F (25°C)Specific Gravity:2.9 (water =1)Water Solubility:ReactsBoiling Point:514°F (268°C)Melting Point:381°F (194°C)

273.2

EXPOSURE LIMITS

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing.
	Headache, weakness, nausea and vomiting

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator:

Molecular Weight:

>0.5 mg/m³ - full facepiece APR with *P100 filter* >5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: MORPHOLINE

Synonyms: Diethyleneimide Oxide; Tetrahydro-2H-1, 4-Oxazine CAS No: 110-91-8 Molecular Formula: C_4H_9NO RTK Substance No: 1315 Description: Colorless liquid with a weak *Ammonia* or fish-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Morpholine is a FLAMMABLE LIQUID.	Morpholine reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires.
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	
DOT#: UN 2054	including Nitrogen Oxides and Ammonia. Vapors may travel to a source of ignition and flash	Morpholine may react with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to form flammable and explosive <i>Hydrogen</i>
ERG Guide #: 132	back.	gas.
Hazard Class: 8 (Corrosive)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	Morpholine is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ISOCYANATES; EPOXIDES; PHENOLS; and NITRO COMPOUNDS.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **Morpholine** out of confined spaces, such as sewers, because of the possibility of an explosion. Use only non-sparking tools and equipment, especially

when opening and closing containers of **Morpholine**. DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 20 ppm, 8-hr TWA

- NIOSH: 20 ppm, 10-hr TWA; 30 ppm, STEL
- ACGIH: 20 ppm, 8-hr TWA
- **IDLH:** 1,400 ppm

The Protective Action Criteria values are: PAC-1 = 30 ppm PAC-2 = 30 ppm PAC-3 = 1,400 ppm

HEALTH EFFECTS

Eyes:	Severe irritation and burns with possible damage
Skin: Inhalation:	Severe irritation and burns Nose, throat and lung irritation, with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	0.01 to 0.07 ppm
Flash Point:	98°F (37°C)
LEL:	1.4%
UEL:	11.2%
Auto Ignition Temp:	555°F (291°C)
Vapor Density:	3 (air = 1)
Vapor Pressure:	6 mm Hg at 68°F (20°C)
Specific Gravity:	1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	262°F (128°C)
Freezing Point:	23.2°F (-4.9°C)
Ionization Potential:	8.88 eV
Molecular Weight:	87.12

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Silver Shield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>20 ppm - full facepiece APR with Organic vapor cartridge>200 - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: NAPHTHALENE

Synonyms: Moth Flakes; Naphthalin; Tar Camphor; White Tar CAS No: 91-20-3 Molecular Formula: C₁₀H₈ RTK Substance No: 1322

Description: Colorless, white or brown solid, in flake, cake or powder form, with a mothball odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Naphthalene is a COMBUSTIBLE SOLID. It may also be transported in a "molten" or heated form. The vapor given	Naphthalene may react violently with CHROMIC ANHYDRIDE and OXIDIZING AGENTS (such as
2 - Fire	off when Naphthalene is heated is FLAMMABLE and a DANGEROUS FIRE HAZARD.	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity DOT#: UN 1334	Use dry chemical, CO ₂ , water spray or alcohol-resistant foam as extinguishing agents.	CHLORINE, BROMINE and FLUORINE).
UN 2304	POISONOUS GASES ARE PRODUCED IN FIRE.	Protect from DIRECT SUNLIGHT.
(molten) ERG Guide #: 133	Use water spray to keep fire-exposed containers cool and to reduce vapors.	
Hazard Class: 4.1	Molten Naphthalene may form an ignitable vapor/air mixture.	
(Flammable solid)	Finely dispersed Naphthalene particles may form explosive mixtures in air.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten **Naphthalene** *powder* or *flake* first or use a HEPAfilter vacuum for clean-up and place into sealed containers for disposal.

Shovel *molten* **Naphthalene** into a suitable, dry container. Keep *molten* **Naphthalene** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Ground and bond containers when transferring *molten* **Naphthalene**.

Use only non-sparking tools and equipment, especially when opening and closing containers of *molten* **Naphthalene**.

Naphthalene is toxic to aquatic organisms and may cause long-term effects in the aquatic environment.

EXPOSURE LIMITS

 OSHA:
 10 ppm, 8-hr TWA

 NIOSH:
 10 ppm, 10-hr TWA; 15 ppm STEL

 ACGIH:
 2 ppm, 8-hr TWA

 IDLH:
 250 ppm

The Protective Action Criteria values are:

PAC-1 = 15 ppm PAC-2 = 15 ppm PAC-3 = 250 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing and
wheezing
Headache, fatigue, confusion, tremor, nausea
and vomitingChronic:Cancer (nasal and lung) in animals

PHYSICAL PROPERTIES Odor Threshold: 0.038 ppm Elash Beint: 174% (70%)

ouor mesnolu.	0.000 ppm
Flash Point:	174°F (79°C)
LEL:	0.9%
UEL:	5.9%
Auto Ignition Temp:	979°F (526°C)
Vapor Density:	4.42 (air = 1)
Vapor Pressure:	0.05 mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	424°F (218°C)
Melting Point:	176°F (80°C)
Ionization Potential:	8.1
Molecular Weight:	128.2

	PROTECTIVE EQUIPMENT
Gloves:	Barrier®
Coveralls:	Tychem® F and CPF 3 (>8-hr breakthrough)
Respirator:	Spill: Full facepiece APR with Organic vapor/P100 cartridges
	Fire or >250 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility



Common Name: NEOHEXANE

Synonyms: 2,2-Dimethyl Butane; Ethyl Trimethyl Methane CAS No: 75-83-2 Molecular Formula: C_6H_{14} RTK Substance No: 1335 Description: Colorless liquid with a *Gasoline*-like odor

	H	AZARD DATA	
Hazard Rating	Firefighting		Reactivity
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1208 ERG Guide #: 128 Hazard Class: 3 (Flammable)	 Neohexane is a FLAMMABLE LIQUUSE dry chemical, CO₂, alcohol-resist foam extinguishing agents, as wate effective in fighting fires. POISONOUS GASES ARE PRODUC CONTAINERS MAY EXPLODE IN FUSE water spray to keep fire-exposed Vapors may travel to a source of ignut vapor is heavier than air and may travel to a source of ignut the source of ignut that are and the source of ignut that are and the source of ignut that water and to a source of ignut to a source of ignition. 	stant foam or other r may not be ICED IN FIRE. FIRE. ed containers cool. nition and flash back. avel a distance to ne source.	Neohexane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
SP	ILL/LEAKS	PH	IYSICAL PROPERTIES
similar material and d Keep Neohexane out sewers, because of th	ers (900 feet)	Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight:	Gasoline-like $-54^{\circ}F(-48^{\circ}C)$ 1.2% 7% : 761^{\circ}F(405^{\circ}C) 3 (air = 1) 400 mm Hg at 86^{\circ}F(30^{\circ}C) 0.6 (water = 1) Insoluble 122° to 145°F(50° to 63°C) $-148^{\circ}F(-100^{\circ}C)$ 86.2
EXPO	SURE LIMITS		
Ceiling ACGIH: 500 ppm, 8	0-hr TWA; 510 ppm, 15-min -hr TWA; 1,000 ppm STEL (as <i>n-Hexane</i>)	Coveralls: DuPo Resp Goba Respirator: >100	e and Viton (>8-hr breakthrough) for <i>Hexane</i> ont Tychem® CPF 3, CPF 4, BR and LV, oonder® and TK; Kappler® Zytron® 300; and Saint- ain ONESuit® TEC (>8-hr breakthrough) for <i>Hexane</i> 0 ppm - Supplied air 00 ppm - SCBA
HEAL	TH EFFECTS	FIRST A	ID AND DECONTAMINATION
Inhalation: Nose an and whe Headac	, drying and cracking nd throat irritation with coughing	contact lenses if wo Quickly remove cor skin with large amo	ge amounts of water for at least 15 minutes. Remove orn. htaminated clothing. Immediately wash contaminated unts of soap and water. iration if breathing has stopped and CPR if



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Common Name: NICKEL

Synonyms: Nickel Catalyst; Pulverized Nickel; Raney Alloy; Raney Nickel CAS No: 7440-02-0 Molecular Formula: Ni RTK Substance No: 1341 Descriptions: Nickel is an odorless, silvery, hard, metallic solid; Raney Nickel is a finely powdered, grayish metal

		HAZARD I	DATA
Hazard Rating	Firefighting		Reactivity
3 - Health 4 - Fire 1 - Reactivity DOT#: UN 2881 (Nickel catalyst, dry ERG Guide #: 138 Hazard Class: 4.1 (Flammable Solid	FirefightingReactivityNickel powder and Raney Nickel are FLAMMABLE SOLIDS.Very fine Nickel powder and dust, and Raney Nickel, react with A and can spontaneously ignite or produce flammable and explosive Hydrogen gas.Use dry sand, sodium chloride powder, graphite or an approved Class D extinguisher appropriate for extinguishing metal fires.Very fine Nickel powder and dust, and Raney Nickel, react with A and can spontaneously ignite or produce flammable and explosive Hydrogen gas.DO NOT USE WATER directly on Nickel powder or Raney Nickel as flammable and explosive Hydrogen gas may be formed.Nickel powder and Raney Nickel react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).DO NOT USE foam or CO2 as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Nickel Carbonyl and Nickel Oxide. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Nickel powder and dust, and Raney Nickel, may form ignitable dust/air mixtures in closed tanks or containers.Nickel powder and dust, and Raney Nickel, may form ignitable dust/air mixtures in closed tanks or 		
S	PILL/LEAKS		PHYSICAL PROPERTIES
Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Cover with dry earth or sand and place into sealed containers for disposal. DO NOT wash into sewer. Use only non-sparking tools and equipment. Keep Nickel powder and dust, and Raney Nickel, out of confined spaces, such as sewers, because of the possibility of an explosion.		Odor Thre Flash Poin Vapor Pres Specific G Water Solu Boiling Po Melting Po Molecular	int: Nickel powder and Raney Nickel are Flammable ressure: 1 mm Hg at 3,290°F (1,810°C) Gravity: 8.9 (water = 1) blubility: Insoluble Point: 4,946°F (2,730°C) Point: 2,651°F (1,455°C)
EXPOSURE LIMITS			PROTECTIVE EQUIPMENT
OSHA: 1 mg/m³, 8 NIOSH: 0.015 mg/m ACGIH: 1.5 mg/m³, IDLH: 10 mg/m³, The Protective Action PAC-1 = 4.5 mg/m PAC-3 = 10 mg/m	n ³ , 10-hr TWA 8-hr TWA 8-hr TWA Criteria values are: 1 ³ PAC-2 = 10 mg/m ³	Gloves: Coveralls: Respirator	Use turn out gear or flash protection if ignition/fire is the greatest hazard.
HEALTH EFFECTS		FI	IRST AID AND DECONTAMINATION
Skin: Irritat Inhalation: Nose coug breat Head vomi	lache, dizziness, nausea and ting	Flush eyes contact ler Quickly rei large amou Begin artifi	the person from exposure. es with large amounts of water for at least 15 minutes. Remove enses. remove contaminated clothing and wash contaminated skin with ounts of soap and water. ifficial respiration if breathing has stopped and CPR if necessary. promptly to a medical facility.
Chronic: Cano	er (lung) in humans and animals		July 2012



Chemical Name: NICKEL CARBONATE

Synonyms: Nickelous Carbonate, Nickel II Carbonate CAS No: 3333-67-3 Molecular Formula: NiCO₃ RTK Substance No: 3086 Description: Light green, odorless, solid or powder

BO MILLA DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	- Extinguish fire using an agent suitable for type of	- Nickel Carbonate must be stored to avoid contact
0 - Fire	surrounding fire. Nickel Carbonate itself does not burn.	with ANILINE; HYDROGEN SULFIDE; FLAMMABLE SOLVENTS; HYDRAZINE; and METAL POWDERS
0 - Reactivity	- POISONOUS GASES ARE PRODUCED IN FIRE, including Nickel Oxides and Nickel Carbonyl.	(such as ZINC, ALUMINUM, and MAGNESIUM) since violent reactions occur.
DOT ID #: UN 3086	- CONTAINERS MAY EXPLODE IN FIRE.	- Nickel Carbonate is not compatible with OXIDIZING
ERG Guide #: 171	- Nickel Carbonate may ignite combustibles (wood,	AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
Hazard Class: 9	paper and oil).	CHLORINE, BROMINE and FLUORINE).
(Environmentally		- Nickel Carbonate decomposes on contact with
Hazardous		STRONG ACIDS (such as HYDROCHLORIC,
Substance)		SULFURIC and NITRIC) or when HEATED to produce <i>Carbon Dioxide</i> .

Odor

SPILL/LEAKS

Isolation Distance: 50 meters (150 feet)

- Use a wet method or a vacuum with a HEPA filter for cleanup.
- DO NOT let this chemical enter the environment. It is toxic to aquatic organisms.

EXPOSURE LIMITS

1.0 mg/m³ 8-hr TWA (as *Nickel*) OSHA: 0.015 mg/m³ 10-hr TWA (as *Nickel*) NIOSH: 0.2 mg/m³ 8-hr TWA (as *Nickel*) ACGIH: 10 mg/m^3 IDLH LEVEL:

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation
Acute:	Coughing and wheezing
Chronic:	Cancer. <i>Nickel compounds</i> may cause lung cancer in humans and animals. Skin allergy, asthma-like allergy, kidney damage

PHYSICAL PROPERTIES		
Threshold:	No Odor	
Point:	Noncombustible	
i+	$2.6 \mathrm{a/cm}^2$	

Flash Point:
Density:
Melting Point:
Solubility:
-

2.6 g/cm Decomposes Insoluble

	PROTECTIVE EQUIPMENT
Gloves:	No Information
Coverall:	No Information
Boot:	No Information
Respirator:	>0.015 mg/m ³ N95
	> 0.15 mg/m ³ SA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- Remove contaminated clothing and wash contaminated skin with soap and water.
- Begin artificial respiration if breathing has stopped and CPR is

necessary.

Transfer to a medical facility.



Common Name: NICKEL NITRATE

Synonyms: Nickel Dinitrate; Nickelous Nitrate CAS No: 13138-45-9 Molecular Formula: Ni(NO₃)₂ RTK Substance No: 1347 Description: Odorless, yellow to green, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Nickel Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Nickel Nitrate may react violently with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and
0 - Fire	combustion of other substances.	their HYDRIDES); MAGNESIUM; TIN II CHLORIDE;
0 - Reactivity DOT#: UN 2725	Use water only. DO NOT USE CHEMICAL or CO ₂ as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	TETRAHYDRAZINE; and TETRAMINES. Nickel Nitrate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 140	including Nitrogen Oxides and Nickel Oxides.	CHLORINE, BROMINE and FLUORINE); CYANIDES;
Hazard Class: 5.1 (Oxidizer)	Use water spray to keep fire-exposed containers cool. Nickel Nitrate may ignite combustibles (wood, paper and oil).	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ESTERS; PHOSPHORUS; and BORON PHOSPHIDE.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Nickel Nitrate is very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: 1 mg/m³, 8-hr TWA
NIOSH: 0.015 mg/m³, 10-hr TWA
ACGIH: 0.1 mg/m³, 8-hr TWA (*inhalable fraction*)
IDLH: 10 mg/m³
(All of the above are for *Nickel*)

The Protective Action Criteria values are:

PAC-1 = 1.5 mg/m^3 PAC-2 = 12.5 mg/m^3 PAC-3 = 31.1 mg/m^3

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	<i>Nickel compounds</i> cause cancer (lung, nose) in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Specific Gravity:	2.05 (water = 1)
Water Solubility:	Soluble
Boiling Point:	278°F (136.7°C)
Melting Point:	134°F (56.7°C)
Molecular Weight:	182.7

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	<1 mg/m ³ - full facepiece APR with <i>High efficiency filter</i> >1 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.



Common Name: NICKEL OXIDE

Synonyms: Nickel Monoxide; Nickelous Oxide CAS No: 1313-99-1 Molecular Formula: NiO RTK Substance No: 3082 Description: Green to black crystalline powder that turns yellow when heated

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Nickel Oxide itself does not	Nickel Oxide reacts violently with IODINE; HYDROXGEN SULFIDE; mixtures of BARIUM OXIDE in AIR or
0 - Fire	burn.	CALCIUM OXIDE in AIR; FLUORINE GAS; and
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Nickel Carbonyl.	HYDROGEN PEROXIDE to cause a fire and explosion hazard.
DOT#: UN 3077	Use water spray to keep fire-exposed containers	Nickel Oxide is not compatible with STRONG ACIDS
ERG Guide #: 171	cool.	(such as HYDROCHLORIC, SULFURIC and NITRIC);
Hazard Class: 9 (Environmentally Hazardous Substance)		and ANILINIUM PERCHLORATE.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first, or use a HEPA-filter vacuum for clean-up, and deposit in sealed containers.

DO NOT wash into sewer.

Nickel Oxide is harmful to aquatic life.

EXPOSURE LIMITS

OSHA:	1 mg/m ³ , 8-hr TWA
NIOSH:	0.015 mg/m ³ , 10-hr TWA
ACGIH:	0.2 mg/m ³ , 8-hr TWA
IDLH:	10 mg/m ³
	(All of the above are for inorganic Nickel
	compounds measured as Nickel)

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, itching and skin rash
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	<i>Nickel compounds</i> cause lung cancer in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Not combustible
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	6.67 (water = 1)
Water Solubility:	Insoluble
Melting Point:	3,603°F (1,984°C)
Ionization Potential:	9.5 +/-4 eV
Molecular Weight:	74.7

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene (>8-hr breakthrough)	
Coveralls:	DuPont Tyvek®	
Respirator:	<0.015 mg/m ³ - APR with High efficiency filter >0.015 mg/m ³ - Supplied air	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: NICOTINE

Synonyms: 1-Methyl-2-(3-Pyridyl)Pyrrolidine CAS No: 54-11-5 Molecular Formula: $C_{10}H_{14}N_2$ RTK Substance No: 1349

Description: Oily, colorless to pale yellow liquid, with a fishy odor, that turns brown with exposure to air

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
3 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant	Nicotine is not compatible with OXIDIZING AGENTS	
1 - Fire	foam as extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides.	CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC,	
DOT#: UN 1654	Use water spray to keep fire-exposed containers cool.	SULFURIC and NITRIC).	
ERG Guide #: 151	Nicotine, when heated above 203°F (95°C), may form		
Hazard Class: 6	an ignitable vapor/air mixture in closed tanks or containers.		
(Poison)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		

Flash Point:

LEL:

UEL:

SPILL/LEAKS

Isolation Distance:

Spill: 50 meter (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Nicotine is very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: 0.5 mg/m^3 , 8-hr TWA 0.5 mg/m³, 10-hr TWA NIOSH: ACGIH: 0.5 mg/m³, 8-hr TWA 5 mg/m^3 IDLH:

The Protective Action Criteria values are: PAC-1 = 1.5 mg/m³ PAC-2 = 3.5 mg/m³ PAC-3 = 5 mg/m^3

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Irritation Eves: Skin: Irritation, rash, and burning feeling Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, dizziness, convulsions, restlessness, confusion, and even death

PHYSICAL PROPERTIES Odor Threshold: Fishy odor 203°F (95°C) 0.7% 4%

Auto Ignition Temp: 471°F (244°C) Vapor Density: 5.6 (air = 1) Vapor Pressure: 0.08 mm Hg at 68°F (20°C) **Specific Gravity:** 1.01 (water = 1) Water Solubility: Soluble **Boiling Point:** 475°F (246°C) (Decomposes) Freezing Point: -110°F (-79°C) **Ionization Potential:** 8.01 eV Molecular Weight: 162.2

PROTECTIVE EQUIPMENT

Gloves:

Butyl and SilverShield®/4H® (>4-hr breakthrough)

Coveralls: Tychem® SL, CPF3, BR, Responder® and TK (>8-hr breakthrough)

Respirator: >0.5 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eves with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: NITRIC ACID

Synonyms: Aqua Fortis; Hydrogen Nitrate CAS No: 7697-37-2 Molecular Formula: HNO₃ RTK Substance No: 1356

Description: Colorless to yellow liquid, or reddish if *fuming* Nitric Acid, with a characteristic, irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 0 - Fire 2 - Reactivity	REACTIVE LIQUID Nitric Acid is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.	Nitric Acid reacts with WATER to release heat. Nitric Acid reacts violently or explosively with most METALS and POWDERED METALS (such as ANTIMONY, BISMUTH, MANGANESE and TITANIUM); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); ALKALINE EARTH METALS (such as
DOT#: UN 3031 UN 3032	Use water only in flooding quanitities. DO NOT USE CHEMICAL or FOAM as extinguishing agents.	BERYLLIUM, MAGNESIUM and CALCIUM); and METAL HYDRIDES to form flammable and explosive <i>Hydrogen gas</i> . Nitric Acid may react violently or cause fires with COMBUSTIBLES;
ERG Guide #: 157 Hazard Class: 8 (Corrosive)	Use water spray to reduce vapors. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool.	ORGANICS (such as TURPENTINE, CHARCOAL and other CARBON CONTAINING COMPOUNDS); AMMONIA; CYANIDES; SULFIDES; CARBIDES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and

SPILL/LEAKS

Isolation Distance:

Small Spill:	30 meters	(100 feet)
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- Large Spill: 150 meters (500 feet)
- Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar noncombustible material and place into sealed containers for disposal. Neutralize remaining liquid with *Sodium Carbonate* or mild caustic.

Nitrogen Oxides are toxic to animal life.

EXPOSURE LIMITS

 OSHA:
 2 ppm, 8-hr TWA

 NIOSH:
 2 ppm, 10-hr TWA; 4 ppm STEL

 ACGIH:
 2 ppm, 8-hr TWA; 4 ppm STEL

 IDLH:
 25 ppm

The Protective Action Criteria values are:

PAC-1 = 0.16 ppm PAC-2 = 24 ppm PAC-3 = 92 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	0.29 to 0.98 ppm
Flash Point:	Nonflammable
Vapor Density:	2.2 (air = 1)
Vapor Pressure:	48 mm Hg at 68°F (20°C)
Specific Gravity:	1.5 (water = 1)
Water Solubility:	Soluble
Boiling Point:	181ºF (83ºC)
Freezing Point:	-44°F (-42°C)
Ionization Potential:	11.95 eV
Molecular Weight:	63.02
pH:	1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough) (only Barrier® for <i>fuming</i> Nitric Acid)
Coveralls:	Tychem® CPF3, F, BR, Responder® and TK; and Trellchem®, HPS and VPS (>8-hr breakthrough)
Respirator:	>2 ppm - full facepiece APR with acid gas filters specific for Nitric Acid >20 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: NITRIC OXIDE

Synonyms: Nitrogen Monoxide CAS No: 10102-43-9 Molecular Formula: NO RTK Substance No: 1357

Description: Colorless gas with a sharp odor that spontaneously converts to Nitrogen Dioxide in air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	REACTIVE AND STRONG OXIDIZER that enhances the combustion of other substances.	Nitric Oxide reacts with AIR, OXYGEN, WATER and MOISTURE to form toxic and corrosive <i>Nitric Acid</i> and <i>Nitrogen Dioxide</i> .
2 - Reactivity DOT#: UN 1660 ERG Guide #: 124 Hazard Class: 2.3 (Toxic gas)	Extinguish fire using an agent suitable for type of surrounding fire. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Nitric Oxide may ignite combustibles (wood, paper and oil).	Nitric Oxide may react violently or explosively with HALOGENS (such as FLUORINE and CHLORINE); NITROGEN TRICHLORIDE; OZONE; and CHLORINE MONOXIDE. Nitric Oxide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES); COMBUSTIBLES; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); POTASSIUM; BORON; CARBON DISULFIDE; FUELS; CHLORINATED HYDROCARBONS (such as TRICHLOROETHYLENE and METHYLENE CHLORIDE); OLEFINS; METALS (such as IRON, MANGANESE and MAGNESIUM); and METAL SALTS.

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)

Large Spill: 100 meters (300 feet)

Fire: 800 meters (1/2 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Purge system with inert gas prior to repairs.

EXPOSURE LIMITS

 OSHA:
 25 ppm, 8-hr TWA

 NIOSH:
 25 ppm, 8-hr TWA

 ACGIH:
 25 ppm, 8-hr TWA

 IDLH:
 100 ppm

The Protective Action Criteria values are: PAC-1 = 0.61 ppm PAC-2 = 14.7 ppm PAC-3 = 24.5 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)

PHYSICAL PROPERTIES

Odor Threshold:	0.3 to 1 ppm
Flash Point:	Nonflammable
Vapor Density:	1.04 (air = 1)
Vapor Pressure:	26,000 mm Hg at 68°F (20°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Soluble
Boiling Point:	-177° to -241°F (-116° to -152°C)
Freezing Point:	-198° to -263°F (-128° to -164°C)
Critical Temperature:	-135°F (-93°C)
Molecular Weight:	30.01

PROTECTIVE EQUIPMENT

Gloves:	Teflon® (>4-hr breakthrough)
Coveralls:	Tychem® TK and Zytron® 500 (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: NITROCELLULOSE

Synonyms: Collodion; Cellulose Nitrate Solution; Pyroxylin Solution CAS No: 9004-70-0 Molecular Formula: Varies RTK Substance No: 1366

Description: White, granular chip or fibrous material, which is usually in a water or alcohol solution

For the second s	Description: White, granular chip or fibrous material, which is usually in a water or alcohol solution					
	HAZARD DATA					
Hazard Rating	Firefighting		Reactivity	1		
2 - Health 3 - Fire (Nitrocellulose) 4 - Fire (Collodion) 3 - Reactivity (Nitrocellulose) 0 - Reactivity (Collodion) DOT#: UN 2556 (Solid) UN 2059 (Solution) ERG Guide #: 113 (Solid) 127 (Solution)	Firefignting Nitrocellulose is a FLAMMABLE LIQUID, or an EXPLOSIVE when dry, and can be ignited or exploded with HEAT, SPARKS, or FRICTION. For Nitrocellulose in solution, use dry chemical or CO ₂ as extinguishing agents. For dry Nitrocellulose, use water spray or fog. POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides and Hydrogen Cyanides. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.		Nitrocellulos spontaneousl IGNITION SC (such as PER CHLORATES Nitrocellulos SULFURIC al HYDROXIDE SALTS; MET Nitrocellulos Nitrocellulos	e, when dry, is shock sensitive and can ignite y and explode when exposed to HEAT; FLAMES; DURCES; AIR; SUNLIGHT or OXIDIZING AGENTS &CHLORATES, PEROXIDES, PERMANGANATES, 5, NITRATES, CHLORINE, BROMINE and FLUORINE). e is not compatible with ACETYL PEROXIDE; DE; STRONG ACIDS (such as HYDROCHLORIC, nd NITRIC); STRONG BASES (such as SODIUM and POTASSIUM HYDROXIDE); METALS; METAL AL OXIDES; and AMINES. e attacks some RUBBER, COATINGS and PLASTICS. e may accumulate static electricity when being filled into nded containers.		
Hazard Class: 4.1 (Flammable solid) 3 (Flammable liquid)						
SPILL	LEAKS		PHY	SICAL PROPERTIES		
Isolation Distance: Small Spill: 100 meters (330 feet) Large Spill: 500 meters (1/3 mile) Fire: 800 meters (1/2 mile) Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. For <i>dry</i> Nitrocellulose, thoroughly wet with water, sweep-up, and place into tightly closed, water tight containers. Keep Nitrocellulose out of confined spaces, such as sewers, because of the possibility of an explosion. Use only non-sparking tools and equipment, especially when opening and closing containers of Nitrocellulose.		Odor Three Flash Poin LEL: UEL: Auto Ignit Vapor Der Specific G Boiling Po Molecular	nt: ion Temp: nsity: Gravity: bint:	Odorless to <i>Ether</i> or <i>Alcohol</i> -like 55°F (13°C) (<i>Solid</i>) <0°F (<-18°C) (<i>Solution</i>) 1.9% (<i>Solution</i>) 48% (<i>Solution</i>) 338°F (170°C) (<i>Solution</i>) 2.6 (<i>Solution</i>) air = 1 1.66 (<i>Solid</i>) 0.8 (<i>Solution</i>) (water = 1) 95°F (35°C) (<i>Solution</i>) 459 to 594		
EXPOSU	RE LIMITS		PROTECTIVE EQUIPMENT			
The Protective Action Criteria values are: PAC-1 = 60 mg/m ³ PAC-2 = 400 mg/m ³ PAC-3 = 500 mg/m ³		Gloves: Coveralls: Respirator:	<i>compo</i> Tycher for <i>Nitr</i> (Use s: >10% o	Shield®/4H® and Barrier® (>8-hr breakthrough for <i>Nitro</i> <i>nunds</i> and <i>Ethyl Ether</i>) m® Responder and Trellchem VPS (>8-hr breakthrough <i>to compounds</i> and <i>Ethyl Ether</i>) afety shoes with antistatic base and flash protection at of the LEL)		
HEALTH	EFFECTS	FI	RST AID	AND DECONTAMINATION		
	roat irritation dizziness, difficulty and loss of consciousness Flush eye contact le Remove of and water Begin arti		nses if worn. ontaminated c icial respiratio	n exposure. nounts of water for at least 15 minutes. Remove dothing and wash contaminated skin with soap n if breathing has stopped and CPR if necessary. nedical facility. February 2010		



Common Name: NITROETHANE

Synonyms: None CAS No: 79-24-3 Molecular Formula: $C_2H_5NO_2$ RTK Substance No: 1373 Description: Colorless, oily liquid with a mild, fruity odor

		Description: Colorless, oily liquid with a mild, fruity odor					
HAZARD DATA							
Hazard Rating	Firefighting			Reactivity			
2 - Health 3 - Fire 3 - Reactivity DOT#: UN 2842 ERG Guide #: 129 Hazard Class: 3 (Flammable)	 FLAMMABLE AND REACTIVE Use dry chemical, CO₂, or alcohol-resistant foam extinguishing agents, as water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool 			STROI POTAS LITHIU (such a and a c OXIDE Nitroet (such a PERM, CHLOF HYDRO Explosi	hane forms shock-sensitive compounds with NG BASES (such as SODIUM HYDROXIDE and SSIUM HYDROXIDE); ALKALI METALS (such as IM, SODIUM and POTASSIUM); STRONG ACIDS as HYDROCHLORIC, SULFURIC and NITRIC); combination of AMINES and HEAVY METAL S. hane is not compatible with OXIDIZING AGENTS as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE); OCARBONS; and HYDROXIDES. ve decomposition may occur with SHOCK and TEMPERATURES, especially in confined spaces.		
SPI	LL/LEAKS			PH۱	SICAL PROPERTIES		
similar material and p disposal. Use only non-sparking when opening and clo Keep Nitroethane out sewers, because of th DO NOT wash into se	D feet) 2 mile) miculite, dry sand, earth, or a place into sealed containers for ng tools and equipment, especially dosing containers of Nitroethane . ut of confined spaces, such as the possibility of an explosion.		Odor Thresho Flash Point: LEL: Auto Ignition Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point: Freezing Point Ionization Point Molecular We	Temp: /: re: ity: ity: ity: ity: ity: ity: ity: ity	2.1 ppm 82°F (28°C) 3.4% 778°F (414°C) 2.58 (air = 1) 15.6 mm Hg at 68°F (20°C) 1.05 (water = 1) Slightly soluble 237°F (114°C) -130°F (-90°C) 10.88 eV 75.1		
	SURE LIMITS			PRO			
NIOSH: 100 ppm, 10 ACGIH: 100 ppm, 8 IDLH: 1,000 ppm	DSH: 100 ppm, 10-hr TWA :GIH: 100 ppm, 8-hr TWA LH: 1,000 ppm e Protective Action Criteria values are: PAC-1 = 100 ppm PAC-3 = 1,000 ppm		Gloves: Coveralls: Respirator:	Tychem breakt	nd Silver Shield®/4H® (>8-hr breakthrough) n® BR, LV, Responder® and TK (>8-hr hrough for <i>Nitromethane</i>) om - SCBA		
HEALTH EFFECTS			FIRS		AND DECONTAMINATION		
coughin shortnes Methem			contact lenses Quickly removing large amounts Begin artificial Transfer prom	th large a s if worn. ve contar s of soap respirati optly to a	mounts of water for at least 15 minutes. Remove ninated clothing and wash contaminated skin with		



Common Name: NITROGEN MUSTARD

Synonyms: Chloramine; HN-2; MBA; Mustine CAS No: 51-75-2 Molecular Formula: $C_5H_{11}CI_{12}N$ RTK Substance No: 1377 Description: Colorless to yellow, oily liquid with a soapy or fruity odor

HAZARD DATA					
Hazard Rating	Firefighting			React	tivity
3 - Health 1 - Fire 1 - Reactivity DOT#: UN 2810 ERG Guide #: 153 Hazard Class: 6.1 (Poison)	Firefighting Nitrogen Mustard may burn, but does not readily ignite. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Chlorine, Nitrogen Oxides and Hydrogen Chloride. Use water spray to keep fire-exposed containers cool.		AGEN their H Hydrog Nitroge HALOO EPOX Nitroge (such a PERM CHLO fire.	en Mustard may react violently with REDUCING TS (such as LITHIUM, SODIUM, ALUMINUM and IYDRIDES) to form flammable and explosive gen gas. en Mustard is not compatible with ISOCYANATES; GENATED ORGANIC COMPOUNDS; PHENOLS; IDES; ANHYDRIDES; and ACID HALIDES. en Mustard in contact with OXIDIZING AGENTS as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE) may result in a en Mustard is unstable in LIGHT and HEAT.	
SP	ILL/LEAKS				SICAL PROPERTIES
Large Spill: 270 meters Fire: 800 meters (1/2 Absorb liquids in verm similar material and o Ventilate and wash ar DO NOT wash into se			Odor Thresho Flash Point: Vapor Densit Vapor Pressu Specific Grav Water Solubil Boiling Point Melting Point Freezing Point Molecular We	y: ire: ity: ity: : : :	Soapy (low concentration) Fruity (high concentration) May burn 5.9 (air = 1) 0.43 mm Hg at $77^{\circ}F$ ($25^{\circ}C$) 1.2 (water = 1) Very slightly soluble 167°F ($75^{\circ}C$) -76°F ($-60^{\circ}C$) -76° to $-85^{\circ}F$ (-60° to $-65^{\circ}C$) 156.1
EXPO	SURE LIMITS			PRO	TECTIVE EQUIPMENT
U.S. Military: 0.003 mg/m ³			Gloves: Coveralls: Respirator:	DuPon Kapple (>8-hr I <0.003	Shield®/4H® t Tychem® BR, LV, CSM, Responder®, and TK; r® Zytron® 300; and Saint-Gobain ONESuit® TEC breakthrough) mg/m ³ - Full facepiece APR with CBRN cartridges mg/m ³ - Supplied air
HEAL	TH EFFECTS	1	FIRS	FIRST AID AND DECONTAMINATION	
Skin: Irritation blisters Inhalation: Nose a and wh Headad	n and burns n, severe burns with itching and nd throat irritation with coughing eezing the, dizziness, nausea, vomiting ssing out		 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. R contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated sk large amounts of soap and water. Seek medical attention . Begin artificial respiration if breathing has stopped and CPR if neo Transfer promptly to a medical facility. 		amounts of water for at least 15 minutes. Remove Seek medical attention immediately. minated clothing and wash contaminated skin with and water. Seek medical attention . ion if breathing has stopped and CPR if necessary.
	(leukemia and skin) in humans	1	1		



Common Name: NITROMETHANE

Synonyms: Nitrocarbol CAS No: 75-52-5 Molecular Formula: CH₃NO₂ RTK Substance No: 1386 Description: Colorless, oily liquid with a mild disagreeable or fruity odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health 3 - Fire	Nitromethane is a FLAMMABLE LIQUID. Use CO ₂ , water spray or alcohol-resistant foam as extinguishing agents.	Nitromethane is unstable and SHOCK; FRICTION or ELEVATED TEMPERATURES can cause explosive decomposition, especially when confined.	
4 - Reactivity	DO NOT use dry chemical extinguishers on a fire. Nitromethane may explosively decompose from	Nitromethane reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and	
DOT#: UN 1261	SHOCK, FRICTION or CONCUSSION.	FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE	
ERG Guide #: 129	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	N and POTASSIUM HYDROXIDE); ALKYL METAL HALIDES (such as SODIUM CHLORIDE and LITHIUM BROMIDE); DIETHY	
Hazard Class: 3 (Flammable)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	ALUMINUM BROMIDE; METHYL ZINC IODIDE; AMMONIA HYDROXIDE; CALCIUM HYPOCHLORITE; FORMALDEHYDE, and many other substances.	
	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Nitromethane may ignite combustibles (wood, paper and oil).	Nitromethane forms shock-sensitive mixtures with AMINES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACETONE; ALUMINUM POWDER; COPPER; COPPER ALLOYS; and LEAD and LEAD ALLOYS.	
SPIL	L/LEAKS	PHYSICAL PROPERTIES	

Isolation Distance:

Small Spills: 60 meters (200 feet)

Large Spills: 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

Keep **Nitromethane** out of confined spaces, such as sewers, because of the possibility of an explosion.

Does not accumulate in aquatic life.

EXPOSURE LIMITS

OSHA:	100 ppm, 8-hr TWA
ACGIH:	20 ppm, 8-hr TWA
IDLH:	750 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation with drying, cracking and redness
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, weakness, dizziness, nausea and vomiting
Chronic:	Cancer (liver, lung, glandular) in animals

Odor Thresho	ld:	3.5 ppm	
Flash Point:		95°F (35°C)	
LEL:		7.3%	
UEL:		62%	
Auto Ignition 7	Гетр:	785°F (418°C)	
Vapor Density	:	2.1 (air = 1)	
Vapor Pressur	e:	27.8 mm Hg at 68°F (20°C)	
Specific Gravi	ty:	1.14 (water = 1)	
Water Solubili	ty:	Slightly soluble	
Boiling Point:		214°F (101°C)	
Ionization Potential:		11.08 eV	
Molecular Wei	ght:	61	
	PROT	ECTIVE EQUIPMENT	
Gloves:	Butyl and Silver Shield®/4H® (>8-hr breakthrough)		
Coveralls:	DuPont Tychem® BR, LV, CSM, Responder®, and TK;		
	Kappler Zytron® 300; and Saint-Gobain ONESuit®TEC		
	(>8-hr breakthrough)		
Respirator:	>20 ppm - Supplied air		
FIDC:			

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: 1-NITROPROPANE

Synonym: 1-NP CAS No: 108-03-2 Molecular Formula: $C_3H_7NO_2$ RTK Substance No: 1394 Description: Colorless liquid with a mild, fruity odor

	HAZARD DATA					
Hazard Rating	Firefighting	Reactivity				
1 - Health	FLAMMABLE AND REACTIVE LIQUID Use CO ₂ , water spray or alcohol-resistant foam as	1-Nitropropane reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,				
3 - Fire	extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,				
2 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE,				
DOT#: UN 2608	including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE.	POTASSIUM HYDROXIDE and CALCIUM HYDROXIDE).				
ERG Guide #: 129	Use water spray to keep fire-exposed containers cool.	1-Nitropropane is not compatible with METAL				
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Flow or agitation may generate electrostatic charges.	OXIDES; AMINES; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and HYDROCARBONS.				
	1-Nitropropane may form an ignitable vapor/air mixture in closed tanks or containers.					

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **1-Nitropropane** out of confined spaces, such as sewers, because of the possibility of an explosion.

Use water spray to keep containers cool and to knock down vapors.

Use only non-sparking tools and equipment, especially when opening and closing containers of **1-Nitropropane**. DO NOT wash into sewer.

EXPOSURE LIMITS

 OSHA:
 25 ppm, 8-hr TWA

 NIOSH:
 25 ppm, 10-hr TWA

 ACGIH:
 25 ppm, 8-hr TWA

 IDLH:
 1,000 ppm

 The Protective Action Criteria values are:
 PAC-1 = 25 ppm

 PAC-2 = 25 ppm
 PAC-3 = 1,000 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)
	Dizziness, weakness, loss of coordination and restlessness

PHYSICAL PROPERTIES

Odor Threshold:	11 ppm	
Flash Point:	75° to 97°F (24° to 36°C)	
LEL:	2.2%	
Auto Ignition Temp:	789° to 802°F (421° to 428°C)	
Vapor Density:	3.1 (air = 1)	
Vapor Pressure:	13 mm Hg at 68°F (20°C)	
Specific Gravity:	/: 1.003 (water = 1)	
Water Solubility:	ter Solubility: Very slightly soluble	
Boiling Point:	269°F (132°C)	
Freezing Point:	-162°F (-108°C)	
Ionization Potential:	10.81 eV	
Molecular Weight:	89.09	

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Polyvinyl Alcohol, Silver Shield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® Responder® and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: N-NITROSODIETHYLAMINE

Synonyms: NDEA; Diethylnitrosoamine CAS No: 55-18-5 Molecular Formula: $C_4H_{10}N_2O$

RTK Substance No: 1404

Description: Pale yellow liquid with an Amine or Aromatic odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 2 - Fire 1 - Reactivity DOT#: UN 3082 ERG Guide #: 171 Hazard Class: 9 (Environmentally hazardous)	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	N-Nitrosodiethylamine is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); ORGANIC ANHYDRIDES; ACRYLATES; ALCOHOLS; ALDEHYDES; CRESOLS; ISOCYANATES; KETONES; GLYCOLS; PHENOLS; and VINYL ACETATE.

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

Bioaccumulation is low in aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for **N-Nitrosodiethylamine**.

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose and throat irritation
Chronic:	Cancer (liver, lung, gastrointestinal tract) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Amine or Aromatic odor	
Flash Point:	145.4°F (63°C)	
Vapor Pressure:	0.86 mm Hg at 68°F (20°C)	
Specific Gravity:	0.94 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	351°F (177°C)	
Molecular Weight:	102.2	

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Silver Shield®/4H® (>8-hr breakthrough)
Coveralls:	DuPont Tychem® Responder®, CPF 3, F, CPF 4, BR, LV
	and TK; Kappler® Zytron® 300; and Saint-Gobain
	ONESuit® TEC (>8-hr breakthrough for Diethyl Amine)
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: N-NITROSODIMETHYLAMINE

Synonyms: Dimethylnitrosamine; Nitrosodimethylamine CAS No: 62-75-9 Molecular Formula: $(CH_3)_2N_2O$ RTK Substance No: 1405 Description: Yellow, oily liquid with a faint odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	N-Nitrosodimethylamine is a COMBUSTIBLE LIQUID.	N-Nitrosodimethylamine reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
2 - Fire	Use dry chemical, CO ₂ , water spray or alcohol-	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	resistant foam as extinguishing agents.	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2810	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	N-Nitrosodimethylamine is not compatible with STRONG ACIDS (such as HYDROCHLORIC,
ERG Guide #: 153	Use water spray to keep fire-exposed containers	SULFURIC and NITRIC) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
Hazard Class: 6.1	cool.	
(Toxic)		

SPILL/LEAKS

Isolation Distance:

Spill (small): 60 meters (200 feet) (large): 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

N-Nitrosodimethylamine is toxic to aquatic organisms and may cause long-term adverse effects to the aquatic environment.

EXPOSURE LIMITS

NIOSH: Lowest feasible concentration

The Protective Action Criteria values are:

PAC-1 = 10 mg/m^3

PAC-2 = 19 mg/m^3 PAC-3 = 100 mg/m^3

HEALTH EFFECTS		
Eyes:	Irritation, and possible eye damage	
Skin:	Irritation (skin absorbable)	
Inhalation:	Nausea, vomiting, diarrhea and abdominal pain	
Chronic:	Cancer (lung, liver, kidney, nasal cavity) in animals	

PHYSICAL PROPERTIES

Flash Point:Vapor Density:Vapor Pressure:Specific Gravity:Water Solubility:Boiling Point:Ionization Potential:Molecular Weight:

142°F (61°C) 2.56 (air = 1) 5 mm Hg at 68°F (20°C) 1.01 (water = 1) Soluble 307°F (153°C) 8.69 eV 74.08

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Silver Shield®/4H® (>4-hr breakthrough)
Coveralls:	Tychem® F (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: N-NITROSODIPHENYLAMINE

Synonyms: Benzenamine, N-Nitro-N-Phenyl-; Diphenylnitrosamine; Nitrous Diphenylamide CAS No: 86-30-6Molecular Formula: $C_{12}H_{10}N_2O$ RTK Substance No: 1408 Description: Yellow to brown or orange powder or flake

Firefighting	Reactivity
	Νεαστινίτα
Extinguish fire using an agent suitable for type of surrounding fire. N-Nitrosodiphenvlamine	N-Nitrosodiphenylamine reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
itself does not burn.	PERMANGANATES, CHLORATES, NITRATES,
POISONOUS GASES ARE PRODUCED IN	CHLORINE, BROMINE and FLUORINE).
cool.	
	surrounding fire. N-Nitrosodiphenylamine itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Flash Point:	326°F (163.4°C)
Spill: 25 meters (75 feet)	Specific Gravity:	1.23 (water = 1)
Fire: 800 meters (1/2 mile)	Water Solubility:	Insoluble
Moisten spilled material first or use a HEPA-filter	Boiling Point:	514°F (268°C)
vacuum for clean-up and place into sealed containers for disposal.	Melting Point:	152°F (67°C)
DO NOT wash into sewer.	Molecular Weight:	198.2

EXPOSURE LIMITS

No occupational exposure limits have been established for **N-Nitrosodiphenylamine**.

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Natural Rubber
Coveralls:	Tyvek®
Respirator:	Spill: Full facepiece APR with <i>High efficiency filters</i> Fire: SCBA

HEALTH EFFECTS

Eyes:	Irritation
Skin:	No information
Inhalation:	Nausea, vomiting and abdominal pain
Chronic:	Cancer (bladder) in animals

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: N-NITROSO-N-ETHYLUREA

Synonyms: ENU; N-Ethyl-N-Nitrosourea CAS No: 759-73-9 Molecular Formula: C₃H₇N₃O₂ RTK Substance No: 1410 Description: Light yellow powder or yellow-pink crystal

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
3 - Health	N-Nitroso-N-Ethylurea may burn, but does not readily ignite.	N-Nitroso-N-Ethylurea is highly sensitive to MOISTURE and LIGHT.	
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	N-Nitroso-N-Ethylurea may be decomposed by	
1 - Reactivity	extinguishing agents.	STRONG BASES (such as SODIUM HYDROXIDE and	
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	POTASSIUM HYDROXIDE) to form flammable and reactive <i>Diazoethane</i> .	
ERG Guide #: 171			
Hazard Class: 9			
(Miscellaneous Hazardous Material)			

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Water Solubility:	Soluble
Spill: 25 meters (75 feet)	Melting Point:	217° to 219°F (103° to 104°C) (Decomposes)
Fire: 800 meters (1/2 mile)	Molecular Weight:	117.1
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. Wash contaminated surfaces with 5% <i>Acetic Acid</i> after clean-up is complete.		
EXPOSURE LIMITS	PRC	DTECTIVE EQUIPMENT
No occupational exposure limits have been	Gloves: Nitrile	and Natural Rubber
established for N-Nitroso-N-Ethylurea.	Coveralls: Tyve	k®
	Respirator: Full fa	acepiece APR with High efficiency filters or SCBA

	HEALTH EFFECTS	
Eyes:	Irritation	ĺ
Skin:	Irritation	
Inhalation:	Nose and throat irritation Headache, dizziness, lightheadedness, and weakness	
Chronic:	Cancer (liver, brain, and intestines) in animals	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: N-NITROSOPYRROLIDINE

Synonyms: NPYR; NO-PYR CAS No: 930-55-2 Molecular Formula: C₄H₈N₂O RTK Substance No: 3000 Description: Yellow liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	N-Nitrosopyrrolidine is a COMBUSTIBLE LIQUID.	N-Nitrosopyrrolidine reacts vigorously with REDUCING AGENTS (such as LITHIUM, SODIUM,
2 - Fire	Use dry chemical, CO ₂ , water spray or foam as	ALUMINUM and their HYDRIDES) and OXIDIZING
0 - Reactivity	extinguishing agents.	AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 3082	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> .	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
ERG Guide #: 171	Use water spray to keep fire-exposed containers	
Hazard Class: 6.1	cool.	
(Poison)		

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

No environmental information is available.

EXPOSURE LIMITS

No occupational exposure limits have been established for **N-Nitrosopyrrolidine**.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Chronic:	Cancer (liver and lung) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Not available
Flash Point:	181°F (83°C)
Vapor Density:	1.2 (air = 1)
Vapor Pressure:	0.06 mm Hg at 68°F (20°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Miscible
Boiling Point:	417°F (214°C)
Molecular Weight:	100.1

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene
Coveralls:	DuPont Tyvek®
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Remove** contaminated clothing and wash contaminated skin with soap and water.



Common Name: OCTANE

Synonyms: n-Octane; Normal Octane; Alkane C(8) CAS No: 111-65-9 Molecular Formula: C₈H₁₈ RTK Substance No: 1434 Description: Clear, colorless liquid with a gasoline-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID	Octane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
3 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	Water may not be effective in fighting fires.	NITRATES, CHLORINE, BROMINE and FLUORINE); NITRIC ACID; and COMBUSTIBLE
DOT#: UN 1262	POISONOUS GASES ARE PRODUCED IN FIRE.	MATERIALS.
ERG Guide #: 128	Use water spray to keep fire-exposed containers cool.	
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	
	Flow or agitation may generate electrostatic charges. Octane may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of Octane.

DO NOT wash into sewer.

Octane may be hazardous to the environment, especially to aquatic organisms.

EXPOSURE LIMITS

OSHA: 500 ppm, 8-hr TWA

- NIOSH: 75 ppm, 10-hr TWA; 385 ppm, 15-min Ceiling
- ACGIH: 300 ppm, 8-hr TWA
- IDLH: 1,000 ppm

The Protective Action Criteria values are:

PAC-1 = 300 ppm PAC-2 = 385 ppm PAC-3 = 1,000 ppm

HEALTH EFFECTS

Eves: Irritation Skin: Irritation Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, dizziness, lightheadedness, confusion and passing out

PHYSICAL PROPERTIES		
Odor Threshold:	48 to 150 ppm	
Flash Point:	56°F (13°C)	
LEL:	1%	
UEL:	6.5%	
Auto Ignition Temp:	403°F (206°C)	
Vapor Density:	3.9 (air = 1)	
Vapor Pressure:	10 mm Hg at 68°F (20°C)	
Specific Gravity:	0.7 (water = 1)	
Water Solubility:	Insoluble	
Boiling Point:	258°F (126°C)	
Melting Point:	-70°F (-57°C)	
Critical Temperature:	563°F (295°C)	
Ionization Potential:	9.82 eV	
Molecular Weight:	114.2	

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile, Fluoroelastomer and Viton (4 to 8-hr breakthrough)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough) >10% LEL - Use flash protection or turn-out gear
Respirator:	>75 ppm - Supplied Air >300 ppm SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water



Common Name: ORYZALIN

Synonyms: Dirimal; Surflan CAS No: 19044-88-3 Molecular Formula: $C_{12}H_{18}N_4O_6S$ RTK Substance No: 3409 Description: Odorless, bright yellow-orange, crystalline powder

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Oryzalin may burn, but does not readily ignite, however, it is often dissolved in a liquid carrier	Oryzalin is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM	
1 - Fire	which may be flammable or combustible.	HYDROXIDE).	
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.		
DOT#: UN 2588	POISONOUS GASES ARE PRODUCED IN FIRE,		
ERG Guide #: 151	including Nitrogen Oxides and Sulfur Oxides.		
Hazard Class: 6.1			
(Poison)			

SPILL/LEAKS

Isolation Distance:

Spills (solid): 25 meters (75 feet) (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Oryzalin is toxic to aquatic organisms and can harm birds.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Oryzalin**.

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Headache, dizziness, muscle weakness, nausea and vomiting
Chronic:	Cancer (thyroid) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	200°F (93°C)
Vapor Pressure:	9.8 x 10 ⁻⁹ mm Hg at 77°F (25°C)
Specific Gravity:	1.1 to 1.2 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	212°F (100°C)
Melting Point:	286° to 288°F (141° to 142°C)
Molecular Weight:	346.4

Gloves: Butyl and Silver Shield®/4H® (>4-hr breakthrough for Amides)

Coveralls: Tyvek® (for *pesticides*, *hazardous dusts*)

Respirator: Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: OXALIC ACID

Synonyms: Oxalic Acid Dihydrate; Ethanedionic Acid CAS No: 144-62-7 Molecular Formula: $C_2H_2O_4$ RTK Substance No: 1445 Description: Colorless to white, odorless powder or crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 3261	Oxalic Acid is a COMBUSTIBLE SOLID.Use dry chemical, CO2, water spray or alcohol- resistant foam as extinguishing agents.POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Formic Acid</i> .Use water spray to keep fire-exposed containers	Oxalic Acid reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); FURFURYL ALCOHOL; and CHLORITES to cause fires and explosions. Oxalic Acid will react with SILVER and SILVER COMPOUNDS to form explosive <i>Silver Oxalate</i> .	
ERG Guide #: 154 Hazard Class: 8 (Corrosive)	cool. Use water spray to prevent dust/air mixtures from igniting or exploding.	Oxalic Acid is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); and ACID CHLORIDES.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Neutralize liquid spills with lime or soda ash.

Oxalic Acid may be dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

OSHA: 1 mg/m³, 8-hr TWA

NIOSH: 1 mg/m³, 10-hr TWA; 2 mg/m³, STEL **ACGIH:** 1 mg/m³, 8-hr TWA; 2 mg/m³, STEL

IDLH: 500 mg/m³

The Protective Action Criteria values are: PAC-1 = 2 mg/m³ PAC-2 = 40 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation and burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, convulsions, coma and even death

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Combustible
Vapor Density:	4.3 (air = 1)
Vapor Pressure:	<0.001 mm Hg at 68°F (20°C)
Specific Gravity:	1.9 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Sublimes (goes from a solid directly to a gas)
Melting Point:	215°F (101.5°C) (Decomposes)
Molecular Weight:	90.04
pH:	1.3 (in solution)

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, Silver Shield®/4H® and Viton (>8-hr breakthrough for Oxalic Acid <i>in solution</i>)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for Oxalic Acid <i>in solution</i>)
Respirator:	>1 mg/m ³ - full facepiece APR with High efficiency filters

>50 mg/m³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: 1,2-OXATHIOLANE, 2,2-DIOXIDE

Synonyms: Propane Sultone; 1,3-Propane Sultone CAS No: 1120-71-4 Molecular Formula: $C_3H_6O_3S$ RTK Substance No: 1446 Description: White, crystalline solid or colorless liquid

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	1,2-Oxathiolane, 2,2-Dioxide may burn, but does not readily ignite.	1,2-Oxathiolane, 2,2-Dioxide reacts with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and	
1 - Fire	Extinguish fire using an agent suitable for type of	 their HYDRIDES) to produce toxic and flammable Hydrogen Sulfide gas. 1,2-Oxathiolane, 2,2-Dioxide reacts with MOIST AIR to form toxic <i>3-Propane Sulfonic Acid</i>. 	
0 - Reactivity	surrounding fire.		
DOT#: UN 2811	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Dioxide</i> .		
ERG Guide #: 154	Use water spray to keep fire-exposed containers		
Hazard Class: 6.1	cool.		
(Poison)			

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Flash Point:	>235° F (>113° C)
Spills (solid): 25 meters (75 feet)	Specific Gravity:	1.39 (water = 1)
(liquid): 50 meters (150 feet)	Water Solubility:	Slightly soluble
Fire: 800 meters (1/2 mile)	Boiling Point:	311° to 315° F (155° to 157° C)
Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.	Melting Point:	87° F (31° C)
Moisten spilled <i>solid</i> material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.	Molecular Weight:	122.1
DO NOT wash into sewer.		

EXPOSURE LIMITS	PROTECTIVE EQUIPMENT	
NIOSH: Lowest feasible	Gloves:	Nitrile and Neoprene (for <i>solid</i> 1,2-Oxathiolane, 2,2- Dioxide)
ACGIH: Low as possible The Protective Action Criteria values are:	Coveralls:	Tyvek® (for <i>solid</i> 1,2-Oxathiolane, 2,2-Dioxide)
PAC-1 = 0.5 mg/m^3	Respirator:	>0.5 mg/m ³ - SA or SCBA
$PAC-2 = 3.5 \text{ mg/m}^3$		-
PAC-3 = 250 mg/m ³		

HEALTH EFFECTS		
Eyes:	Irritation	
Skin:	Irritation	
Inhalation:	Nose and throat irritation	
Chronic:	Cancer (Leukemia and brain, skin and mammary gland)	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PARAFORMALDEHYDE

Synonyms: Metaformaldehyde; Paraform; Polyoxymethylene CAS No: 30525-89-4 Molecular Formula: (CH₂O)n (Polymer) RTK Substance No: 1454 Description: White, crystalline solid with an odor of *Formaldehyde*

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE SOLID Use dry chemical, CO ₂ , water spray or alcohol-	Paraformaldehyde decomposes slowly in WATER to form toxic and flammable <i>Formaldehyde</i> gas.
2 - Fire	resistant foam as extinguishing agents.	Paraformaldehyde is not compatible with OXIDIZING
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 2213	including <i>Formaldehyde</i> , which is HIGHLY FLAMMABLE.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG
ERG Guide #: 133	Use water spray to keep fire-exposed containers	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM
Hazard Class: 4.1 (Flammable Solid)	cool. Paraformaldehyde may form an ignitable vapor/air mixture in closed tanks or containers at temperatures above 160°F (71°C).	HYDROXIDE and POTASSIUM HYDROXIDE)

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Paraformaldehyde is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA: 0.75 ppm, 8-hr TWA; 2 ppm, STEL (as *Formaldehyde*) ACGIH: 0.3 ppm, Ceiling

IDLH: 20 ppm (as Formaldehyde)

The Protective Action Criteria values are:

PAC-1 = 12.5 mg/m³ PAC-2 = 75 mg/m³ PAC-3 = 100 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible damage
Skin:	Severe irritation and burns
Inhalation:	Nose, mouth, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Formaldehyde-like
Flash Point:	160°F (71°C)
LEL:	7%
UEL:	73%
Auto Ignition Temp:	572°F (300°C)
Vapor Density:	1.03 (air = 1)
Vapor Pressure:	1.2 mm Hg at 75°F (25°C)
Specific Gravity:	1.46 (water = 1)
Water Solubility:	Slowly dissolves
Boiling Point:	Decomposes
Melting Point:	313°F (156°C)
Molecular Weight:	600 (approx.)

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Nitrile, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Formaldehyde</i>)
Coveralls:	Tychem® SL, CPF 3, F, BR, Responder®, and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Formaldehyde</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: PARAQUAT

Synonyms: Dimethyl Viologen; Pathclear; Sweep CAS No: 4685-14-7 Molecular Formula: C₁₂H₁₄N₂ RTK Substance No: 1458 Description: Colorless to yellow, odorless solid

HAZARD DATA

-		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Paraquat itself does not burn.	Paraquat is not compatible with OXIDIZING AGENTS
0 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	including Nitrogen Oxides.	CHLORINE, BROMINE and FLUORINE) and STRONG
DOT# : UN 2781	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
ERG Guide #: 151	cool.	
Hazard Class: 6.1		
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

Ventilate and wash area after clean-up is complete.

DO NOT wash into sewer.

Toxic to animals, birds and aquatic life.

EXPOSURE LIMITS

OSHA:	0.5 mg/m ³ , 8-hr TWA (as <i>respirable dust</i>)
NIOSH:	0.1 mg/m ³ , 10-hr TWA (as <i>Paraquat Dichloride</i>)
ACGIH:	0.5 mg/m ³ , 8-hr TWA (as <i>total particulate</i>) 0.1 mg/m ³ , 8-hr TWA (as the <i>respirable fraction</i>)
IDLH:	1 mg/m ³

HEALTH EFFECTS	
Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing, nose bleeds and severe shortness of breath (pulmonary edema)
	Nausea and vomiting
Chronic:	Cancer (skin) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Very soluble
Boiling Point:	347° to 356°F (175° to 180°C)
Molecular Weight:	186

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H/®
Coveralls:	DuPont® Tyvek®
Respirator:	>0.1 mg/m ³ - full facepiece APR with Organic vapor

•	cartridges and High efficiency pre-filters
	<1 mg/m ³ - Supplied air
	>1 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: PARATHION

Synonyms: Ethyl Parathion; Methyl Parathion CAS No: 56-38-2 Molecular Formula: C10H14NO5PS RTK Substance No: 1459 Description: Yellowish liquid with a garlic-like odor when pure, commercial product is usually dissolved in a hydrocarbon solvent (such as *Toluene* or *Xylene*)

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health	Parathion is often dissolved in a liquid carrier which may be flammable or combustible.	Parathion is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	Use dry chemical, CO ₂ , water spray or foam	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	as extinguishing agents. POISONOUS GASES ARE PRODUCED IN	CHLORINE, BROMINE and FLUORINE) and ALKALINE MATERIALS (such as LIME, SODA ASH, and BAKING
DOT#: UN 2783	FIRE, including Nitrogen Oxides, Sulfur Oxides,	SODA).
ERG Guide #: 152	Phosphorus Oxides and Diethyl Sulfide.	Parathion attacks some forms of PLASTICS, RUBBER or COATINGS.
Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool and to disperse vapors.	

SPILL/LEAKS	HYSICAL PROPERTIES
On Distance: D meters (150 feet)Odor Thresh Flash Point: Vapor Press Specific Gra Water Solub Boiling Point Freezing Point Free	old: 0.04 ppm 248° to 320°F (120° to 160°C) ure: 0.00004 mm Hg at 68°F (20°C) vity: 1.26 (water = 1) lity: Slightly soluble : 707°F (375°C) nt: 43°F (6°C)
, because of the possibility of an explosion. Γ wash into sewer.	

EXPOSURE LIMITS

	0.1 mg/m ³ , 8-hr TWA
	0.05 mg/m ³ , 10-hr TWA
	0.05 mg/m ³ , 8-hr TWA
IDLH:	10 mg/m ³
The Prote	ective Action Criteria values are:
PAC-1 =	$= 0.15 \text{ mg/m}^3$ PAC-2 = 2 mg/m ³
$PAC-3 = 10 \text{ mg/m}^3$	

HEALTH EFFECTS		
Eyes:	Eyes: Irritation	
Skin:	Irritation	
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)	
	Headache, sweating, nausea and vomitting, loss of coordination, and death (Organophosphate poisoning)	
Chronic:	Cancer (adrenal gland) in animals	

Gloves:	Butyl and SilverShield®/4H® (>8-hr breakthrough for Organophosphorus compounds)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough

- for Organophosphorus compounds) Full facepiece APR with Organic vapor cartridges and **Respirator:** P100 filters
 - >2.5 mg/m³ SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Shampoo hair immediately if contaminated.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: PENDIMETHALIN

Synonyms: Phenoxalin; Prowl®; Stomp® CAS No: 40487-42-1 Molecular Formula: C₁₃H₁₉N₃O₄ RTK Substance No: 3415 Description: Orange-yellow, crystalline solid with a fruit-like odor; the commercial products may be dark orange liquids

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Although Pendimethalin does not burn or burns with difficulty, it may be dissolved in a liquid carrier that is	Pendimethalin is not compatible with OXIDIZING AGENTS (such as
1 - Fire	flammable or combustible.	PERCHLORATES, PEROXIDES,
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and
DOT#: None	POISONOUS GASES ARE PRODUCED IN FIRE, including	FLUORINE).
ERG Guide #: None	Nitrogen Oxides.	Pendimethalin is slowly decomposed by light.
Hazard Class: None	Use water spray to keep fire-exposed containers cool. Flow or agitation may generate electrostatic charges.	

Molecular Weight:

SPILL/LEAKS

Isolation Distance:

Spill (solid): 25 meters (75 feet)

Spill (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Collect solid material in the most convenient and safe manner and place into sealed containers for disposal. **Pendimethalin** is toxic to aquatic life and does not biodegrade quickly.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Pendimethalin**.

PHYSICAL PROPERTIESOdor Threshold:FruityFlash Point: 92° to $>230^{\circ}$ F (33° to $>110^{\circ}$ C)Vapor Pressure: 3×10^{-5} mm Hg at 77° F (25° C)Specific Gravity:1.19 (water = 1)Water Solubility:InsolubleBoiling Point: 126° F (52° C)Melting Point: 117° to 127° F (47° to 53° C)

	PROTECTIVE EQUIPMENT	
Gloves:	Bloves: Viton/Butyl and Barrier® (>4-hr breakthrough for Amines) and Anilines)	
Coveralls:	Tyvek® for solids and aerosols	
	Tychem® SL, BR, CSM and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for liquid mixtures containing Pendimethalin)	
Respirator:	Small spill: full facepiece APR with <i>Organic vapor</i> and <i>P100 cartridges</i> Large spill or fire: SCBA	

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HEALTH EFFECTS

Eyes:IrritationSkin:Irritation (skin absorbable)Inhalation:Headache, dizziness, muscle weakness,
nausea and vomitingChronic:Cancer (thyroid) in animals

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: **PENTANE**

Synonyms: Amyl Hydride; Normal Pentane CAS No: 109-66-0 Molecular Formula: C_5H_{12} RTK Substance No: 1476 Description: Clear, colorless liquid with a mild gasoline-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 4 - Fire 0 - Reactivity DOT#: UN 1265 ERG Guide #: 128	 FLAMMABLE LIQUID Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. 	Pentane may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) to cause fires and explosions. Pentane is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and
Hazard Class: 3 (Flammable)	Pentane may form an ignitable vapor/air mixture in closed tanks or containers.	POTASSIUM HYDROXIDE); and COMBUSTIBLE MATERIALS.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Pentane**. DO NOT wash into sewer.

EXPOSURE LIMITS

 OSHA:
 1,000 ppm, 8-hr TWA

 NIOSH:
 120 ppm, 10-hr TWA; 610 ppm, 15-min Ceiling

 ACGIH:
 600 ppm, 8-hr TWA

 IDLH:
 1,500 ppm

The Protective Action Criteria values are:

PAC-1 = 610 ppm PAC-2 = 610 ppm PAC-3 = 1,500 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, confusion, lightheadedness, loss of balance and passing out

PHYSICAL PROPERTIES

P. Construction of the second s	
Odor Threshold:	Gasoline-like
Flash Point:	-56°F (-49°C)
LEL:	1.5%
UEL:	7.8%
Auto Ignition Temp:	500°F (260°C)
Vapor Density:	2.48 (air = 1)
Vapor Pressure:	426 mm Hg at 68°F (20°C)
Specific Gravity:	0.6 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	97°F (36°C)
Freezing Point:	-202°F (-130°C)
Ionization Potential:	10.34 eV
Molecular Weight:	72.15

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough for <i>Hydrocarbons, aliphatic</i>)
Respirator:	>120 ppm - Supplied air >610 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PERMETHRIN

Synonyms: 3-Phenoxybenzyl (IRS)-cis-trans-3-(2,2-Dichlorovinyl)-2,2-Dimethylcyclopropanecarboxylate CAS No: 52645-53-1 Molecular Formula: C₂₁H₂₀Cl₂O₃ RTK Substance No: 3422 Description: White to pale yellow or beige granular or crystalline solid or a light brown liquid (*Pyrethroid insecticide*)

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Permethrin does not burn or burns with difficulty.	Permethrin is not compatible with OXIDIZING AGENTS
1 - Fire	However, it is often dissolved in a liquid carrier which may be flammable or combustible.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use dry chemical, CO ₂ , or foam as extinguishing	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 2588	agents. POISONOUS GASES ARE PRODUCED IN FIRE,	
ERG Guide #: 151	including Hydrogen Chloride.	
Hazard Class: 6.1 (Poison)	Use water spray only to keep fire-exposed containers cool.	

SPIL	_L/L	.EA	KS
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Isolation Distance:

Spill (solid): 25 meters (75 feet)

Spill (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. Moisten *solid* material first or use a HEPA-filter

vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Permethrin is highly toxic to fish and aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Permethrin**.

PHYSICAL PROPERTIES		
Flash Point:	Varies (dependent on "carrier")	
Vapor Pressure:	2.15 x 10 ⁻⁸ mm Hg at 68°F (20°C)	
Specific Gravity:	1.2 (water = 1)	
Water Solubility:	Insoluble	
Boiling Point:	392°F (200°C)	
Melting Point:	93°F (34°C)	
Molecular Weight:	391.3	

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Halogen compounds, aromatic</i>)
Coveralls:	Tychem® F, C3, BR, CSM and TK (>8-hr breakthrough for <i>Halogen compounds, aromatic</i>)
Respirator:	Spill: full facepeice APR with Organic vapor cartridges and <i>P100 prefilters</i> Fire: SCBA

	HEALTH EFFECTS
Eyes:	Irritation and burns
Skin:	Irritation, burns, itching, rash and redness
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, fatique, muscle

Headache, dizziness, fatigue, muscle weakness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PETROLEUM DISTILLATES

Synonyms: Crude Oil; Petroleum; Petroleum Oil CAS No: 8002-05-9 Molecular Formula: Varies RTK Substance No: 2648

Description: Dark yellow to brown or green-black liquids with a mild gasoline or kerosene odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	FLAMMABLE LIQUIDS	Petroleum Distillates may react violently with OXIDIZING AGENTS (such as NITROGEN TETROXIDE,
3 - Fire	Use dry chemical, CO ₂ , alcohol-resistant foam or other foam extinguishing agents, as water may not be effective	PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Reactivity	in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and NITRIC ACID.
DOT#: UN 1268	CONTAINERS MAY EXPLODE IN FIRE.	
ERG Guide #: 128	Use water spray to keep fire-exposed containers cool.	
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source and flash back.	
	Flow or agitation may generate electrostatic charges.	
	Petroleum Distillates may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill:	50 meters (150 feet)	
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Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

Bond and ground containers when transferring **Petroleum Distillates**.

Use only non-sparking tools and equipment.

Keep **Petroleum Distillates** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS

 OSHA:
 500 ppm, 8-hr TWA

 NIOSH:
 88 ppm, 10-hr TWA; 450 ppm, Ceiling (15-minute)

 IDLH:
 1.100 ppm

The Protective Action Criteria values are:

PAC-1 = 87.5 ppm PAC-2 = 450 ppm

PAC-3 = 1,100 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath
	Headache, dizziness, confusion and loss of balance

PHYSICAL PROPERTIES

1	
Odor Threshold:	Mild gasoline or kerosene-like
Flash Point:	-40° to -86°F (-40° to -66°C)
LEL:	1.1%
UEL:	5.9%
Vapor Pressure:	40 mm Hg at 68°F (20°C) (approximately)
Specific Gravity:	0.78 to 0.97 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	86 ° to 460°F (30° to 238°C)
Freezing Point:	-99°F (-73°C)
Molecular Weight:	98 (approximately)

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®, Viton, Viton/Butyl and Barrier® (>8-hr breakthrough for <i>Hydrocarbons</i>)
Coveralls:	Tychem® BR, CSM and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons</i>)
	Use turn out gear or flash protection if ignition/fire is the greatest hazard.
Respirator:	>88 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PHENANTHRENE

combustion of wood and fossil fuels

Synonyms: Phenantrin; Coal Tar Pitch Volatiles CAS No: 85-01-8 Molecular Formula: C₁₄H₁₀ RTK Substance No: 3004 Description: Colorless to white, crystalline solid with a faint odor, also present as a by-product of incomplete

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Phenanthrene may burn, but does not readily ignite.	Phenanthrene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	Use dry chemical, CO_2 or water as extinguishing	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	agents.	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers	
ERG Guide #: 171	cool.	
Hazard Class: 9		
(Environmentally Hazardous Substance)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Phenanthrene is an environmental hazard and very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA: 0.2 mg/m^3 , 8-hr TWANIOSH: 0.1 mg/m^3 , 10-hr TWAACGIH: 0.2 mg/m^3 , 8-hr TWAIDLH: 80 mg/m^3 (All the above are for Coal Tar Pitch Volatiles)The Protective Action Criteria values are:PAC-1 = 6 mg/m³PAC-2 = 40 mg/m³

PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation

PHYSICAL PROPERTIES

Odor Threshold:	Aromatic odor
Flash Point:	340°F (171°C)
Vapor Density:	6.14 (air = 1)
Vapor Pressure:	1 mm Hg at 245°F (118.3°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	642°F (339°C)
Melting Point:	212°F (100°C)
Molecular Weight:	178.23

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Barrier® (>1-hr breakthrough for <i>Coal Tar Extract</i>)
Coveralls:	Tyvek®
Respirator:	 >0.1 mg/m³ - full facepiece APR with Organic vapor and P100 cartridges >1 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Eves: Skin:

Inhalation:

Irritation and burns

(pulmonary edema)

out

Nose, throat and lung irritation with

Methemoglobinemia with headache,

dizziness, lightheadedness and passing

coughing and severe shortness of breath

Common Name: PHENOL

Synonyms: Carbolic Acid; Hydroxybenzene CAS No: 108-95-2 Molecular Formula: C₆H₅OH RTK Substance No: 1487

Description: Colorless or white, crystalline solid that is usually sold or used in solution

HAZARD DATA Hazard Rating Firefighting Reactivity Phenol is not compatible with OXIDIZING AGENTS (such as Phenol is a COMBUSTIBLE SOLID. 4 - Health PERCHLORATES, PEROXIDES, PERMANGANATES, Use dry chemical, CO₂, water spray or 2 - Fire CHLORATES, NITRATES, CHLORINE, BROMINE and alcohol-resistant foam as extinguishing FLUORINE); ALUMINUM CHLORIDE; CALCIUM 0 - Reactivity agents. HYPOCHLORITE; STRONG ACIDS (such as POISONOUS GASES ARE PRODUCED IN HYDROCHLORIC, SULFURIC and NITRIC); DOT#: UN 1671 FIRE. FORMALDEHYDE; ISOCYANATES; BUTADIENE; SODIUM ERG Guide #: 153 Use water spray to keep fire-exposed NITRITE; and many other materials. containers cool. Hazard Class: 6.1 Phenol is corrosive to COPPER, BRASS and STAINLESS (Poison) STEELS.

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Odor Threshold:	0.4 ppm
Spill: 25 motors (75 foot) (Solid)	Flash Point:	175°F (79.4°C)
Spill: 25 meters (75 feet) (Solid) 50 meters (150 feet) (Liquid)	LEL:	1.3%
, , , , , ,	UEL:	8.6%
Fire: 800 meters (1/2 mile)	Auto Ignition Temp:	1,319°F (715°C)
For Phenol in <i>solution</i> , cover with sand and place into	Vapor Density:	3.2 (air = 1)
sealed containers for disposal.	Vapor Pressure:	0.4 mm Hg at 68°F (20°C)
Collect solid material in the most convenient and	Specific Gravity:	1.1 (water = 1)
safe manner and place into sealed containers for	Water Solubility:	Soluble
disposal.	Boiling Point:	358°F (181°C)
DO NOT wash into sewer.	Melting Point:	106°F (41°C)
Neutralize water spills with dry lime or soda ash.	Ionization Potential:	8.5 eV
Phenol is harmful to aquatic life at very low	Molecular Weight:	94.1
concentrations.	pH:	6 (aqueous solution)

EXPOSURE LIMITS		PROTECTIVE EQUIPMENT
OSHA: 5 ppm, 8-hr TWA NIOSH: 5 ppm, 10-hr TWA; 15.6 ppm, 15-min Ceiling	Gloves:	Butyl, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
ACGIH: 5 ppm, 8-hr TWA IDLH: 250 ppm	Coveralls:	Tychem® BR, Responder®, and TK; Trellchem® HPS and VPS (>8-hr breakthrough)
The Protective Action Criteria values are: PAC-1 = 15 ppm PAC-2 = 23 ppm PAC-3 = 200 ppm	Respirator:	>5 ppm - full facepiece APR with Organic vapor cartridges and High efficiency prefilters>50 ppm - SCBA
HEALTH EFFECTS	FIRST AID AND DECONTAMINATION	
Eyes: Irritation and burns	Remove the person from exposure.	

	Flush eyes with large amounts of water for at least 30 minutes. Ren	nove
	contact lenses if worn. Seek medical attention.	

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: PHENOTHRIN

Synonyms: 3-Phenoxybenzyl(1R)-cis-trans-Chrysanthemate; Phenothrine; Sumitrin CAS No: 26002-80-2 Molecular Formula: $C_{23}H_{26}O_3$ RTK Substance No: 3727 Description: Pale yellow to yellow-brown liquid *Pyrethroid* insecticide

	HAZARD DATA				
Hazard Rating	Firefighting	Reactivity			
2 - Health	Phenothrin does not burn, however, it is often dissolved in a liquid carrier that may be	Phenothrin is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM			
1 - Fire	flammable or combustible.	HYDROXIDE).			
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.				
DOT#: UN 2902	POISONOUS GASES ARE PRODUCED IN FIRE.				
ERG Guide #: 151					
Hazard Class: 6.1 (Poison)					

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance:	Flash Point:	Combustible/Flammable	
Spill: 50 meters (150 feet)	Vapor Pressure:	1.43 x 10 ⁻⁷ mm Hg at 70°F (21°C)	
Fire: 800 meters (1/2 mile)	Specific Gravity:	1.06 (water = 1)	
Absorb liquids in dry sand, earth, or a similar material	Water Solubility:	Insoluble	
and place into sealed containers for disposal. DO NOT wash into sewer.	Boiling Point:	>554°F (>290°C)	
Phenothrin is very toxic to aquatic organisms.	Molecular Weight:	350.46	

EXPOSURE LIMITS

No occupational exposure limits have been established for **Phenothrin**.

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Silver Shield®/4H and Barrier® (>1-hr breakthrough for <i>Esters</i>)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for <i>Esters</i>)
Respirator:	Spill - full facepiece APR with Organic vapor and P100 cartridges
	Fire - SCBA

HEALTH EFFECTS		
Eyes: Skin:	Irritation and burns Irritation, burns, itching, rash and redness (skin absorbable)	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Headache, dizziness, fatigue, muscle weakness, nausea and vomiting	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: m-PHENYLENEDIAMINE

Synonyms: 3-Aminoaniline; 1,3-Benzenediamine; 1,2-Phenylenediamine CAS No: 108-45-2 Molecular Formula: $C_6H_8N_2$ RTK Substance No: 1316 Description: White, crystalline solid that turns red on exposure to air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity				
2 - Health	m-Phenylenediamine may burn, but does not readily ignite.	m-Phenylenediamine reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,				
1 - Fire	Use dry chemical or water as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,				
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	CHLORINE, BROMINE and FLUORINE); STRONG				
DOT#: UN 1673	including Nitrogen Oxides. Use water spray to keep fire-exposed containers	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID ANHYDRIDES; ACID CHLORIDES; and CHLOROFORMATES.				
ERG Guide #: 153	cool.					
Hazard Class: 6		Protect from SUNLIGHT.				
(Toxic)						

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

m-Phenylenediamine is very toxic to aquatic organisms.

EXPOSURE LIMITS

ACGIH: 0.1 mg/m³, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 0.3 mg/m^3

 $PAC-2 = 10 \text{ mg/m}^{3}$

PAC-3 = 125 mg/m^3

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)

PHYSICAL PROPERTIES

Flash Point:	280° to 369°F (138° to 187°C)
LEL:	1.3%
UEL:	9.8%
Auto Ignition Temp:	1,040°F (560°C)
Vapor Density:	3.7 (air = 1)
Vapor Pressure:	0.62 mm Hg at 212°F (100°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	540° to 543°F (282° to 284°C)
Melting Point:	145° to 147°F (63° to 64°C)
Molecular Weight:	108.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, SilverShield®/4H®; Barrier (>8-hr breakthrough for Amines, aromatic, primary)
Coveralls:	Tyvek® (solid m-Phenylenediamine); Tychem® BR and TK (>8-hr breakthrough for <i>Amines, aromatic, primary</i>)
Respirator:	 >0.1 mg/m³ - Full facepiece APR with Organic vapor cartridges and P100 prefilters >10 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



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Common Name: PHENYLMERCURIC ACETATE

Synonyms: Acetoxyphenylmercury; PMA CAS No: 62-38-4 Molecular Formula: C₈H₈HgO₂ **RTK Substance No: 1502** Description: Odorless, white to yellow-white, crystalline powder

HAZARD DATA				
Hazard Ra	ting Firefighting			Reactivity
Hazard RatingFirefighting3 - HealthDry Phenylmercuric Acetate is a CO1 (Dry) - FireSOLID, but it may be dissolved in a2 (Solution) - FireUse dry chemical, CO2, water spray of0 - Reactivityextinguishing agents.DOT#: UN 1674Water may not be effective in fighting Phenylmercuric Acetate in an orgateERG Guide #: 151POISONOUS GASES ARE PRODUCT including Mercury Oxides.Use water spray to keep fire-exposed			ELAMMABLE or foam as fires involving <i>nic solution.</i> CED IN FIRE,	PhenyImercuric Acetate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SULFUR; AMMONIA; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE)
	SPILL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers. Moisten spilled dry material first or use a vacuum specific for <i>Mercury</i> for clean-up and place into sealed containers. Keep PhenyImercuric Acetate in organic solution out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. PhenyImercuric Acetate is very toxic to aquatic organisms and may be hazardous to the environment.			Odor Thresho Flash Point: Vapor Density Vapor Pressu Specific Grav Water Solubil Melting Point Molecular We	>100°F ($38^{\circ}C$) ty: 11.6 (air = 1) ure: 6 x 10 ⁻⁶ mm Hg at $68^{\circ}F$ ($20^{\circ}C$) vity: 0.24 (water = 1) ility: Soluble t: $300^{\circ}F$ ($149^{\circ}C$)
l	EXPOSURE LIMITS	ור		PROTECTIVE EQUIPMENT
NIOSH: 0.	SHA: 0.1 mg/m ³ , 8-hr TWA IOSH: 0.05 mg/m ³ , 10-hr TWA		Gloves:	Butyl, Nitrile, Neoprene, Natural Rubber, Polyvinyl Chloride, Silver Shield®/4H® and Viton (>8-hr breakthrough for <i>Mercury</i>)
IDLH: 10	025 mg/m ³ , 8-hr TWA 9 mg/m ³		Coveralls:	Tychem® SL, CPF 3, F, BR, LV, Responder® and TK (>8-hr breakthrough for <i>Mercury</i>)
(A	(All of the above are for <i>Mercury vapor</i>)		Respirator:	<0.5 mg/m ³ - APR with filter specific for <i>Mercury</i> >0.5 mg/m ³ - Supplied air >10 mg/m ³ - SCBA
	HEALTH EFFECTS		FIRS	ST AID AND DECONTAMINATION
Eyes: Skin: Inhalation:	Irritation and burns Irritation and burns, skin rash, itching and gray skin color Nose, throat and lung irritation with		Flush eyes wi contact lenses Quickly remov	person from exposure. with large amounts of water for at least 15 minutes. Remove es if worn. Seek medical attention. ove contaminated clothing and wash contaminated skin with
Chronic:	coughing, wheezing and severe shortness of breath (pulmonary edema) Nausea, vomiting and tremors <i>Methylmercury compounds</i> may cause cancer (kidney) in animals		Transfer prom	ts of d water. al respiration if breathing has stopped and CPR if necessary. mptly to a medical facility. ervation is recommended as symptoms may be delayed.



Common Name: o-PHENYLPHENOL

Synonyms: 2-Biphenylol; 2-Hydroxydiphenyl; 2-Phenylphenol CAS No: 90-43-7 Molecular Formula: $C_{12}H_{10}O$ RTK Substance No: 1439 Description: White, buff, to light lavender, crystalline solid

	HAZARD DATA					
Hazard Rating	Firefighting	Reactivity				
3- Health	COMBUSTIBLE SOLID Use dry chemical, CO ₂ , water spray or alcohol-	o-Phenylphenol is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG				
1 - Fire	resistant foam as extinguishing agents.					
0 - Reactivity POISONOUS GASES ARE PRODUCEI FIRE.		BASES (such as SODIUM HYDROXIDE and				
DOT#: None	Use water spray to keep fire-exposed containers	POTASSIUM HYDROXIDE).				
ERG Guide #: None	cool.					
Hazard Class: None	o-Phenylphenol in <i>powder</i> or <i>granular</i> form may form an ignitable vapor/air mixture in closed tanks or containers.					

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Moisten spilled material with *Alcohol* first, or use a HEPA-filter vacuum for clean-up, and place into sealed containers for disposal.

Wash area with *Alcohol* and then with a strong soap and water solution.

DO NOT wash into sewer.

o-Phenylphenol is toxic to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for **o-Phenylphenol**.

The Protective Action Criteria values are:

PAC-1 = 75 mg/m³

 $PAC-2 = 500 \text{ mg/m}^3$

 $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing

PHYSICAL PROPERTIES

Flash Point:	255°F (124°C)
Auto Ignition Temp:	986°F (530°C)
Vapor Pressure:	1 mm Hg at 212°F (100°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	527° to 547°F (275° to 286°C)
Melting Point:	132° to 135°F (56° to 57°C)
pH:	11.2 to 11.6 (1% solution)
Molecular Weight:	170.2

	PROTECTIVE EQUIPMENT
Gloves:	Butyl and Viton (>8-hr breakthrough for <i>Hydroxyl compounds, aromatic</i>)
Coveralls:	Tyvek®
Respirator:	Small Spill: Full facepiece APR with <i>High efficiency filters</i> Large Spill or Fire: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.
Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.
Begin artificial respiration if breathing has stopped and CPR if necessary.
Transfer promptly to a medical facility.



Common Name: PHENYTOIN

Synonyms: 5,5-Diphenylhydantoin CAS No: 57-41-0 Molecular Formula: $C_{15}H_{12}N_2O_2$ RTK Substance No: 1507

Description: Fine white or almost white, odorless, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire 0 - Reactivity DOT#: None	 Phenytoin may burn, but does not readily ignite. Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>. 	Phenytoin is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and may react with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).
ERG Guide #: None Hazard Class: None	Use water spray to keep fire-exposed containers cool.	

SPILL/LEAKS PHYSICAL PROPERTIES **Odor Threshold:** Odorless **Isolation Distance:** 1.2 x 10⁻¹⁰ mm Hg at 77 °F (25 °C) Vapor Pressure: Spill: 25 meters (75 feet) **Specific Gravity:** 1.29 (water = 1) Fire: 800 meters (1/2 mile) Water Solubility: Very slightly soluble Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers **Boiling Point:** Decomposes for disposal. 563 ° to 568 °F (295 ° to 298 °C) **Melting Point:** Wash area with 60 to 70% Ethanol, followed by soap Molecular Weight: 252.28 and water.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Phenytoin**.

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Neoprene
Coveralls:	Tyvek®
Respirator:	 Spill: full facepiece APR with Organic vapor/Acid gas and P100 particulate filter cartridges Fire: SCBA

	HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Headache, dizziness, drowsiness, weakness, tremors and confusion Cancer (lymphatic system) in humans and (lymphatic system and liver) animals	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: PHOSPHOROTHIOIC ACID, O,O-DIMETHYL-S-(2-(METHYLTHIO)

ETHYL ESTER

Synonyms: Methyl Demeton Methyl; Tinox CAS No: 2587-90-8 Molecular Formula: C₅H₁₃O₃PS₂ RTK Substance No: 2910 Description: Pale yellow, oily liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or foam as	Phosphorothioic Acid, O,O-Dimethyl-S-(2- Methylthio)Ethyl Ester may react with REDUCING
1 - Fire	extinguishing agents.	AGENTS (such as LITHIUM, SODIUM, ALUMINUM and
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	their HYDRIDES) to produce highly toxic and flammable <i>Phosphine gas.</i>
DOT#: UN 3018	including <i>Phosphorus Oxides</i> and <i>Sulfur Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE.	DO NOT place Phosphorothioic Acid, O,O-Dimethyl-S-
ERG Guide #: 152	Use water spray to keep fire-exposed containers	(2-Methylthio)Ethyl Ester into unlined steel containers.
Hazard Class: 6.1	cool.	
(Toxic)		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Phosphorothioic Acid, O,O-Dimethyl-S-(2-Methylthio)Ethyl Ester may be toxic to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for Phosphorothioic Acid, O,O-Dimethyl-S-(2-Methylthio)Ethyl Ester.

The Protective Action Criteria values are: PAC-1 = 12.5 mg/m³ PAC-2 = 20 mg/m³ PAC-3 = 20 mg/m³

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Eyes:	No information available
Skin:	No information available (skin absorbable)
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
Chronic:	Headache, sweating, nausea and vomiting, loss of coordination, and death (Organophosphate poisoning)
	High exposure can cause irregular heartbeat (arrhythmia)

PHYSICAL PROPERTIES

243°F (117°C)
1.2 (water = 1)
Soluble
446°F (230°C)
216.25

PROTECTIVE EQUIPMENT

Gloves:	Neoprene (>4-hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)
Respirator:	Full facepiece APR with cartridges approved for <i>Pesticides</i> >12.5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately



Common Name: PHTHALIC ANHYDRIDE

Synonyms: 1,2-Benzendicarboxylic Anhydride; 1,3-Dioxophthalon; 1,3-Isobenzofurandione CAS No: 85-44-9 Molecular Formula: $C_8H_4O_3$ RTK Substance No: 1535 Description: Colorless to white, crystalline or peedle-shaped solid, or a pale liquid when in *m*

Description: Colorless to white, crystalline or needle-shaped solid, or a pale liquid when in *molten form*, with a strong, choking odor

HAZARD DATA **Hazard Rating** Firefighting Reactivity Phthallic Anhydride may burn, but does not Phthallic Anhydride reacts slowly with WATER to form Phthalic Acid 3 - Health readily ignite. and heat. The reaction may be violent. 1 - Fire Use dry chemical, CO₂, water spray or alcohol-Phthallic Anhydride reacts violently on heating with COPPER OXIDE or resistant foam as extinguishing agents. SODIUM NITRITE causing an explosion hazard. 0 - Reactivity DO NOT use solid streams of water. Phthallic Anhydride is not compatible with OXIDIZING AGENTS (such POISONOUS GASES ARE PRODUCED IN FIRE DOT#: UN 2214 as PERCHLORATES, PEROXIDES, PERMANGANATES, including Phthalic Acid. CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE): ERG Guide #: 156 STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); Use water spray to keep fire-exposed containers STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM cool. Hazard Class: 8 HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, Phthallic Anhydride may form an ignitable (Corrosive) ALUMINUM and their HYDRIDES); AMINES; ALCOHOLS; and dust/air mixture in closed tanks or containers. AMMONIA. Phthallic Anhydride is corrosive to metals in the presence of WATER.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Slightly moisten spilled material first or use a HEPAfilter vacuum for clean-up and place into sealed containers for disposal.

For *molten* (*iquid*) **Phthallic Anhydride**, cover with dry lime, sand or soda ash and place into sealed containers for disposal.

Neutralize water spill with crushed limestone, soda ash or sodium bicarbonate.

EXPOSURE LIMITS

PAC-3 = 60 mg/m³

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing

PHYSICAL PROPERTIES

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Odor Threshold:	0.053 ppm
Flash Point:	305°F (152°C)
LEL:	1.7%
UEL:	10.5%
Auto Ignition Temp:	1,058°F (570°C)
Vapor Density:	5.1 (air = 1)
Vapor Pressure:	0.0002 mm Hg at 68°F (20°C)
Specific Gravity:	1.5 (flake) 1.2 (molten) (water = 1)
Water Solubility:	Slightly soluble (decomposes)
Boiling Point:	563°F (295°C)
Melting Point:	267°F (131°C)
Ionization Potential:	10 eV
Molecular Weight:	148.1

	PROTECTIVE EQUIPMENT
Gloves:	SilverShield®/4H® (>4-hr breakthrough)
Coveralls:	Tyvek® (for solid Phthallic Anhydride) and Tychem® CPF3, BR, Responder® and TK; and Trellchem HPS and VPS (>8-hr breakthrough for <i>liquid Anyhydrides, alicylic</i>)
Respirator:	>6 mg/m ³ - full facepiece APR with Organic vapor and High efficiency particulate cartridges >12 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: alpha-PINENE

Synonyms: 2-Pinene; Cyclic Dexadiene CAS No: 80-56-8 Molecular Formula: C₁₀H₁₆ RTK Substance No: 0052 Description: Oily, colorless liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1- Health 3- Fire	alpha-Pinene is a FLAMMABLE LIQUID. Use dry chemical, CO ₂ , alcohol-resistant foam or other foam extinguishing agents, as water may not be effective	alpha-Pinene reacts violently with OXIDIZING AGENTS (such as PERCHLORATES,
0- Reactivity DOT#: UN 2368	in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.	PEROXIDES, PERMANGANATES, PERCHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); PERCHROMATES; STRONG ACIDS (such as HYDROCHLORIC,
ERG Guide #: 128 Hazard Class: 3	Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash	SULFURIC and NITRIC); and OXIDIZING ACIDS (such as PEROXYACETIC ACID and PEROXYBENZOIC ACID).
(Flammable)	back.	

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 270 meters (900 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. Keep **alpha-Pinene** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Harmful to aqautic life.

EXPOSURE LIMITS

- OSHA:100 ppm, 8-hr TWA (as Turpentine)NIOSH:100 ppm, 10-hr TWA (as Turpentine)ACGIH:20 ppm, 8-hr TWADistance200 ppm, 6-hr TWA
- IDLH: 800 ppm (as *Turpentine*)

HEALTH EFFECTS

Eyes: Skin:	Irritation Irritation
Inhalation:	Nose, throat and lung irritation with coughing and wheezing
	Headache, dizziness, confusion, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	<i>Turpentine</i> -like
Flash Point:	91°F (33°C)
Auto Ignition Temp:	491°F (255°C)
Vapor Density:	4.7 (air = 1)
Vapor Pressure:	4.9 mm Hg at 81°F (27°C)
Specific Gravity:	0.9 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	313°F (156°C)
Melting Point:	-67°F (-55°C)
Freezing Point:	-81°F (-63°C)
Ionization Potential:	8.07 +/- 0.5 (eV)
Molecular Weight:	136.3

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H® and Viton (>8-hr breakthrough for <i>Turpentine</i>)
Coveralls:	DuPont Tychem® Responder®; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Turpentine</i>)
Respirator:	>20 ppm – Full facepiece APR with Organic vapor filter >200 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: POLYCHLORINATED BIPHENYLS

Synonyms: Aroclor; Chlorodiphenyls; PCBs CAS No: 1336-36-3 Molecular Formula: C₁₂H_{10-n}Cl_n RTK Substance No: 1554 Description: Light yellow or colorless, thick, oily liquids

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Polychlorinated Biphenyls may burn, but do not readily ignite.	Polychlorinated Biphenyls are not compatible with
1 - Fire	Use dry chemical, CO_2 , water spray or alcohol-	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	resistant foam as extinguishing agents.	NITRATES, CHLORINE, BROMINE and FLUORINE) and
DOT#: UN 2315	POISONOUS GASES ARE PRODUCED IN FIRE,	STRONG ACIDS (such as HYDROCHLORIC,
ERG Guide #: 171	including Polychlorinated Dibenzofurans and Chlorinated Dibenzo-p-dioxins.	SULFURIC and NITRIC).
Hazard Class: 9	Use water spray to keep fire-exposed containers	
(Miscellaneous Hazardous Materials)	cool.	

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Polychlorinated Biphenyls bioaccumulate and are hazardous to the environment.

EXPOSURE LIMITS

 OSHA:
 1 mg/m³, 8-hr TWA (42% Chlorine) and 0.5 mg/m³, 8-hr TWA (54% Chlorine)

 NIOSH:
 0.001 mg/m³, 10-hr TWA

ACGIH: 1 mg/m³, 8-hr TWA (42% *Chlorine*) and 0.5 mg/m³, 8-hr TWA (54% *Chlorine*)

IDLH: 5 mg/m³

HEALTH EFFECTS	S
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Eyes: Skin:	Irritation Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea, vomiting, and abdominal pain
Chronic:	Cancer (skin, brain, pancreas) in humans

PHYSICAL PROPERTIES

Flash Point:	286° to 385°F (141° to 196°C)
Auto Ignition Temp:	464°F (240°C)
Vapor Pressure:	0.001 mm Hg at 68°F (20°C)
Specific Gravity:	1.3 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	617° to 734°F (325° to 390°C)
Melting Point:	-2° to 50°F (-19° to 10°C)
Molecular Weight:	258 to 326

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Neoprene, Polyvinyl Chloride, Silver Shield®/4H® and Viton (>4-hr breakthrough)
Coveralls:	Tychem® CPF 2, SL, CPF 4 and Responder® (>8-hr breakthrough)
Respirator:	>0.001 mg/m ³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: POTASSIUM ARSENITE

Synonyms: Potassium Metaarsenite; Potassium Arsonate CAS No: 10124-50-2 Molecular Formula: $A_5H_3K_xO_4$ RTK Substance No: 1557 Description: White, odorless powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Potassium Arsenite itself does	Potassium Arsenite reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form
0 - Fire	not burn.	toxic Arsine gas.
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Arsine, Arsenic Oxides and Potassium	Potassium Arsenite attacks many METALS to form flammable and explosive <i>Hydrogen gas</i> .
DOT#: UN 1678	Oxides.	Potassium Arsenite decomposes slowly in AIR and
ERG Guide #: 154	Use water spray to keep fire-exposed containers	CARBON DIOXIDE.
Hazard Class: 6.1	cool.	
(Poison)		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Toxic to aquatic plants and animals.

EXPOSURE LIMITS

OSHA: 0.01 mg/m³, 8-hr TWA NIOSH: 0.002 mg/m³, 15-min Ceiling ACGIH: 0.01 mg/m³, 8-hr TWA IDLH: 5 mg/m³ (All the above are for *inorganic Arsenic*)

HEALTH EFFECTS

Eyes:	Irritation, burns and red watery eyes
Skin:	Irritation, burns, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing and wheezing, weakness, nausea, vomiting, headache and muscle cramps
Chronic:	<i>Inorganic Arsenic compound</i> s cause skin, liver, and lung cancer in humans

PHYSICAL PROPERTIES

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	<0.1 mg/m ³ - Full facepiece APR with High efficiency filter <0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of water.



Common Name: POTASSIUM CHROMATE

Synonyms: Chromate of Potash; Dipotassium Chromate: Potassium Bichromate CAS No: 7789-0-6 Molecular Formula: K₂CrO₄ RTK Substance No: 1561 Description: Yellow, odorless, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health	Potassium Chromate is not combustible, but it is a STRONG OXIDIZER that enhances the	Potassium Chromate may react violently with REDUCING AGENTS (such as LITHIUM, SODIUM,
0 - Fire	combustion of other substances.	ALUMINUM and their HYDRIDES) and COMBUSTIBLES
0 - Reactivity	Extinguish fire using an agent suitable for type of	(such as PAPER, WOOD and OILS).
DOT#: UN 3086	surrounding fire. POISONOUS GASES ARE PRODUCED IN FIRE,	Potassium Chromate reacts with METALS to release flammable <i>Hydrogen gas</i> .
ERG Guide #: 141	including Chromic Oxides and Potassium Oxides.	Potassium Chromate is not compatible with MINERAL
Hazard Class: 6.1	Use water spray to keep fire-exposed containers cool.	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
(Toxic)		- /

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. DO NOT wash into sewer.

Potassium Chromate is very toxic to aquatic organisms and may cause long-term effects in the aquatic environment.

EXPOSURE LIMITS

- 0.005 mg/m³, 8-hr TWA OSHA:
- **NIOSH:** 0.001 mg/m³, 10-hr Ceiling
- **ACGIH:** 0.05 mg/m³, 8-hr
- 15 mg/m^3 IDLH:
- (All the above are for Chromium VI)

The Protective Action Criteria values are:

PAC-1 = 2 mg/m^3 $PAC-2 = 12.5 \text{ mg/m}^3$

 $PAC-3 = 56 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes: Irritation and burns Skin: Irritation and burns Inhalation: Nose, throat and lung irritation causing coughing, wheezing and shortness of breath Cancer (lung, sinonasal cavity) in Chronic: humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	2.73 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	1,787°F (975°C)
Molecular Weight:	194.2

Gloves:	Nitrile and Neoprene (for solid Potassium Chromate)
Coveralls:	Tyvek® (for <i>solid</i> Potassium Chromate) and Tychem® SL, BR, CSM, and TK (>8-hr breakthrough for Potassium Chromate in <i>solution</i>)
Respirator:	>0.001 mg/m ³ - full facepiece APR with <i>P100 filters</i> >2 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eves with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: POTASSIUM DICHROMATE

Synonyms: Dipotassium Dichromate; Potassium Bichromate CAS No: 7778-50-9 Molecular Formula: K₂Cr₂O₇ RTK Substance No: 1564 Description: Odorless, orange to red, crystalline solid or powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Potassium Dichromate is not combustible, but it is a STRONG OXIDIZER that enhances the	Potassium Dichromate reacts violently with HYDRAZINE; ANHYDROUS HYDROXYLAMINE;
0 - Fire	combustion of other substances.	ETHYLENE GLYCOL; and mixtures of SULFURIC ACID
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or CO ₂	and ACETONE. Combinations of Potassium Dichromate with BORON
DOT#: UN 3085	as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	and SILICON, IRON or TUNGSTEN form explosive pyrotechnic mixtures.
ERG Guide #: 140	including Potassium Oxides.	Potassium Dichromate is not compatible with
Hazard Class: 5.1 (Oxidizer)	Use water spray to keep fire-exposed containers cool. Potassium Dichromate may ignite combustibles (wood, paper and oil).	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and METALS.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Potassium Dichromate is dangerous to aquatic life and is a hazardous air pollutant.

EXPOSURE LIMITS

OSHA: 0.005 mg/m³, 8-hr TWA **NIOSH:** 0.001 mg/m³, 10-hr TWA ACGIH: 0.05 mg/m³, 8-hr TWA 15 mg/m^3 IDLH: (all of the above are for Chromium VI) The Protective Action Criteria values are:

PAC-1 = 1.5 mg/m³ PAC-2 = 10 mg/m³ PAC-3 = 42.4 mg/m³

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation, burns, itching, rash and skin ulcers
Inhalation:	Nose and throat irritation with coughing, wheezing
Chronic:	Hexavalent Chromium or Chromium VI Compounds cause lung cancer in humans

PHYSICAL PROPERTIES	
Odor Threshold:	Odorless
Flash Point:	Noncombustible
Specific Gravity:	2.7 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes at 932°F (500°C)
Melting Point:	748°F (398°C)
Molecular Weight:	294.2
pH:	4 (1% solution)

PROTECTIVE EQUIPMENT

Gloves:	Neoprene and Polyvinyl Chloride (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for <i>Potassium Dichromate</i> , (<i>saturated</i>))
Respirator:	 >0.001 mg/m³ - full facepiece APR with <i>High efficiency filters</i> >1 mg/m³ - Supplied air >15 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eves with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.



Common Name: POTASSIUM HYDROGEN FLUORIDE

Synonyms: Potassium Bifluoride CAS No: 7789-29-9 Molecular Formula: F₂HK **RTK Substance No: 1568** Description: Colorless to white, crystalline substance

HAZARD DATA					
Hazard Rating	Firefighting				Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1811 ERG Guide #: 154 Hazard Class: 8 (Corrosive)	 Extinguish fire using an agent su surrounding fire. Potassium H itself does not burn. Use WATER with care as heat w POISONOUS GASES ARE PRO including Hydrogen Fluoride, Potassium Fluoride. Use water spray to keep fire-exp DO NOT get water inside contai Potassium Hydrogen Fluoride combustibles (wood, paper and paper p		rogen Fluoride be released. JCED IN FIRE, ss <i>ium Hydroxide</i> ed containers co s. ay ignite		 Potassium Hydrogen Fluoride may be corrosive to METALS in the presence of WATER, MOISTURE or HIGH HUMIDITY and may release flammable and explosive Hydrogen gas. Potassium Hydrogen Fluoride is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). Do not allow Potassium Hydrogen Fluoride to contact SILICA-CONTAINING MATERIALS (such as GLASS, CEMENT and PORCELAIN).
SP	ILL/LEAKS			Р	HYSICAL PROPERTIES
and safe manner and DO NOT wash into se May affect aquatic life EXPO OSHA: 2.5 mg/m ³ , NIOSH: 2.5 mg/m ³ , 5 mg/m ³ , 1 ACGIH: 0.4 mg/m ³ , 1.7 mg/m ³ , IDLH: 25 mg/m ³	e mile) terial in the most convenient d deposit in sealed containers. ewer. SURE LIMITS 8-hr TWA , 10-hr TWA; 5-min Ceiling		Odor Thresho Flash Point: Vapor Pressu Specific Grav Water Solubil Boiling Point: Melting Point Molecular We Gloves: Coveralls: Respirator:	re: ity: ity: : : : : : : : : : : : : : : : : : :	Slightly pungent Nonflammable 1 mm Hg at 1,625°F (885°C) 2.37 (water = 1) Soluble Decomposes 437°F (225°C) 78.1 COTECTIVE EQUIPMENT rene and Polyvinyl Chloride for <i>solid</i> Potassium oxide Fluoride and Silver Shield®/4H® for <i>Hydrogen</i> <i>ide gas</i> ont Tychem® Polycoat, CPF 1, QC, CPF 2 and SL, for Potassium Hydrogen Fluoride ; DuPont Tychem® onder® and TK and Saint-Gobain CHALLENGE RAPRO® Vapor for <i>Hydrogen Fluoride gas</i> <i>olid</i> Potassium Hydrogen Fluoride - full facepiece with cartridges specific for <i>Hydrogen Fluoride</i> with High
			Use S	ency particulate pre-filters Supplied Air or SCBA if there is a potential for sure to <i>Fluorine</i> or <i>Hydrogen Fluoride</i> .	
HEAL	TH EFFECTS	ļ		-	AID AND DECONTAMINATION
Skin: Severe Inhalation: Nose, t coughir (pulmor	irritation and burns irritation and burns hroat and lung irritation with ng and shortness of breath nary edema) che, nausea and vomiting		Flush eyes wir contact lenses Immediately f removing cloth Seek medical Begin artificial necessary. Transfer to a	th larg s if wo flush w hing. assist l respin	-
]			is recommended as symptoms may be delayed. June 2008



Common Name: POTASSIUM HYDROXIDE

Synonyms: Caustic Potash; Lye; Potassium Hydrate CAS No: 1310-58-3 Molecular Formula: KOH RTK Substance No: 1571 Description: Odorless, white or slightly yellow, flakey or lumpy solid which is often in a water solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity				
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Potassium Hydroxide itself	Potassium Hydroxide reacts violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).				
0 - Fire	does not burn.	Potassium Hydroxide is CORROSIVE in MOIST AIR to				
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Potassium Oxides</i> .	METALS (such as ALUMINUM, ZINC, TIN and LEAD) and forms flammable and explosive <i>Hydrogen gas</i> .				
DOT#: UN 1813	DO NOT get water inside containers as contact	Potassium Hydroxide is not compatible with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES);				
ERG Guide #: 154	with moisture or water may generate enough	WATER; HALOGENATED HYDROCARBONS (such as				
Hazard Class: 8 (Corrosive)	heat to ignite combustibles (wood, paper and oil).	METHYLENE CHLORIDE and TRICHLOROETHYLENE); ORGANICS; NITROCARBONS; and AMMONIUM SALTS.				

SPILL/LEAKS	PHYS	ICAL PROPERTIES
Isolation Distance: Solid Spills: 25 meters (75 feet) Liquid Spills: 50 meters (150 feet) Fire: 800 meters (1/2 mile)	Odor Threshold: Flash Point: Vapor Pressure:	Odorless Noncombustible 1 mm Hg at 1,317°F (714°C)
Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.	Specific Gravity:	2.04 (water = 1)
For Potassium Hydroxide in <i>solution</i> absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer.	Water Solubility: Boiling Point:	Soluble 2,408°F (1,320°C)
For water spills, neutralize with dilute acid (such as Acetic Acid). Potassium Hydroxide is harmful to aquatic life in very low concentrations.	Melting Point: Molecular Weight:	761°F (405°C) 56.1

EXPOSURE LIMITS

NIOSH: 2 mg/m³, Ceiling ACGIH: 2 mg/m³, Ceiling

The Protective Action Criteria values are:

PAC-1 = 0.3 mg/m^3

- $PAC-2 = 2 mg/m^3$
- PAC-3 = 125 mg/m³

	HEALTH EFFECTS
Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and severe burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, dizziness, nausea and vomiting

PROTECTIVE EQUIPMENT

Butyl, Nitrile, Neoprene, Polyvinyl Chloride, Viton and Barrier® (>8-hr breakthrough for **Potassium Hydroxide** in *solution*)

Coveralls: Tychem® BR, Responder® and TK (>8-hr breakthrough for Potassium Hydroxide in *solution*)

Respirator:

Gloves:

or: >2 mg/m³ - full facepiece APR with High efficiency filters >20 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Quickly brush off excess chemical from the face. Flush with large amounts of water for at least 30 minutes. Remove contact lenses, if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash with amounts of soap and water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility. Medical observation is recommended as symptoms may be delayed.



Common Name: POTASSIUM OXIDE

Synonyms: Potassium Monoxide; Dipotassium Oxide CAS No: 12136-45-7 Molecular Formula: K_2O RTK Substance No: 1576 Description: Yellowish white to gray, crystalline powder

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
3 - Health	DOES NOT BURN Use dry chemical, CO_2 , alcohol-resistant foam or	Potassium Oxide may react violently with WATER to release heat and <i>Potassium Hydroxide</i> .			
0 - Fire	other foam as extinguishing agents.	Potassium Oxide is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).			
2 - Reactivity	DO NOT USE WATER as violent reaction may occur.				
DOT#: UN 2033	POISONOUS GASES ARE PRODUCED IN FIRE. Potassium Oxide may ignite combustibles (wood,				
ERG Guide #: 154	paper and oil).				
Hazard Class: 8 (Corrosive)					

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Use a HEPA-filter vacuum for clean-up.

DO NOT wash into sewer.

No information about environmental impact.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Potassium Oxide**.

PHYSICAL PROPERTIES

Odor Threshold:	No information
Flash Point:	Noncombustible
Water Solubility:	Reactive and Soluble
Melting Point:	662°F (350°C)
Molecular Weight:	94.2
1	

PROTECTIVE EQUIPMENT

Gloves:	Neoprene (>8-hr breakthrough for Potassium Hydroxide)
Coveralls:	DuPont Tychem® Polycoat, CPF 1, QC, CPF 2, and SL; Kappler Zytron® 200; and Saint-Gobain ONESuit® TEC for <i>hazardous dry powders</i> and <i>solids</i>
Respirator:	Supplied air

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation:	Severe irritation and burns Severe irritation and burns Nose, throat and lung irritation with coughing, wheezing and shortness of breath	 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility.

April 2008



Common Name: **PROPANE**

Synonyms: Dimethylmethane; Propyl Hydride CAS No: 74-98-6 Molecular Formula: C₃H₈ RTK Substance No: 1594

Description: Colorless, odorless gas when pure, or may have a faint petroleum-like odor, and is usually shipped as a liquefied gas with a foul-smelling odorant added

HAZARD DATA				
Hazard Rating	Firefighting			Reactivity
2 - Health 4 - Fire 0 - Reactivity DOT#: UN 1978 ERG Guide #: 115 Hazard Class: 2.1 (Flammable gas)	FIREFIGNTING FLAMMABLE GAS Stop flow of gas and use water spray to disperse vapors. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to cause fire or explosion far from the source or flash back. Flow, agitation, low humidity and other factors may generate electrostatic charges resulting in fire and/or explosion. Propane may form an ignitable vapor/air mixture in closed tanks or containers.		D IN FIRE. ntainers cool. a distance to cause a lash back. actors may generate d/or explosion.	Propane may react violently with CHLORINE DIOXIDE and other OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
SPI	LL/LEAKS		PH	YSICAL PROPERTIES
cannot be stopped in pla safe place in the open al empty. Conduct air monitoring to above 19.5% and the Lo being exceeded. Use only non-sparking to opening and closing con Propane may "pool" or "s in a fixed location for a lo Keep Propane out of cor because of the possibilit	ce of leak is a cylinder and the leak ace, remove the leaking cylinder to a ir, and repair leak or allow cylinder to o determine that <i>Oxygen</i> levels are over Explosive Limit (LEL) is not ols and equipment, especially when tainers of Propane . Settle" in low areas and may remain ong period of time. Infined spaces, such as sewers, y of an explosion.		Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Critical Temperature: Ionization Potential: Molecular Weight:	20,000 ppm -155°F (-104°C) 2.1% 9.5% 842°F (450°C) 1.6 (air = 1) >760 mm Hg at 68°F (20°C) 0.58 (water = 1) Slightly soluble -44°F (-42°C) -305.9°F (-187.7°C) 207°F (97°C) 11.07 eV 44.09
	SURE LIMITS		PRO	TECTIVE EQUIPMENT
OSHA: 1,000 ppm, 8-I NIOSH: 1,000 ppm, 10 ACGIH: 1,000 ppm, 8-I IDLH: 2,100 ppm The Protective Action Cri PAC-1 = 5,500 ppm PAC-3 = 3	-hr TWA hr TWA teria values are: PAC-2 = 17,000 ppm		Coveralls: Use to the gr Tyche	<i>ted</i> Nitrile or Neoprene (>8-hr breakthrough) urn out gear or flash protection if ignition/fire is reatest hazard! m® Responder® (>8-hr breakthrough) 0 ppm or <19.5% <i>Oxygen</i> - SCBA
HEAL	TH EFFECTS		FIRST AIL	O AND DECONTAMINATION
frostbite Skin: Contact frostbite Inhalation: Headac	with liquefied gas may cause		contact lenses if worn. Immerse affected part i	mounts of water for at least 15 minutes. Remove Seek medical attention. In warm water. Seek medical attention. on if breathing has stopped and CPR if necessary.



Common Name: 1-PROPANETHIOL

Synonyms: n-Propyl Mercaptan; 1-Mercaptopropane CAS No: 107-03-9 Molecular Formula: C_3H_8S RTK Substance No: 1595 Description: Colorless liquid with a skunk or cabbage-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity			
2 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray, alcohol-resistant	1-Propanethiol may react violently or explosively with OXIDIZING AGENTS (such as PERCHLORATES,			
3 - Fire	foam or other foam as extinguishing agents.	PEROXIDES, PERMANGANATES, CHLORATES,			
0 - Reactivity Water may not be effective in fighting fires.		NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC,			
DOT#: UN 2402	including Hydrogen Sulfide and Sulfur Oxides.	SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); and			
ERG Guide #: 130	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.				
Hazard Class: 3 Vapors may travel to a source of ignition and flash back.		CALCIUM HYPOCHLORITE.			
(Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source. Flow or agitation may generate electrostatic discharges.	1-Propanethiol is not compatible with AMINES; ETHYLENE OXIDE; and ISOCYANATES.			

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **1-Propanethiol**.

Keep **1-Propanethiol** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

NIOSH: 0.5 ppm, 15-min Ceiling

The Protective Action Criteria values are:

PAC-1 = 0.075 ppm

PAC-2 = 0.5 ppm

PAC-3 = 750 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation and rash
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and/or shortness of breath

Headache, dizziness, convulsions and unconsciousness

PHYSICAL PROPERTIES

Odor Threshold:	0.00075 to 0.0016 ppm
Flash Point:	-6°F (-21°C)
Vapor Density:	2.6 (air = 1)
Vapor Pressure:	155 mm Hg at 77°F (25°C)
Specific Gravity:	0.84 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	154°F (68°C)
Freezing Point:	-172°F (-113.3°C)
Ionization Potential:	9.2 eV
Molecular Weight:	76.2

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Viton and Barrier® (>8-hr breakthrough for Sulfur compounds)
Coveralls:	Tychem® BR, LV, Responder®, and TK (>8-hr breakthrough for <i>Sulfur compounds</i>)
Respirator:	<5 ppm - Full facepiece APR with <i>Organic vapor</i> cartridges >5 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PROPIONIC ACID

Synonyms: Ethylformic Acid; Methylacetic Acid; Propanoic Acid CAS No: 79-09-4 Molecular Formula: $C_3H_6O_2$ RTK Substance No: 1599 Description: Colorless, oily liquid with a strong, unpleasant odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID	Propionic Acid reacts violently and explosively with
2 - Fire	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	NITRATES, CHLORINE, BROMINE and FLUORINE) and PHOSPHORUS TRICHLORIDE.
DOT#: UN 1848	Use water spray to keep fire-exposed containers cool.	Propionic Acid may react violently with STRONG
ERG Guide #: 132	Flow or agitation may generate electrostatic	BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such
Hazard Class: 8	charges. Propionic Acid may form an ignitable vapor/air	as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and AMINES.
(Corrosive)	mixture in closed tanks or containers.	Propionic Acid reacts with POWDERED METALS (such as ALUMINUM and ZINC) to produce flammable and explosive <i>Hydrogen gas</i> .

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Keep **Propionic Acid** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer. Neutralize water spills with lime or soda ash.

Propionic Acid is harmful to aquatic organisms.

EXPOSURE LIMITS

NIOSH: 10 ppm, 10-hr TWA; 15 ppm STEL

ACGIH: 10 ppm, 8-hr TWA

The Protective Action Criteria values are:

PAC-1 = 15 ppm PAC-2 = 15 ppm PAC-3 = 350 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath
	Headache, nausea and abdominal pain

PHYSICAL PROPERTIES

Odor Threshold:	0.026 to 0.17 ppm
Flash Point:	126°F (52°C)
LEL:	2.9%
UEL:	12.1%
Auto Ignition Temp:	869° to 955°F (465° to 513°C)
Vapor Density:	2.6 (air = 1)
Vapor Pressure:	2 mm Hg at 68°F (20°C)
Specific Gravity:	1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	286°F (141°C)
Freezing Point:	-60°F (-21°C)
Ionization Potential:	10.24 eV
Molecular Weight:	74.08

PROTECTIVE EQUIPMENT

Gloves:	Butyl and Teflon ${ m I\!R}$ (>4-hr breakthrough)
Coveralls:	Tychem® Responder® (>8-hr breakthrough)
Respirator:	>10 ppm - full facepiece APR with Organic Vapor filters >100 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: n-PROPYL ACETATE

Synonyms: 1-Acetoxypropane; Propyl Ethanoate CAS No: 109-60-4 Molecular Formula: $C_5H_{10}O_2$ RTK Substance No: 1419

Description: Clear, colorless liquid with a pleasant, fruity odor

	HAZARD DATA	
Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant	n-Propyl Acetate may react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
3 - Fire	foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Solid streams of water may be ineffective in fighting fire.	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
DOT#: UN 1276	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE.	NITRIC); and STRONG BASES (such as SODIUM
ERG Guide #: 129	Use water spray to keep fire-exposed containers cool.	HYDROXIDE and POTASSIUM HYDROXIDE) to cause fires and explosions.
Hazard Class: 3 (Flammable)	Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back.	n-Propyl Acetate is not compatible with ALKALI METAL HYDROXIDES (such as LITHIUM HYDROXIDE) and HYDRAZINES.
	n-Propyl Acetate may form an ignitable vapor/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **n-Propyl Acetate**.

Metal containers involving the transfer of **n-Propyl Acetate** should be grounded and bonded.

Keep **n-Propyl Acetate** out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA: 200 ppm, 8-hr TWA
NIOSH: 200 ppm, 10-hr TWA; 250 ppm, STEL
ACGIH: 200 ppm, 8-hr TWA; 250 ppm, STEL
IDLH: 1,700 ppm
The Protective Action Criteria values are:

PAC-1 = 250 ppm PAC-2 = 250 ppm PAC-3 = 1,700 ppm

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation

Skin:IrritationInhalation:Nose and throat irritation with coughing
and wheezingHeadache, dizziness, nausea and
vomiting, confusion, lightheadedness
and loss of consciousness

PHYSICAL PROPERTIES

Odor Threshold:	0.18 to 0.67 ppm
Flash Point:	55°F (13°C)
LEL:	1.7%
UEL:	8%
Auto Ignition Temp:	842°F (450°C)
Vapor Density:	3.5 (air = 1)
Vapor Pressure:	36 mm Hg at 77°F (25°C)
Specific Gravity:	0.83 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	215°F (102°C)
Freezing Point:	-134°F (-92°C)
Ionization Potential:	10.04 eV
Molecular Weight:	102.13

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®4/H® (>8-hr breakthrough)
Coveralls:	Tychem® F, BR and TK; Trellchem® HPS and VPS (>8- hr breakthrough for <i>Esters, carboxylic, acetate</i>)
Respirator:	>200 ppm - full facepiece APR with <i>Organic vapor filters</i> >250 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: PROPYLENE GLYCOL

Synonyms: 1,2-Dihydroxypropane; Methyl Ethylene Glycol; 1,2-Propanediol CAS No: 57-55-6 Molecular Formula: $C_3H_8O_2$ RTK Substance No: 3595 Description: Colorless, odorless, thick liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health 2 - Fire	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents.	Propylene Glycol is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ACID CHLORIDES (such as HYROCHLORIC ACID); ACID
DOT#: None	CONTAINERS MAY EXPLODE IN FIRE.	ANHYDRIDES (such as ACETIC ANHYDRIDE);
ERG Guide #: 153	Use water spray to keep fire-exposed containers	CHLOROFORMATES; and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their
Hazard Class: None	cool.	HYDRIDES).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	210°F (99°C)
LEL:	2.6%
UEL:	12.5%
Auto Ignition Temp:	700°F (371°C)
Vapor Density:	2.62 (air = 1)
Vapor Pressure:	<0.1 mm Hg at 68°F (20°C)
Specific Gravity:	1.04 (water = 1)
Water Solubility:	Miscible
Boiling Point:	370°F (188°C)
Freezing Point:	-74°F (-59°C)
Molecular Weight:	76.09

EXPOSURE LIMITS

No occupational exposure limits have been established for **Propylene Glycol**.

The Protective Action Criteria values are: PAC-1 = 10 mg/m³ (3.2 ppm) PAC-2 = 10 mg/m³ (3.2 ppm)

 $PAC-3 = 500 \text{ mg/m}^3 (160.6 \text{ ppm})$

HEALTH EFFECTS

-	
Eyes:	Irritation
Skin:	Irritation
Inhalation:	Exposure can cause headache, nausea and vomiting, dizziness, lightheadedness, and passing out

PROTECTIVE EQUIPMENT

Gloves: Butyl, Nitrile and Neoprene (>8-hr breakthrough)

Coveralls: Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for *Hydroxyl compounds*)

Respirator: >10 mg/m³ (3 ppm) - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: PROPYLENE GLYCOL MONOMETHYL ETHER

Synonyms: Dowanol®; 1-Methoxy-2-Propanol; PGME CAS No: 107-98-2 Molecular Formula: $C_4H_{10}O_2$ RTK Substance No: 1613 Description: Colorless liquid with a sweet *Ether*-like odor

HAZARD DATA

	TIAZARD DATA	
Hazard Rating	Firefighting	Reactivity
1 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-resistant	Propylene Glycol Monomethyl Ether may form explosive <i>Peroxides</i> during prolonged storage.
3 - Fire	foam as extinguishing agents.	Propylene Glycol Monomethyl Ether is not
0 - Reactivity	Water may not be effective in fighting fires.	compatible with OXIDIZING AGENTS (such as
DOT#: UN 3092	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers cool.	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG
ERG Guide #: 129	Vapors may travel to a source of ignition and flash	ACIDS (such as HYDROCHLORIC, SULFURIC and
Hazard Class: 3 (Flammable)	back. Propylene Glycol Monomethyl Ether may form an ignitable vapor/air mixture in closed tanks or containers.	NITRIC); ACID CHLORIDES; ACID ANHYDRIDES; ALUMINUM; COPPER; and ISOCYANATES.

Molecular Weight:

Gloves:

Coveralls:

Respirator:

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Propylene Glycol Monoethyl Ether**.

PHYSICAL PROPERTIES **Odor Threshold:** 10 ppm Flash Point: 90°F (32°C) LEL: 1.6% UEL: 18.8% 518°F (270°C) Auto Ignition Temp: Vapor Density: 3.1 (air = 1) Vapor Pressure: 11.8 mm Hg at 77°F (25°C) **Specific Gravity:** 0.92 (water = 1) Water Solubility: Soluble **Boiling Point:** 248°F (120°C) Freezing Point: -139°F (-95°C)

90.12

>100 ppm - SCBA

EXPOSURE LIMITS

NIOSH: 100 ppm, 10-hr TWA; 150 ppm, STEL **ACGIH:** 100 ppm, 8-hr TWA; 150 ppm, STEL

The Protective Action Criteria values are: PAC-1 = 150 ppm PAC-2 = 300 ppm PAC-3 = 750 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, dizziness, lightheadedness, and passing out

FIRST AID AND DECONTAMINATION

PROTECTIVE EQUIPMENT

Butyl, Nitrile and Neoprene (>8-hr breakthrough)

VPS (>8-hr breathrough for Dipropylene Glycol)

Tychem® BR, Responder® and TK; Trellchem® HPS and

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: PROPYLENE OXIDE

Synonyms: Epoxypropane; Methyl Ethylene Oxide CAS No: 75-56-9 Molecular Formula: C_3H_6O RTK Substance No: 1615 Description: Clear, colorless liquid with an *Ether*-like odor

4 - Fire Use dry chemical, CQ, water spray or alcohol- CXYGEN: All or FLAMES resulting in an explosion hazard. 4 - Fire - Reactivity COXYGEN: All or FLAMES resulting in an explosion hazard. 2 - Reactivity DOT#: UN 1280 Proylene Oxide reacts vicehtly with METAL ALLOYS: METAL PEROX Part UN 1280 Use dry chemical, CQ, water spray to vertice of all and reduce vapors. Proylene Oxide reacts vicehtly with METAL ALLOYS: METAL PEROX Part Class: 3 (Flammabile) FLAMES resulting in an explosion hazard. Proylene Oxide reacts vicehtly with METAL SLOYS. METAL PEROX MetaL Class: 3 (Flammabile) FLAMES resulting in an explosion hazard. Proylene Oxide reacts vicehtly with METALS (Such as RON.) MetaL Class: 3 (Flammabile) Fire stole is not compatible with XOIDES, PERAMICANATES. Proylene Oxide class at fire or explosion far from the source of head or otherination resulting in container ruptures and explosions. Port ESULL/LEAKS Phylene Oxide Class: 100 feet) Fire: 800 meters (100 feet) Codor Threshold: 35 to 200 pm Large Spill: 60 meters (200 feet) Fires: 800 meters (1/2 mile) Odor Thressure: 36% (46%'C) Assewers, because of the possibility of an explosion. Specific Gravity: 0.80% (46%'C) Vapor Density: 2 (air = 1) Vapor Density:				HA	ZARD	DAT	TA
VYGEN: All of FLAMES resulting in an explosion hazard. 4 - Fire Use dry chemical; CQL, water spray or alcohol- estimation and set indiguishing agents. OXYGEN: All of FLAMES resulting in an explosion hazard. 2 - Reactivity POSIONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. CONTAINES ACIDIC CONTES, PERAMINGANATES, COLICOR EST, NITRATES, CHUCRINE, BROMINES AND LUCK TRATES, CHUCRINE, BROMINES AND LUCK TRATES, CHUCRINE, BROMINES AND LUCK TRATES, MITRATES, CHUCRINE, BROMINES AND LUCK TRATES, CHUCRINE, BROMINES AND LUCK TRATES, MAINES: ACIDIC ALCOHOLS; ETRYLENE CONDER, PERAMINES AND LUCK TRATES, CHUCRINE, BROMINES AND LUCK TRATES, CHUCRINE, BROMINES AND LUCK TRATES, MAINES; ACIDIC ALCOHOLS; ETRYLENE CONDER, PERAMINES, ACIDIC ALCOHOLS; ETRYLENE CONDER (200 feet) Isolation Distance: Sto 200 ppm Small Spill: 60 meters (1/2 mile) Mode and the spaces, such as severs, bccause of the possibility of an explosion. Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Mode CHI = 10 Yappr Pressure: 35'fc 20'0; Yappr Density:: 2 (air = 1) Yappr Pressure: Keep Propylene Oxide out of confined spaces, such as severs, bccause of the possibility of an explosion. Soff (465°C) Yappr De	Hazard Ra	ating	Firefighting			Rea	activity
Isolation Distance: Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Sealed Spill: 2 (air = 1) Keep Propylene Oxide out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Soluble DNOT wash into sewer. Soluble Solution Propylene Oxide out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Soluble Solution Propylene Oxide out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Soluble Boiling Point: 9.8 (water = 1) Water Solubility: Soluble Boiling Point: 9.4 (F (34°C) Freezing Point: -170°F (-112°C) Ionization Potential: 9.8 Molecular Weight: 58 EXPOSURE LIMITS PROTECTIVE EQUIPMENT Solate: 100 ppm, 8-hr TWA IDLH: 400 ppm ERPG-1 = 50 ppm; ERPG-2 = 250 ppm; ERPG-3 = 750 ppm FIRST AID AND DECONTAMINATION Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Ren contact lenses if wrom. Seek medic	3 - Health 4 - Fire 2 - Reactivit DOT#: UN ERG Guide Hazard Clas	:y 1280 #: 127P ss: 3	 FLAMMABLE and REACTIVE Use dry chemical, CO₂, water spray or alcoholresistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool and reduce vapors. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back. Propylene Oxide may polymerize (self-react) due to high heat or contamination resulting in container 		Prop OXY Prop ALUI MET (such Prop as Pi CHL STR STR POT ETH	pylene Oxide may polymerize (self react) when exposed to HEAT; YGEN; AIR or FLAMES resulting in an explosion hazard. pylene Oxide reacts violently with METALS (such as IRON, TIN, JMINUM and COPPER); METAL ALLOYS; METAL PEROXIDES; TAL CHLORIDES; METAL HYDROXIDES; STRONG ACIDS ch as HYDROCHLORIC, SULFURIC and NITRIC); and OLEUM. pylene Oxide is not compatible with OXIDIZING AGENTS (such PERCHLORATES, PEROXIDES, PERMANGANATES, LORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); RONG BASES (such as SODIUM HYDROXIDE and TASSIUM HYDROXIDE); AMINES; ACIDIC ALCOHOLS; HYLENE OXIDE; EPOXY RESIN; and CLAY-BASED	
Isolation Distance: Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet) ELE: 2% Fire: 800 meters (1/2 mile) Auto Ignition Temp: 869°F (465°C) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Vapor Density: 2 (air = 1) Keep Propylene Oxide out of confined spaces, such as sewers, because of the possibility of an explosion. Vapor Pressure: 445 mm Hg at 68°F (20°C) DO NOT wash into sewer. UE Solubility: Solubility: Solubility: OSHA: 100 ppm, 8-hr TWA Molecular Weight: 58 Value: 2 ppm, 8-hr TWA Gloves: Lamiate Film and Barrier® (>8-hr breakthrough) NIOSH: Lowest feasible concentration Coveralls: Tychem® CPF 4, BR, LV, Responder® and TK (>8-hr breakthrough) Costent: 2 ppm, 8-hr TWA Bespirator: >2 ppm - Supplied air or SCBA ExpeG-1 = 50 ppm; ERPG-2 = 250 ppm; ERPG-3 = 750 ppm FIRST AID AND DECONTAMINATION Eyes: Irritation and burns Remove the person from exposure. Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Seek medical attention. Ouckly remove contaminated clothing a		SPI	LL/LEAKS				PHYSICAL PROPERTIES
OSHA: 100 ppm, 8-hr TWA NIOSH: Lowest feasible concentration ACGIH: 2 ppm, 8-hr TWA IDLH: 400 ppm ERPG-1 = 50 ppm; ERPG-2 = 250 ppm; ERPG-3 = 750 ppm Respirator: >2 ppm - Supplied air or SCBA FIRST AID AND DECONTAMINATION Skin: Irritation and burns Remove the person from exposure. Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Remove contaminated clothing and wash contaminated skin large amounts of water.	 Small Spill: 30 meters (100 feet) Large Spill: 60 meters (200 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Keep Propylene Oxide out of confined spaces, such as sewers, because of the possibility of an explosion. 			Flash Poin LEL: UEL: Auto Igniti Vapor Den Vapor Pres Specific G Water Solu Boiling Po Freezing P Ionization	on Ten sity: ssure: ravity: ubility: int: Point: Potent	-35°F (-37°C) 2% 37% 2(air = 1) : 445 mm Hg at 68°F (20°C) 7: 0.83 (water = 1) 7: Soluble 94°F (34°C) -170°F (-112°C) 9.8	
NIOSH: Lowest feasible concentration ACGIH: 2 ppm, 8-hr TWA IDLH: 400 ppm ERPG-1 = 50 ppm; ERPG-2 = 250 ppm; ERPG-3 = 750 ppm Respirator: >2 ppm - Supplied air or SCBA First AID AND DECONTAMINATION Kin: Irritation and burns Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)	l	EXPOS	SURE LIMITS			I	PROTECTIVE EQUIPMENT
Eyes: Irritation and burns Skin: Irritation and burns Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove the person from exposure. Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Quickly remove contaminated clothing and wash contaminated skin large amounts of water.	NIOSH: L ACGIH: 2 IDLH: 4	owest fea 2 ppm, 8-h 100 ppm ERPG-1 =	sible concentration r TWA 50 ppm; ERPG-2 = 250 ppm;		Coveralls	: ·	Tychem® CPF 4, BR, LV, Responder® and TK (>8-hr breakthrough)
Skin: Irritation and burns Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema) Flush eyes with large amounts of water for at least 30 minutes. Rem contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin large amounts of water.		HEAL	TH EFFECTS		F	IRS	T AID AND DECONTAMINATION
Headache, dizziness, incoordination and passing outBegin artificial respiration if breathing has stopped and CPR if neces Transfer promptly to a medical facility.Chronic:Cancer (nose and stomach) in animalsMedical observation is recommended as symptoms may be delayed	Skin: Inhalation:	Irritation Nose, th coughin breath (Headac and pas	n and burns nroat and lung irritation with ng and severe shortness of pulmonary edema) he, dizziness, incoordination ssing out		Flush eye contact le Quickly re large amo Begin arti Transfer	es with enses i emove ounts o ificial r promp	h large amounts of water for at least 30 minutes. Remove if worn. Seek medical attention. 'e contaminated clothing and wash contaminated skin with of water. respiration if breathing has stopped and CPR if necessary. ptly to a medical facility.



Common Name: PSEUDOCUMENE

Synonyms: 1,2,4-Trimethylbenzene; Psicumene; Pseudocumol CAS No: 95-63-6 Molecular Formula: C_9H_{12} RTK Substance No: 2716 Description: Clear, colorless liquid with a distinctive, sweet odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Pseudocumene is a COMBUSTIBLE LIQUID.	Pseudocumene may react violently with
2 - Fire	Use dry chemical, CO ₂ , water spray, alcohol-resistant foam or other foam as extinguishing agents.	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, PROMINE and
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	NITRATES, CHLORINE, BROMINE and FLUORINE) and NITRIC ACID to cause fires and
DOT#: UN 2325	Use water spray to keep fire-exposed containers cool. Vapor is heavier than air and may travel a distance to	explosions.
ERG Guide #: 129	cause a fire or explosion far from the source	
Hazard Class: 3		
(Flammable)		

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet) Large Spill: 300 meters (1,000 feet) Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

DO NOT wash into sewer.

This substance is toxic to aquatic organisms and may bioaccumulate in fish.

EXPOSURE LIMITS

OSHA:	None
NIOSH:	25 ppm, 10-hr TWA
ACGIH:	25 ppm, 8-hr TWA
IDLH:	None

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea, vomiting, dizziness, lack of coordination and confusion

PHYSICAL PROPERTIES

Odor Threshold:	0.4 ppm
Flash Point:	112°F (44°C)
LEL:	0.9%
UEL:	6.4%
Vapor Density:	4.15 (air = 1)
Vapor Pressure:	2.1 mm Hg at 77°F (25°C)
Specific Gravity:	0.88 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	329°F (165°C)
Ionization Potential:	8.27 eV
Molecular Weight:	120.2

PROTECTIVE EQUIPMENT

Gloves:	NITRI-SOLVE® (<6-hr breakthrough)
Coveralls:	DuPont Tychem® Polycoat and Responder®; Kappler® Zytron® 500; and Saint-Gobain ONESuit® TEC for Aromatic Hydrocarbons (>8-hr breakthrough)
Respirator:	<25 ppm - Full facepiece APR with Organic vapor cartridge >250 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.



Common Name: QUINOLINE

Synonyms: Benzo(b)Pyridine; Chinoline; Leukol CAS No: 91-22-5 Molecular Formula: C₉H₇N RTK Substance No: 1628 Description: Colorless liquid with a strong, characteristic odor, which turns brown when exposed to light

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE LIQUID	Quinoline may explode and/or react violently with HYDROGEN PEROXIDE; PERCHROMATES; DINITROGEN TETROXIDE; and
2 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	MALEIC ANHYDRIDE. Reactions with OXIDIZING AGENTS (such as PERCHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN	PEROXIDES, PERMANGANATES, CHLORATES,
DOT#: UN 2656	FIRE, including <i>Nitrogen Oxides</i> .	NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) may be
ERG Guide #: 154	Use water spray to keep fire-exposed containers cool.	violent.
Hazard Class: 6.1 (Poisonous material)		Quinoline is not compatible with ORGANIC ANHYDRIDES; ALKYLENE OXIDES; EPICHLOROHYDRIN; ALDEHYDES; ALCOHOLS; GLYCOLS; PHENOLS; CRESOLS; CAPROLACTAM SOLUTION; and mixtures of LINSEED OIL and THIONYL CHLORIDE.
		Quinoline is hygroscopic.

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fires: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Quinoline is harmful to aquatic life in very low concentrations.

EXPOSURE LIMITS

AIHA: 0.001 ppm, 8-hr TWA WEEL

The Protective Action Criteria values are:

PAC-1 = 0.6 ppm

- PAC-2 = 5 ppm
- PAC-3 = 25 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath
	Headache, nausea, vomiting, fever, fatigue and dizziness
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.015 to 71 ppm
Flash Point:	138° to 214°F (59° to 101°C)
LEL:	1.2%
Auto Ignition Temp:	896°F (480°C)
Vapor Density:	4.5 (air = 1)
Vapor Pressure:	5 mm Hg at 194°F (90°C)
Specific Gravity:	1.1 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	460°F (238°C)
Melting Point:	5°F (-15°C)
Molecular Weight:	129

PROTECTIVE EQUIPMENT

Gloves: Coveralls:	Silver Shield®/4H® (>4-hr breakthrough) Tychem® BR, LV, Responder®, and TK (>4-hr breakthrough for <i>Heterocyclic compounds</i> , <i>Nitrogen</i>)
Respirator:	<0.01 -Full facepiece APR with Organic vapor cartridge>0.01 - Supplied air>0.6 - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: QUINTOZENE

Synonyms: Avicol®; Pentachloronitrobenzene; PCNB; Terraclor® CAS No: 82-68-8 Molecular Formula: C₆Cl₅NO₂ RTK Substance No: 1630 Description: Colorless, crystalline solid when pure, or a yellow to cream-colored powder, with a musty odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity				
2 - Health	Quintozene can burn, and may also be dissolved in a liquid carrier that is flammable or	Quintozene is not compatible with OXIDIZING AGENTS				
1 - Fire	combustible.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,				
0 - Reactivity	Use dry chemical, CO ₂ , water fog or foam as extinguishing agents.	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and				
DOT#: UN 3077	POISONOUS GASES ARE PRODUCED IN FIRE,	NITRIC); and STRONG BASES (such as SODIUM				
ERG Guide #: 171	including Hydrogen Chloride and Nitrogen Oxides.	HYDROXIDE and POTASSIUM HYDROXIDE).				
Hazard Class: 9	Use water spray to keep fire-exposed containers cool.					
(Environmentally						
Hazardous Material)						

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Quintozene is very toxic to aquatic organisms and bioaccumulation may occur.

EXPOSURE LIMITS

ACGIH: 0.5 mg/m³, 8-hr TWA

The Protective Action Criteria values are:

 $PAC-1 = 1.5 \text{ mg/m}^3$

 $PAC-2 = 300 \text{ mg/m}^3$

 $PAC-3 = 500 \text{ mg/m}^3$

Н	E,	AI	LT	Ή	EF	FF	E	СТ	⁻ S
					_			<u> </u>	-

Eyes:	Irritation and corneal injury
Skin:	Irritation
Inhalation:	Dizziness, convulsions, nausea and vomiting
	Headache, fatigue and blue color to the skin and lips (<i>Methemoglobinemia</i>)

PHYSICAL PROPERTIES

Odor Threshold:	Musty odor
Vapor Density:	10.2 (air = 1)
Vapor Pressure:	0.013 mm Hg at 77°F (25°C)
Specific Gravity:	1.72 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	622°F (328°C)
Melting Point:	291°F (144°C)
Molecular Weight:	295.3

	PROTECTIVE EQUIPMENT
Gloves:	Viton or Barrier® (>8-hr breakthrough for <i>Halogen compounds, aromatic</i>)
Coveralls:	Tyvek®
Respirator:	>0.5 mg/m ³ - Full facepiece APR with Organic vapor/Acid gas cartridges and High efficiency particulate prefilters >1.5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: RESMETHRIN

Synonyms: Benzofuroline; Chryson; Vectrin CAS No: 10453-86-8 Molecular Formula: $C_{22}H_{26}O_3$ RTK Substance No: 3450

Description: Waxy, white to tan solid or colorless crystal, Pyrethroid insecticide

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Resmethrin does not burn, however, it is often dissolved in a liquid carrier which may be	Resmethrin is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE, POTASSIUM
DOT#: UN 2902	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE.	HYDROXIDE and LIME).
ERG Guide #: 151	Use water spray to keep fire-exposed containers	
Hazard Class: 6.1	cool.	
(Poison)		

SPILL/LEAKS	PHYSICAL PROPERTIES			
Isolation Distance:	Odor Threshold:	Chrysanthemum-like		
Spill (solid): 25 meters (75 feet)	Flash Point:	Flammable/Combustible		
(liquid): 50 meters (150 feet) Fire: 800 meters (1/2 mile)	Vapor Pressure:	1.13 x 10 ⁻⁸ mm Hg at 86°F (30°C)		
Absorb Resmethrin in solution in dry sand, earth, or a	Water Solubility:	Insoluble		
similar material and place into sealed containers for disposal.	Melting Point:	43° to 48°F (6° to 9°C)		
Moisten solid spilled material first or use a HEPA-filter	Molecular Weight:	338.4		

Description is your tayle to be pay have and retartially
for disposal.
vacuum for clean-up and place into sealed containers
Moisten solid spilled material first or use a HEPA-filter

Resmethrin is very toxic to honeybees and potentially toxic to fish.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Resmethrin**.

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile (for solid Resmethrin) Silver Shield®/4H® and Barrier® (>8-hr breakthrough for Resmethrin in <i>solution</i>)
Coveralls:	Tyvek® (for <i>solid</i> Resmethrin) Tychem® BR, CSM and TK (>8-hr breakthrough for Resmethrin in <i>solution</i>)
Respirator:	Spill: full facepiece APR with <i>Organic vapor</i> and <i>P100</i> cartridges Fire: SCBA

HEALTH EFFECTS

- Eyes:Irritation and burnsSkin:Irritation, burns, itching, rash and
redness (skin absorbable)
- Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, dizziness, fatigue, muscle weakness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: RESORCINOL

Synonyms: 1,3-Dihydroxybenzene; 3-Hydroxyphenol; 1,3-Benzenediol CAS No: 108-46-3 Molecular Formula: $C_6H_4(OH)_2$ RTK Substance No: 1634 Description: White, crystalline solid that turns pink on exposure to light and air

HAZARD					
Hazard Rating	Firefighting			React	ivity
3 - Health COMBUSTIBLE SOLID 1 - Fire Use dry chemical, CO ₂ , alcohol-re other foam extinguishing agents, be effective in fighting fires. 0 - Reactivity POISONOUS GASES ARE PROICONTAINERS MAY EXPLODE II ERG Guide #: 153 Use water spray to keep fire-exponents Hazard Class: 6.1 Cool.		s, a DDU IN	s water may not JCED IN FIRE. FIRE.	Resorc (such a PERM/ CHLOF as HYE CHLOF SALTS MENTH	Sinol may react explosively with NITRIC ACID. Sinol is not compatible with OXIDIZING AGENTS as PERCHLORATES, PEROXIDES, ANGANATES, CHLORATES, NITRATES, RINE, BROMINE and FLUORINE); ACIDS (such DROCHLORIC, SULFURIC and ACETIC); ACID RIDES; ACID ANHYDRIDES; IRON and IRON S; ALBUMIN; CAMPHOR; URETHANE; HOL; ACETANILIDE; and ANTIPYRINE. Sinol absorbs moisture from the air.
SP	ILL/LEAKS			PHY	SICAL PROPERTIES
Isolation Distance: Spill: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. Cover <i>liquid</i> spills with dry lime, sand or soda ash and place into sealed containers for disposal. DO NOT wash into sewer. Resorcinol is harmful to aquatic life at very low concentrations. EXPOSURE LIMITS NIOSH: 45 mg/m ³ (10 ppm), 10-hr TWA; 90 mg/m ³ (20 ppm), STEL ACGIH: 45 mg/m ³ (10 ppm), 8-hr TWA; 90 mg/m ³ (20 ppm), STEL The Protective Action Criteria values are: PAC-1 = 75 mg/m ³ PAC-2 = 75 mg/m ³ PAC-3 = 75 mg/m ³		Flash Point: LEL: Auto Ignition T Vapor Density: Vapor Pressure Specific Gravit Water Solubilit Boiling Point: Melting Point: Ionization Pote Molecular Weig pH:		e: y: y: ntial: ght:	261°F (127°C) 1.4% 1,125°F (607°C) 3.79 (air = 1) 1 mm Hg at 227°F (108°C) 1.2 (water = 1) Soluble 531° to 536°F (277° to 280°C) 228° to 232°F (109° to 111°C) 8.63 eV 110.18 5.2 ECTIVE EQUIPMENT
			Gloves: Coveralls: Respirator:	Nitrile and Natural Rubber Tyvek® >45 mg/m ³ - full facepiece APR with <i>Organic vapor</i> <i>cartridges</i> and <i>P100 prefilters</i> >75 mg/m ³ - SCBA	
HEALTH EFFECTS			FIRS	T AID	AND DECONTAMINATION
Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose, throat and lung irritation, with coughing, wheezing and shortness of breath Headache, fatigue and blue color to the skin and lips (methemoglobinemia)			contact lenses Quickly remove large amounts	large am if worn. S contamin of water. espiratior	nounts of water for at least 15 minutes. Remove Seek medical attention. nated clothing and wash contaminated skin with n if breathing has stopped and CPR if necessary.



Common Name: SAFROLE

Synonyms: 5-Allyl-1,3-Benzodioxole; 1,2-Methylenedioxy-4-Allylbenzene CAS No: 94-59-7 Molecular Formula: $C_{10}H_{10}O_2$ RTK Substance No: 1642 Description: Clear, colorless or slightly yellow liquid with a sassafras odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	COMBUSTIBLE LIQUID	Safrole is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
1 - Fire	Use dry chemical or CO ₂ as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	Use water spray to keep fire-exposed containers	CHLORINE, BROMINE and FLUORINE).
DOT#: UN 3082	cool.	
ERG Guide #: 171		
Hazard Class: 9 (Miscellaneous Hazardous Material)		

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Wash spill area with 60 to 70% *Ethanol* followed by a soap and water solution.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Safrole**.

The Protective Action Criteria values are:

PAC-1 = 15 mg/m³ PAC-2 = 100 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes:	Irritation	Remove the person from exposure.
Skin:	Irritation	Flush eyes with large amounts of water for at least 15 minutes. Remove
Inhalation: Headache, dizziness, convulsions,	contact lenses if worn.	
	excitement and even unconsciousness	Remove contaminated clothing and wash contaminated skin with soap a water.
Chronic: Cancer (liver) in anim	Cancer (liver) in animals	
		Begin artificial respiration if breathing has stopped and CPR if necessar
		Transfer promptly to a medical facility.

PHY	SICAL PROPERTIES
Odor Threshold:	Sassafras odor
Flash Point:	207° to 212°F (97° to 100°C)

Flash Point:	207° to 212°F (97° to 100°C)
Vapor Pressure:	1 mm Hg at 147°F (64°C)
Specific Gravity:	1.09 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	450° to 453°F (232° to 234°C)
Freezing Point:	52.2°F (11.2°C)
Molecular Weight:	162.12

	PROTECTIVE EQUIPMENT
Gloves:	SilverShield®/4H® and Viton (>8-hr breakthrough for <i>Hydrocarbons, aliphatic, unsaturated</i>)
Coveralls:	Tychem® F, BR, Responder® and TK, and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrocarbons</i> , <i>aliphatic, unsaturated</i>)
Respirator:	<15 mg/m ³ - full facepiece APR with Organic vapor/Acid gas cartridges and High efficiency prefilters >15 mg/m ³ - SCBA



Common Name: SILICA, CRISTOBALITE

Synonyms: Calcined Diatomaceous Earth; Crystalline Silicon Dioxide, Crystabolite CAS No: 14464-46-1 Molecular Formula: SiO₂ RTK Substance No: 1657 Description: Colorless, odorless, crystalline solid

ł	HAZ	ARD	DATA	
-				

Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Silica, Cristobalite itself does	Silica, Cristobalite is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	not burn.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity		CHLORINE, BROMINE and FLUORINE); ACETYLENE and AMMONIA.
DOT#: None		
ERG Guide #: None		
Hazard Class: None		

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold:	Odorless
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.	Vapor Pressure:	0 mm Hg at 68°F (20°C)
	Specific Gravity:	2.32 (water = 1)
	Water Solubility:	Insoluble
	Boiling Point:	4,046°F (2,230°C)
	Melting Point:	3,133°F (1,723°C)
	Molecular Weight:	60.08

NIOSH: 0.05 mg/m³, 10-hr TWA

ACGIH: 0.025 mg/m³, 8-hr TWA

IDLH: 25 mg/m³

The Protective Action Criteria values are: PAC-1 = 0.075 mg/m^3 PAC-2 = 25 mg/m^3 PAC-3 = 25 mg/m^3

	HEALTH EFFECTS	
Eyes: Skin: Inhalation:	Irritation Irritation Nose and lung irritation with cough and shortness of breath (<i>Silicosis</i>)	F F
Chronic:	<i>Crystalline Silica</i> causes cancer (lung) in humans.	E

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	<0.5 mg/m ³ - Full facepiece APR with <i>High efficiency filter</i> >0.5 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Inhalation:

Chronic:

Nose and lung irritation with cough, and

Crystalline Silica causes cancer (lung) in

shortness of breath (Silicosis)

humans.

Common Name: SILICA, QUARTZ

Synonyms: Silica, Crystalline; Crystallized Silicon Dioxide CAS No: 14808-60-7 Molecular Formula: SiO₂ RTK Substance No: 1660 Description: Odorless, colorless, white or reddish crystalline solid

HAZARD DATA Hazard Rating Firefighting Reactivity Silica, Quartz is not compatible with OXIDIZING Extinguish fire using an agent suitable for type of 4 - Health surrounding fire. Silica, Quartz itself does not AGENTS (such as PERCHLORATES, PEROXIDES, 0 - Fire PERMANGANATES, CHLORATES, NITRATES, burn. CHLORINE, BROMINE and FLUORINE); ACETYLENE; 0 - Reactivity AMMONIA; HYDROGEN FLUORIDE; and CATECHOL. DOT#: None ERG Guide #: None Hazard Class: None

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold:	Odorless
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.	Vapor Pressure:	0 mm Hg at 68ºF (20ºC)
	Specific Gravity:	2.6 (water = 1)
	Water Solubility:	Insoluble
	Boiling Point:	4,046°F (2,230°C)
	Melting Point:	3,110°F (1,719°C)
	Molecular Weight:	60.09

EXPOSURE LIMITS	PROTECTIVE EQUIPMENT
NIOSH: 0.1 mg/m ³ , 10-hr TWA	Gloves: Nitrile and Natural Rubber
ACGIH: 0.025 mg/m ³ , 8-hr TWA IDLH: 50 mg/m ³	Coveralls: Tyvek®
The Protective Action Criteria values are: PAC-1 = 0.075 mg/m ³ PAC-2 = 33 mg/m ³ PAC-3 = 200 mg/m ³	Respirator: <1 mg/m³ - Full facepiece APR with High efficiency filter
HEALTH EFFECTS	FIRST AID AND DECONTAMINATION
Eyes: Irritation Skin: Irritation	Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove

contact lenses if worn.
Remove contaminated clothing and wash contaminated skin with soap and water.
Begin artificial respiration if breathing has stopped and CPR if necessary.
Transfer promptly to a medical facility.



Common Name: SILICA, TRIDYMITE

Synonyms: Crystalline Silica, Tridymite; Crystalline Silicon Dioxide, Tridymite CAS No: 15468-32-3 Molecular Formula: SiO₂ RTK Substance No: 1663 Description: White or colorless, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Silica, Tridymite itself does	Silica, Tridymite is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	not burn.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity		CHLORINE, BROMINE and FLUORINE); ACETYLENE; AMMONIA; HYDROGEN FLUORIDE; and CATECHOL.
DOT#: None		
ERG Guide #: None		
Hazard Class: None		

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Odor Threshold:	Odorless
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible
Moisten spilled material first or use a HEPA-filter	Vapor Pressure:	0 mm Hg at 68°F (20°C)
vacuum for clean-up and place into sealed containers for disposal.	Specific Gravity:	2.3 (water = 1)
	Water Solubility:	Insoluble
	Boiling Point:	4,046°F (2,230°C)
	Melting Point:	3,097°F (1,703°C)
	Molecular Weight:	60.09

NIOSH: 0.05 mg/m³; 10-hr TWA **IDLH:** 25 mg/m³

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	<0.5 mg/m ³ - full facepiece APR with <i>High efficiency filter</i> >0.05 mg/m ³ - SCBA

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	Irritation Irritation Nose and lung irritation with cough and shortness of breath (<i>Silicosis</i>) <i>Crystalline Silica</i> causes cancer (lung) in humans.	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: SILICA, TRIPOLI

Synonyms: Silica, Crystalline-Tripoli; alpha-Quartz CAS No: 1317-95-9 Molecular Formula: SiO₂ RTK Substance No: 1664 Description: Colorless, odorless mineral solid

HAZARD DATA

	TIAZARD DA	
Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Silica, Tripoli itself does not	Silica, Tripoli reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
0 - Fire	burn.	CHLORATES, NITRATES, CHLORINE, BROMINE and
0 - Reactivity		FLUORINE).
DOT#: None		Silica, Tripoli is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC);
ERG Guide #: None		ACETYLENE; and AMMONIA.
Hazard Class: None		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	2.2 to 2.65 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	4,046°F (2,230°C)
Melting Point:	2,984° to 3,105°F (1,640° to 1,707°C)
Molecular Weight:	60.1

EXPOSURE LIMITS

ACGIH: 0.025 mg/m³ (as the *respirable fraction*)

The Protective Action Criteria values are:

PAC-1 = 0.3 mg/m^3

 $PAC-2 = 0.3 \text{ mg/m}^3$

PAC-3 = 50 mg/m³

(All of the above as Silica, Crystalline-Quartz)

HEALTH EFFECTS

Eyes:	Irritation
Skin:	No information
Inhalation:	Nose and lung irritation with cough, and shortness of breath (<i>Silicosis</i>)
Chronic:	<i>Crystalline Silica</i> causes cancer (lung) in humans

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator:

APR with high *efficiency filters* >25 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: SILICOFLUORIC ACID

Synonyms: Fluorosilicic Acid; Hydrofluorosilicic Acid; Sand Acid CAS No: 16961-83-4 Molecular Formula: H_2SiF_6 RTK Substance No: 1665 Description: Fuming, colorless to pale, straw-colored liquid with a sharp, irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Silicofluoric Acid itself does not burn.	Silicofluoric Acid may react with WATER and MOIST AIR to form toxic and/or flammable <i>Hydrogen Fluoride</i> and <i>Hydrogen</i> gases, especially in confined spaces.
1 - Reactivity DOT#: UN 1778 ERG Guide #: 154 Hazard Class: 8	POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Fluoride and Silicon Tetrafluoride. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers	Silicofluoric Acid reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); AMIDES; and CYANIDES to produce flammable and explosive <i>Hydrogen gas</i> , toxic gases (such as <i>Hydrogen Cyanide</i>) and heat.
(Corrosive)	cool.	Silicofluoric Acid is not compatible with COMBUSTIBLE MATERIALS; OXIDIZING AGENTS (such as PERCHLORATES PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
		Anhydrous Silicofluoric Acid will separate quickly in AIR to form Silicon Tetrafluoride and Hydrogen Fluoride.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Keep **Silicofluoric Acid** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

May be hazardous to the environment and aquatic organisms.

EXPOSURE LIMITS

ACGIH: 0.5 ppm, 8-hr TWA; 2 ppm Ceiling (for Hydrogen Fluoride)

IDLH: 30 ppm (for Hydrogen Fluoride)

The Protective Action Criteria values are: PAC-1 = 12 ppm PAC-3 = 60 ppm PAC-2 = 16 ppm

HEALTH EFFECTS

Eyes: Skin: Inhalation:	Severe irritation and burns Severe irritation and burns Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, nausea and vomiting, weakness, convulsions and collapse

PHYSICAL PROPERTIES

Sharp, irritating odor
Noncombustible
1.3 (water = 1)
Soluble (releases Heat)
Decomposes
4°F (-15.5°C)
144.1

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough for <i>Hydrogen Fluoride</i>)
Coveralls:	Tychem® BR, LV, Responder®, and TK; and Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	 >0.5 ppm - Full facepiece APR with acid gas cartridges specific for <i>Hydrogen Fluoride</i> >5 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Immediately flush with large amounts of water. Continue flushing while removing clothing. Apply 2.5% *Calcium Gluconate* gel to the affected skin. Seek medical assistance immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: SILICON TETRACHLORIDE

Synonyms: Silicon Chloride; Tetrachlorosilicon CAS No: 10026-04-7 Molecular Formula: SiCl₄ RTK Substance No: 1666

Description: Clear, colorless, fuming liquid with an irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity			
3 - Health	CORROSIVE AND WATER REACTIVE Extinguish fire using an agent suitable for type of	Silicon Tetrachloride reacts violently with WATER and MOIST AIR to form heat, and toxic and corrosive Hydrogen Chloride			
0 - Fire	surrounding fire. Silicon Tetrachloride itself does not burn.	gas. Contact between Hydrogen Chloride gas and METALS			
2 W - Reactivity	Silicon Tetrachloride may react with WATER and FOAM	may release flammable and explosive <i>Hydrogen gas</i> . Silicon Tetrachloride reacts violently with OXIDIZING AGENTS			
DOT#: UN 1818	to release toxic and corrosive gases.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ALCOHOLS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); KETONES; and ALDEHYDES. Prevent contact with LIGHT, HEAT and AIR.			
ERG Guide #: 157	When using Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF) use at medium expansion and carefully				
Hazard Class: 8 (Corrosive)	float onto spill to form a continuous layer. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Silicon Oxide</i> . CONTAINERS MAY EXPLODE IN FIRE.				
	Use water spray to keep fire-exposed containers cool but DO NOT get water into containers.				

SPILL/LEAKS

Isolation Distance:

Spill (small): 30 meters (100 feet) (large): 100 meters (300 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

AR-AFF Foam can be used to suppress vapors and blanket release

Silicon Tetrachloride spilled in water produces large amounts of Hydrogen Chloride.

Neutralize spills using Sodium Hydroxide with a 1 to 1 ratio of Sodium Hydroxide to Chlorosilane or use a 2 to 1 ratio of Sodium Bicarbonate to Chlorosilane.

Keep Silicon Tetrachloride out of confined spaces, such as sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

OSHA/NIOSH: 5 ppm, Ceiling (as Hydrogen Chloride) ACGIH: 2 ppm, Ceiling (as Hydrogen Chloride)

- IDLH: 50 ppm (as Hydrogen Chloride)
- The Protective Action Criteria values are:

PAC-1 = 0.45 ppm PAC-2 = 5.5 ppm

PAC-3 = 25 ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	1 to 5 ppm
Flash Point:	Nonflammable
Vapor Density:	5.8 (air = 1)
Vapor Pressure:	194 mm Hg at 68°F (20°C)
Specific Gravity:	1.48 (water = 1)
Water Solubility:	Reactive (Decomposes)
Boiling Point:	136°F (58°C)
Freezing Point:	-57°F (-70°C)
Ionization Potential:	12.74 eV (as Hydrogen Chloride)
Molecular Weight:	169.9

PROTECTIVE EQUIPMENT

Gloves:	Viton (>8-hr breakthrough)	
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)	
Respirator:	SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: SILVER NITRATE

Synonyms: Argerol; Lunar Caustic CAS No: 7761-88-8 Molecular Formula: AgNO₃ RTK Substance No: 1672 Description: Odorless, colorless or white, crystalline solid

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health 0 - Fire	Silver Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.	Silver Nitrate reacts with ACETYLENE, in the presence of AMMONIA, to form <i>Silver Acetylide</i> , a sensitive and powerful detonator.		
0 - Reactivity DOT#: UN 1493 ERG Guide #: 140 Hazard Class: 5.1 (Oxidizer)	Use large quantities of water as an extinguishing agent or extinguish fire using an agent suitable for type of surrounding fire. Silver Nitrate itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Silver Oxides</i> and <i>Nitrogen</i> <i>Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Silver Nitrate may ignite combustibles (wood, paper and oil).	Silver Nitrate reacts violently with COMBUSTIBLES; CHLOROSULFONIC ACID and other ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); METALS; METAL CARBIDES; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE). Silver Nitrate is not compatible with ETHYLENE OXIDE; CHARCOAL; AMMONIUM HYDROXIDE; ETHANOL; AZIRIDINE; ARSENIC; SULFUR; and many other compounds.		

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance: Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. DO NOT wash into sewer. Silver Nitrate is very toxic to aquatic organisms.	Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Boiling Point: Melting Point: Molecular Weight:	Odorless Noncombustible 4.35 to 5.35 (water = 1) Soluble $831^{\circ}F$ (444 $^{\circ}C$) (Decomposes) 413.6 $^{\circ}F$ (212 $^{\circ}C$) 169.9	

Gloves:

Coveralls:

EXPOSURE LIMITS

OSHA: 0.01 mg/m³, 8-hr TWA (as *Silver*) **IDLH:** 10 mg/m³ (as *Silver*)

The Protective Action Criteria values are:

PAC-1 = 0.4 mg/m^3

PAC-2 = 3 mg/m^3

 $PAC-3 = 15.7 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage	
Skin:	Irritation, burns, rash and blisters	
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath	
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)	

Tyvek®

PROTECTIVE EQUIPMENT

Nitrile and Natural Rubber

Respirator: >0.01 mg/m³ - full facepiece APR with High efficiency filters >0.4 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.



Common Name: **SODIUM**

Synonyms: Natrium CAS No: 7440-23-5 Molecular Formula: Na RTK Substance No: 1674 Description: Odorless, soft, silvery-white metal

	HAZARD DATA				
Hazard Rating	Firefighting	Reactivity			
3 - Health	Sodium is a FLAMMABLE SOLID which will ignite spontaneously in AIR or MOIST AIR and	Sodium reacts violently with WATER, STEAM, AIR and MOIST AIR to produce corrosive <i>Sodium Hydroxide</i> and flammable and explosive			
3 - Fire	reacts violently with WATER or STEAM to	Hydrogen gas.			
2 - Reactivity	 produce flammable and explosive <i>Hydrogen</i> gas. Use dry chemicals appropriate for extinguishing metal fires such as graphite, soda ash or powdered sodium chloride. DO NOT USE WATER, CO₂ or halogenated extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including (<i>Sodium Oxides</i>). 	Sodium can react explosively or violently with a broad range of chemicals including METALS (such as ALUMINUM, ARSENIC and ZINC); METAL			
DOT#: UN 1428		COMPOUNDS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC			
ERG Guide #: 138		and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,			
Hazard Class: 4.3		CHLORINE, BROMINE and FLUORINE); CHLORINATED			
(Dangerous when wet)		HYDROCARBONS (such as METHYLENE CHLORIDE and TRICHLOROETHYLENE); CARBON DIOXIDE; AZIDES; and MALEIC ANHYDRIDE.			

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

DO NOT sweep up dry material, keep dry, cover with dry sand, limestone or clay, and place quickly into a container of *Kerosene*, *Naphtha, Light Oil* or similar material.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Sodium**.

DO NOT wash into sewer.

Keep **Sodium** out of confined spaces, such as sewers, because of the possibility of an explosion.

Sodium is dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Sodium**.

The Protective Action Criteria values are: PAC-1 = 0.5 mg/m^3 PAC-2 = 5 mg/m^3 PAC-3 = 50 mg/m^3

HEALTH EFFECTS

Eyes: Skin: Inhalation:	Irritation and burns Irritation and burns Nose, throat and lung irritation, with coughing, and severe shortness of	
	breath (pulmonary edema) Headache, dizziness, nausea and vomiting	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Flammable
Auto Ignition Temp:	>239°F (11
Vapor Density:	0.003 (air =
Vapor Pressure:	1.2 mm Hg
Specific Gravity:	0.97 (water
Water Solubility:	Decompose
Boiling Point:	1,619°F (88
Melting Point:	208°F (98°C
Molecular Weight:	22.49

Flammable solid >239°F (115°C) 0.003 (air = 1) 1.2 mm Hg at 752°F (400°C) 0.97 (water = 1) Decomposes (violently) 1,619°F (882°C) 208°F (98°C) 22.49

PROTECTIVE EQUIPMENT

Gloves:	Nitrile (>8-hr breakthrough for Kerosene and Naphtha)
Coveralls:	Turn out gear or flash protection
Respirator:	>0.5 mg/m 3 -full facepiece APR with High efficiency filters >5 mg/m 3 - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Quickly brush off excess chemical from the face. Flush with large amounts of water for at least 30 minutes. Remove contact lenses, if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash with large amounts of water for at least 30 minutes. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: SODIUM AZIDE

Synonyms: Azide; Azium; Smite® CAS No: 26628-22-8 Molecular Formula: NaN₃ RTK Substance No: 1684 Description: Colorless to white, odorless

Description: Colorless to white, odorless solid which is highly soluble in water which may result in the formation of *Hydrazoic Acid*

HAZARD DATA						
Hazard Rating Firefighting				Reactivity		
3 - Health 1 - Fire 3 - Reactivity DOT#: UN 168 ERG Guide #: Hazard Class: (Poi	153	Firefighting REACTIVE and SEVERE EXPLOSION HAZARD. Use dry sand or special powder as extinguishing agents. DO NOT USE WATER. POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides and Sodium Oxide. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. DO NOT get water inside containers as Sodium Azide reacts with WATER to form Hydrazoic Acid.		ED IN <i>Sodium</i> RE. nside	 Reacts with CARBON DISULFIDE and METALS (such as LEAD, BRASS, COPPER, SILVER and MERCURY) to form shock-sensitive compounds. Reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic and explosive <i>Hydrazoic Acid</i>. Sodium Azide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); BARIUM CARBONATE; DIMETHYL SULFATE; HALOGENATED SOLVENTS; and DIBROMOMALONONITRILE. Sodium Azide is not compatible with CAUSTICS; METAL OXIDES; METAL SULFIDES; METAL AZIDES; and PHOSGENE. Protect from HEAT, SHOCK and FRICTION. 	
	SPI	LL/LEAKS				SICAL PROPERTIES
Isolation Distance: Liquids: 50 meters (150 feet) Solid: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT FLUSH into <i>Copper</i> or <i>Lead</i> pipes, as violent explosions may occur. Harmful to aquatic life.			Odor Threshold: Flash Point: Vapor Density: Specific Gravity: Water Solubility: Melting Point: Ionization Potential Molecular Weight:		Odorless Not flammable but decomposes explosively when heated 2.2 (air = 1) 1.8 (water = 1) Soluble/Decomposes 527°F (275°C) (decomposes and may explode) 11.7 eV 65	
· · · · · ·		SURE LIMITS			PRO	
0.1 p ACGIH: 0.29	opm, C mg/m ³	Ceiling (as Sodium Azide) eiling (as <i>Hydrazoic Acid</i>), ⁸ , Ceiling (as Sodium Azide) Ceiling (as <i>Hydrazoic Acid</i>)		Gloves: Coveralls Respirato	DuP for <i>I</i>	ber ont Tyvek® for Sodium Azide ont Responder® and St. Gobain ONESuit® TEC <i>Hydrazoic Acid</i> olied air
Н	EAL	TH EFFECTS		FI	FIRST AID AND DECONTAMINAT	
Skin: In Inhalation: N a e H d M	rritation Nose ar and/or s edema) Headac Iizzines Muscle	he, nausea, vomiting and		 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed. 		



Common Name: SODIUM BISULFITE

Synonym: Sodium Hydrogen Sulfite CAS No: 7631-90-5 Molecular Formula: NaHSO₃ RTK Substance No: 1685 Description: White, crystalline solid which is corrosive when in a liquid solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Sodium Bisulfite itself does not	Sodium Bisulfite reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	burn.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Sodium Oxides and Sulfur Oxides.	CHLORINE, BROMINE and FLUORINE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
DOT#: UN 2693	Use water spray to keep fire-exposed containers	NITRIC) to release Sulfur Dioxide gas.
(Solution)	cool.	Sodium Bisulfite decomposes in HEAT and is corrosive
ERG Guide #: 154		to ALUMINUM.
Hazard Class: 8		
(Corrosive)		

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet) Fire: 800 meters (1/2 mile) Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT wash into sewer.

Dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

OSHA: None NIOSH: 5 mg/m³, 10-hr TWA ACGIH: 5 mg/m³, 8-hr TWA

IDLH: None

Eves:

HEALTH EFFECTS Severe irritation and burns

Skin:	Severe irritation, burns, itching and skin rash
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:Odor of rotten eggsFlash Point:Not combustibleSpecific Gravity:1.48 (water =1)Water Solubility:SolubleBoiling Point:DecomposesMelting Point:DecomposesMolecular Weight:104.1

PROTECTIVE EQUIPMENT

Gloves:	Rubber or Nitrile
Coveralls:	DuPont Tyvek® or equivalent
Respirator:	>5 mg/m 3 - Full facepiece APR with High efficiency filters >50 mg/m 3 - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Quickly brush off excess chemical from the face. Immediately flush with large amounts of water for at least 60 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. DO NOT INTERRUPT FLUSHING. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash gently with large amounts of water for at least 60 minutes. DO NOT INTERRUPT WASHING. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: SODIUM BROMATE

Synonyms: None CAS No: 7789-38-0 Molecular Formula: NaBrO₃ RTK Substance No: 1686 Description: Colorless to white, crystalline or granular, odorless powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health 0 - Fire	Sodium Bromate is not combustible but it is a STRONG OXIDIZER which enhances the combustion of other substances.	Sodium Bromate reacts violently with REDUCING AGENTS (such as LITHIUM, SODIUM, POTASSIUM and their HYDRIDES); COMBUSTIBLE MATERIALS;
0 - Reactivity DOT#: UN 1494 ERG Guide #: 141 Hazard Class: 5.1 (Oxidizer)	Use water only. DO NOT USE DRY CHEMICAL or CO ₂ extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Bromide</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Sodium Bromate may ignite combustibles (wood,	ORGANICS (such as OIL, FAT, GREASE and FUELS); METAL POWDERS (such as ALUMINUM, ARSENIC and COPPER); POTASSIUM; METAL SULFIDES; CARBON; SUGAR; and AMMONIUM SALTS. Sodium Bromate will become shock sensitive if contaminated with ORGANIC MATERIALS, METALS or CARBON.
	paper and oil). Contamination may cause containers to explode.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal. DO NOT use combustible absorbents. DO NOT wash into sewer.

PHYSICAL PROPERTIES

Nitrile and Natural Rubber

Odor Threshold: Flash Point: Specific Gravity: Water Solubility: Boiling Point: Molecular Weight:

Gloves:

Coveralls:

Respirator:

Odorless Noncombustible 3.34 (water = 1) Soluble 718°F (381°C) (Decomposes) 150.9

EXPOSURE LIMITS

The Protective Action Criteria values are:

- PAC-1 = 1.5 mg/m^3
- PAC-2 = 12.5 mg/m³
- $PAC-3 = 60 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes: Irritation Skin: Irritation

Skin:IrritationInhalation:Nose, throat and lung irritation with
coughing, wheezing and severe
shortness of breath (pulmonary edema)
Headache, fatigue and blue color to the
skin and lips (methemoglobinemia)

>1.5 mg/m³ - SCBA

PROTECTIVE EQUIPMENT

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Tyvek®

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: SODIUM CACODYLATE

Synonyms: Cacodylic Acid, Sodium Salt CAS No: 124-65-2 Molecular Formula: $C_2H_6AsO_2Na$ RTK Substance No: 1687 Description: Colorless to light vellow, crystalline solid o

Description: Colorless to light yellow, crystalline solid or powder with a slight garlic odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health	Sodium Cacodylate may burn, but does not readily ignite.	Sodium Cacodylate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	Use dry chemical, CO_2 , water spray or foam as	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and
DOT#: UN 1688	including Arsenic Oxide and Arsenic fumes.	POTASSIUM HYDROXIDE); and SODIUM
ERG Guide #: 152	Use water spray to keep fire-exposed containers	BOROHYDRIDE.
Hazard Class: 6.1 (Poison)	cool.	Sodium Cacodylate reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic <i>Dimethylarsine gas</i> .

Odor Threshold:

Specific Gravity:

Water Solubility:

Molecular Weight:

Boiling Point:

Melting Point:

pH:

Flash Point:

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and desposit in sealed containers.

DO NOT wash into sewer.

Harmful to aquatic life.

EXPOSURE LIMITS

OSHA: 0.5 mg/m³, 8-hr TWA NIOSH: None ACGIH: None IDLH: None

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	DuPont Tyvek®
Respirator:	<0.5 mg/m ³ - full facepiece APR with High efficiency filter >0.5 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.

HEALTH EFFECTS	
Eyes:	Irritation, burns, red and watery eyes
Skin:	Irritation, burns, itching, rash and loss of pigment
Inhalation:	Nose and throat irritation with coughing and wheezing, weakness, nausea, vomiting, headache and muscle cramps
Chronic:	Arsenic and Arsenic compounds cause skin and lung cancer in humans

PHYSICAL PROPERTIES

Slight garlic odor

Nonflammable

>1 (water = 1)

Decomposes

140°F (60°C)

Soluble

160

8 to 9



Common Name: SODIUM CHLORATE

Synonyms: Atlacide; Chlorate of Soda; Oxycil CAS No: 7775-09-9 Molecular Formula: NaClO₃ RTK Substance No: 1688 Description: Odorless, pale yellow to white, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Sodium Chlorate is not combustible, but it is a STRONG OXIDIZER that enhances the	Sodium Chlorate reacts with ARSENIC TRIOXIDE; STRONG ACIDS (such as HYDROCHLORIC,
0 - Fire	combustion of other substances.	SULFURIC and NITRIC); REDUCING AGENTS (such as
0 - Reactivity DOT#: UN 1495 UN 2428 (solution) ERG Guide #: 140 Hazard Class: 5.1	Flood with water. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorides</i> and <i>Sodium Oxides</i> . Use water spray to keep fire-exposed containers cool. Sodium Chlorate may ignite combustibles (wood, paper and oil)	LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); ORGANIC MATERIALS (such as PEAT, SUGAR and WOOD); COMBUSTIBLES; and FINELY POWDERED METALS (such as ALUMINUM) to cause fires and explosions. Sodium Chlorate is not compatible with AMMONIUM COMPOUNDS; CYANIDES; and HYDROGEN
(Oxidizer)	paper and oil).	PEROXIDE.

SPILL/L	EAKS
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Isolation Distance:

Spill (solid): 25 meters (75 feet) (solution): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Sodium Chlorate is dangerous to aquatic life at high concentrations.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Sodium Chlorate**.

The Protective Action Criteria values are:

- $PAC-1 = 0.4 \text{ mg/m}^3$
- $PAC-2 = 3 \text{ mg/m}^3$
- PAC-3 = 75 mg/m³

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Headache, fatigue and blue color to the
skin and lips (methemoglobinemia)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	2.5 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Melting Point:	478°F (248°C)
Molecular Weight:	106.44
1	

PROTECTIVE E	QUIPMENT
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Gloves:	Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough)
Coveralls:	Tyvek® (solid); Tychem® F, C3, BR, CSM and TK (>8-hr breakthrough for Sodium Chlorate <i>in solution</i>)
Respirator:	Spill (<i>solid</i>): full facepiece APR with <i>High efficiency filters</i> >0.4 mg/m ³ or fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: SODIUM CHROMATE

Synonyms: Disodium Chromate; Chromate of Soda CAS No: 7775-11-3 Molecular Formula: Na₂CrO₄ RTK Substance No: 1692 Description: Odorless, yellow, crystalline solid

HAZARD	DATA
	<i>Di i i i i i i</i>

Hazard Rating	Firefighting	Reactivity
4 - Health	Sodium Chromate is not combustible but is a STRONG OXIDIZER which enhances the	Sodium Chromate is a powerful OXIDIZER. Contact with REDUCING AGENTS (such as LITHIUM, SODIUM,
0 - Fire	combustion of other substances.	ALUMINUM and their HYDRIDES); COMBUSTIBLE
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chromium Oxide</i> and <i>Sodium Monoxide</i> .	and ORGANIC MATERIALS (such as PAPER, WOOD and PLASTICS); and STRONG ACIDS (such as
DOT#: UN 3288	Use water spray to keep fire-exposed containers	HYDROCHLORIC, SULFURIC and NITRIC) may result in
ERG Guide #: 151	cool.	violent reactions and fires.
Hazard Class: 6.1 (Poison)	Sodium Chromate may ignite combustibles (wood, paper and oil).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Sodium Chromate is very toxic to aquatic organisms.

EXPOSURE LIMITS

- **OSHA:** 0.005 mg/m³, 8-hr TWA (as *Chromium VI*)
- **NIOSH:** 0.001 mg/m³, 10-hr TWA (as *Chromium*)
- **ACGIH:** 0.05 mg/m³, 8-hr TWA (as *Chromium*)
- **IDLH:** 15 mg/m³ (as *Chromium VI*)

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage
Skin:	Irritation, burns, itching, rash and skin ulcers.
Inhalation:	Nose and throat irritation with coughing and wheezing
Chronic:	Hexavalent Chromium or Chromium VI compounds cause cancer (lung) in humans.

PHYSICAL PROPERTIES

Odorless
Noncombustible
2.7 (air = 1)
1.48 (water = 1)
Soluble
1,458°F (792°C)
162

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene and Natural Rubber
Coveralls:	Tyvek®
Respirator:	 >0.005 mg/m³ - Full facepiece APR with High efficiency filters >0.05 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.



Common Name: SODIUM DICHROMATE

Synonyms: Sodium Bichromate; Chromic Acid, Disodium Salt CAS No: 10588-01-9 Molecular Formula: Na₂Cr₂O₇ RTK Substance No: 1695 Description: Odorless, red or red-orange, crystalline solid

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Sodium Dichromate is not combustible, but it is a STRONG OXIDIZER that enhances the	Sodium Dichromate reacts violently with HYDRAZINE; ACETIC ANHYDRIDE; ETHANOL; and SULFURIC
0 - Fire	combustion of other substances.	ACID.
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or CO ₂ as extinguishing agents.	Sodium Dichromate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
DOT#: UN 1479	POISONOUS GASES ARE PRODUCED IN FIRE,	PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 140	including Sodium Oxides.	CHLORINE, BROMINE and FLUORINE) and
Hazard Class: 6 (Poison)	Use water spray to keep fire-exposed containers cool.	COMBUSTIBLES.
(FOISOIT)	Sodium Dichromate may ignite combustibles (wood, paper and oil).	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

Liquid spills can be neutralized with *Sodium Carbonate*. DO NOT wash into sewer.

Sodium Dichromate is very toxic to aquatic organisms and may cause long-term effects in the aquatic environment.

EXPOSURE LIMITS

OSHA:	0.005 mg/m³, 8-hr TWA

- **NIOSH:** 0.001 mg/m³, 10-hr TWA
- ACGIH: 0.05 mg/m³, 8-hr TWA
- **IDLH:** 15 mg/m³

(All the above are for Chromium VI)

The Protective Action Criteria values are:

PAC-1 = 20 mg/m³ PAC-2 = 37.8 mg/m³ PAC-3 = 37.8 mg/m³

HEALTH EFFECTS

Eyes:	Irritation, burns and possible eye damage	
Skin:	Irritation, burns, itching, rash and ulcers	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
Chronic:	Hexavalent Chromium or Chromium VI compounds cause lung cancer in humans.	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	2.35 (water = 1)
Water Solubility:	Soluble
Boiling Point:	752°F (400°C)
Melting Point:	675°F (357°C)
Molecular Weight:	262
pH:	4 (1% solution)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber	
Coveralls:	Tyvek®	
Respirator:	 >0.001 mg/m³ - full facepiece APR with <i>High efficiency filters</i> >1 mg/m³ - Supplied air >15 mg/m³ - SCBA 	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.



Common Name: SODIUM DITHIONITE

Synonyms: Sodium Hydrosulfite CAS No: 7775-14-6 Molecular Formula: Na₂S₂O₄ RTK Substance No: 1697

Description: White to gravish, crystalline powder with a slight rotten egg odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Sodium Dithionite is REACTIVE and contact with MOIST AIR, MOISTURE, WATER or HEAT can cause Sodium	Exposure to MOISTURE, MOIST AIR, WATER or elevated TEMPERATURES (over 140°F (60°C)) causes Sodium
1 - Fire 2 - Reactivity	Dithionite to decompose, producing enough heat to ignite combustible materials.	Dithionite to decompose. Decomposition produces enough heat to ignite combustibles.
DOT#: UN 1384	Use CO_2 or dry sand for small fires. Use water in flooding quantities for large fires. If flooding quantities are not	Sodium Dithionite may react violently or explosively with SODIUM CHLORITE and other OXIDIZING AGENTS (such
ERG Guide #: 135	available, let burn. Monitor container temperature for at least 48-hours to make	as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and
Hazard Class: 4.2 (Spontaneously	sure decomposition is not occurring. POISONOUS GASES ARE PRODUCED IN FIRE, including	FLUORINE). Sodium Dithionite reacts with STRONG ACIDS (such as
Combustible)	Sulfur Dioxide.	HYDROCHLORIC, SULFURIC and NITRIC) to form toxic gases.
	Use water spray to keep fire-exposed containers cool.	Sodium Dithionite, in combination with a mixture of ALUMINUM POWDER, POTASSIUM CARBONATE, and
	Sodium Dithionite may form an ignitable dust/air mixture in closed tanks or containers.	BENZALDEHYDE, resulted in an explosion.
	Sodium Dithionite may be ignited by static discharge.	

Isolation Distance:

Dry Spill: 25 meters (75 feet) Water Spill: 30 meters (100 feet)

Fire: 800 meters (1/2 mile)

Cover and mix in with dry sand, earth or other noncombustible material and place into sealed, dry containers for disposal. Use only non-sparking tools and equipment, especially when opening and

SPILL/LEAKS

closing containers of Sodium Dithionite.

LINALTO

Ventilate and wash area after clean-up is complete.

DO NOT wash into sewer.

Sodium Dithionite is harmful to the aquatic environment

PHYSICAL PROPERTIES

Odor Threshold:	Rotten egg odor
Flash Point:	212°F (100°C)
Vapor Density:	3.6 (air = 1)
Specific Gravity:	1.4 (water = 1)
Water Solubility:	Soluble (Decomposes)
Melting Point:	158° to 266° F (70° to 130° C)
Molecular Weight:	174.1

DDOTECTIVE EQUIDMENT

EXPOSURE LIMITS		PROTECTIVE EQUIPMENT
No occupational exposure limits have been	Gloves:	Neoprene, Natural Rubber and Polyvinyl Chloride
established for Sodium Dithionite .	Coveralls:	Tyvek®
The Protective Action Criteria values are: PAC-1 = 30 mg/m^3 PAC-2 = 50 mg/m^3	Respirator:	SCBA

$PAC-1 = 30 \text{ mg/m}^3$ PAC-2 PAC-3 = 250 mg/m³

HEALTH EFFECTS

Eves: Irritation and burns Skin: Irritation and burns Nose, throat and lung irritation, with coughing, Inhalation: wheezing and shortness of breath Headache, dizziness, lightheadedness, and convulsions.

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: SODIUM FLUORIDE

Synonyms: Natrium Fluoride; Sodium Monofluoride CAS No: 7681-49-4 Molecular Formula: NaF RTK Substance No: 1699 Description: Colorless or white, odorless crystal or powder that also may be dyed blue or green when used as a pesticide

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Sodium Fluoride itself does not burn.	Sodium Fluoride reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic <i>Hydrogen Fluoride gas</i> .
0 - Reactivity DOT#: UN 1690	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Fluoride gas</i> .	Sodium Fluoride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,
ERG Guide #: 154 Hazard Class: 6.1 (Poison)	Use water spray to keep fire-exposed containers cool.	CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and METALS.

Isolation Distance:

Spill (solid): 25 meters (75 feet)

Spill (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

For **Sodium Fluoride** *in solution*, cover with dry lime, sand or soda ash and place into sealed containers for disposal.

For water spills, neutralize with agricultural lime, crushed limestone or sodium bicarborate.

DO NOT wash into sewer.

Sodium Fluoride is dangerous to aquatic life in high concentrations.

EXPOSURE LIMITS

OSHA: 2.5 mg/m³, 8-hr TWA NIOSH: 2.5 mg/m³, 10-hr TWA ACGIH: 2.5 mg/m³, 8-hr TWA IDLH: 250 mg/m³ (All of the above are for *inorganic Fluoride*) The Protective Action Criteria values are:

PAC-1 = 5.5 mg/m³ PAC-2 = 5.5 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:
Flash Point:
Vapor Pressure:
Specific Gravity:
Water Solubility:
Boiling Point:
Melting Point:
Molecular Weight:

Odorless Nonflammable 0 mm Hg at 68°F (20°C) (approx) 2.56 (water = 1) Very slightly soluble 3,083°F (1,695°C) 1,819°F (993°C) 42

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Neoprene (>8-hr breakthrough for <i>inorganic salt solutions</i>)
Coveralls:	Tychem® Responder® (>8-hr breakthrough for Sodium Fluoride in <i>water solution</i>)
Respirator:	>2.5 mg/m ³ - full facepiece APR with <i>High efficiency filters</i> >25 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: SODIUM HYDROGEN FLUORIDE

Synonyms: Sodium Bifluoride; Sodium Difluoride CAS No: 1333-83-1 Molecular Formula: Na(HF₂) RTK Substance No: 1703

Description: Colorless to white, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Sodium Hydrogen Fluoride	Sodium Hydrogen Fluoride will react with WATER and MOIST AIR to form flammable and corrosive gases.
0 - Fire	itself does not burn.	Sodium Hydrogen Fluoride is not compatible with
1 - Reactivity	Sodium Hydrogen Fluoride may react with WATER to form flammable and corrosive gases.	METALS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and COMBUSTIBLE
DOT#: UN 2439	POISONOUS GASES ARE PRODUCED IN FIRE,	MATERIALS.
ERG Guide #: 154	including Hydrogen Fluoride and Sodium Fluoride.	Water-based solutions of Sodium Hydrogen Fluoride
Hazard Class: 8 (Corrosive)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	can corrode GLASS, CONCRETE and certain METALS, and will attack RUBBER, LEATHER and many ORGANIC MATERIALS.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Sodium Hydrogen Fluoride is harmful to fish and other aquatic organisms.

EXPOSURE LIMITS

OSHA:2.5 mg/m³, 8-hr TWA (as Fluorides)ACGIH:2.5 mg/m³, 8-hr TWA (as Fluorides);
0.5 ppm, 8-hr TWA (as Hydrogen Fluoride)IDLH:250 mg/m³ (as Fluorine)

The Protective Action Criteria values are:

 $PAC-1 = 2.5 \text{ mg/m}^3$

 $PAC-2 = 2.5 \text{ mg/m}^{3}$

PAC-3 = 250 mg/m³

HEALTH EFFECTS

Eyes:	Irritation, severe burns and possible eye damage
Skin:	Irritation, severe burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema) Headache, dizziness, and nausea

PHYSICAL PROPERTIES

Flash Point:	Nonflammable
Vapor Pressure:	<0.01 mm Hg at 68°F (20°C)
Specific Gravity:	2.08 (water = 1)
Water Solubility:	Soluble
Boiling Point:	Decomposes
Molecular Weight:	61.99

PROTECTIVE EQUIPMENT

Gloves: Nitrile or Natural Rubber

Coveralls: Tyvek®

Respirator:<2.5 mg/m³ - full facepiece APR with High efficiency filters</td>>2.5 mg/m³ (as Fluorides) - SCBA>0.5 ppm (as Hydrogen Fluoride) - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Immediately flush with large amounts of water. Apply 2.5% *Calcium Gluconate* gel to the affected skin. Seek medical assistance immediately. **Begin** artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: SODIUM HYDROSULFIDE

Synonyms: Sodium Bisulfide; Sodium Hydrogen Sulfide; Sodium Mercaptan; Sodium Sulfide CAS No: 16721-80-5 Molecular Formula: NaHS RTK Substance No: 1705

Description: Colorless to lemon-colored, crystalline solid with a rotten egg odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health *2 - Fire 1 - Reactivity DOT#: UN 2318 (less than 25% water of crystallization) ERG Guide #: 135 Hazard Class: 4.2 (Spontaneously Combustible)	 Sodium Hydrosulfide, when not solution, may be SPONTANEOUSLY COMBUSTIBLE. FLAMMABLE Hydrogen Sulfide gas may form with heating. Use dry chemical, CO₂, water spray or foam as extinguishing agents. DO NOT apply directly on Sodium Hydrosulfide itself as splattering may occur. POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Oxides and Hydrogen Sulfide. Use water spray to keep fire-exposed containers cool. Sodium Hydrosulfide may form an ignitable vapor/air mixture in closed tanks or containers. 	Sodium Hydrosulfide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); MOIST AIR and MOISTURE to release flammable and toxic <i>Hydrogen Sulfide gas</i> . Sodium Hydrosulfide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and METALS (such as ZINC, ALUMINUM and COPPER, and their ALLOYS).

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

For **Sodium Hydrosulfide** in *solution*, cover with dry sand or earth and place into sealed containers for disposal.

Keep **Sodium Hydrosulfide** out of confined spaces, such as sewers, because of the possibility of an explosion due to *Hydrogen Sulfide* gas *formation*.

DO NOT wash into sewer.

For water spills, add Sodium Carbonate (Na₂CO₃).

Sodium Hydrosulfide is very toxic to aquatic life.

EXPOSURE LIMITS

ACGIH: 1 ppm, 8-hr TWA; 5 ppm STEL (as *Hydrogen Sulfide*)

IDLH: 100 ppm (as Hydrogen Sulfide)

The Protective Action Criteria values are:

PAC-1 = 0.51 ppm PAC-2 = 27 ppm PAC-3 = 50 ppm (as *Hydrogen Sulfide*)

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing and severe shortness of breath (pulmonary edema)
	Headache, dizziness, disorientation, and passing out
	Higher levels can cause seizures and death

PHYSICAL PROPERTIES

Odor Threshold:	Rotten egg odor
Flash Point:	194°F (90°C) (Hydrate form)
LEL:	4.3% (as Hydrogen Sulfide)
UEL:	46% (as Hydrogen Sulfide)
Vapor Density:	1.17 (air = 1)
Specific Gravity:	1.79 (water = 1)
Water Solubility:	Soluble
Boiling Point:	212°F (100°C)
Melting Point:	662°F (350°C)
Molecular Weight:	56.06

PROTECTIVE EQUIPMENT

Gloves:	Neoprene (>8-hr breakthrough)
Coveralls:	Tychem® Responder (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately.
- Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: SODIUM HYDROXIDE

Synonyms: Caustic Soda; Lye; Sodium Hydrate CAS No: 1310-73-2 Molecular Formula: NaOH RTK Substance No: 1706

Description: Odorless, white solid that absorbs moisture from the air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. Sodium Hydroxide itself does not burn.	Sodium Hydroxide reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); WATER; and MOISTURE to rapidly release heat.
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE. Use water spray to keep fire-exposed containers	Sodium Hydroxide reacts with METALS (such as ALUMINUM, LEAD, TIN and ZINC) to form flammable and explosive <i>Hydrogen gas</i> .
DOT#: UN 1823 (solid)	cool. DO NOT get water inside containers. Sodium Hydroxide in contact with water or	Sodium Hydroxide can form shock sensitive salts on contact with NITROGEN CONTAINING COMPOUNDS (such as NITROMETHANE).
UN 1824 (solution)	moisture may generate enough heat to ignite combustibles.	Sodium Hydroxide is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,
ERG Guide #: 154 Hazard Class: 8		CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); CHLORINATED SOLVENTS; AMMONIA; and ORGANIC MATERIALS.
(Corrosive)		Sodium Hydroxide can attack IRON, COPPER, PLASTICS, RUBBER and COATINGS.

SPILL/LEAKS

Isolation Distance:

Spill (solid): 25 meters (75 feet): Spill (liquid): 50 meters (150 feet) Fire: 800 meters (1/2 mile)

For **Sodium Hydroxide** in *solution* absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Collect *solid* material in the most convenient and safe manner

and place into sealed containers for disposal.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Neutralize water spills with a dilute acid.

Sodium Hydroxide is hazardous to the environment, especially water organisms.

EXPOSURE LIMITS

OSHA: 2 mg/m^3 , 8-hr TWANIOSH: 2 mg/m^3 , CeilingACGIH: 2 mg/m^3 , CeilingIDLH: 10 mg/m^3 The Protective Action Criteria values are:PAC-1 = 0.5 mg/m^3 PAC-2 = 5 mg/m^3PAC-3 = 50 mg/m^3

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Irritation and severe burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

Odor Threshold: Odorless

PHYSICAL PROPERTIES

ouor mesnolu.	00011033
Flash Point:	Noncombustible
Vapor Density:	2.1 (air = 1)
Vapor Pressure:	0 mm Hg at 68ºF (20ºC)
Specific Gravity:	2.1 (water = 1)
Water Solubility:	Soluble
Boiling Point:	2,534°F (1,390°C)
Melting Point:	604°F (318°C)
Molecular Weight:	40

PROTECTIVE EQUIPMENT

Coveralls:

Gloves:

Butyl, Nitrile, Neoprene, PVC, SilverShield®/4H®, Viton and Barrier® (>8-hr breakthrough for **Sodium Hydroxide** in *solution*)

Tychem® SL and Responder®, and Trellchem® HPS and VPS (>8-hr breakthrough for **Sodium Hydroxide** solid or solution)

Respirator:

<10 mg/m³ - Full facepiece APR with *High efficiency filters* >10 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Quickly brush off excess chemical from the face. Flush with large amounts of water for at least 30 minutes. Remove contact lenses, if worn. Seek medical attention immediately.

Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash with large amounts of water for at least 30 minutes. Seek medical attention immediately.

 $\ensuremath{\text{Begin}}$ artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed



Common Name: SODIUM HYPOCHLORITE

Synonyms: Clorox; Liquid Bleach; Sodium Oxychloride CAS No: 7681-52-9 Molecular Formula: NaOCI RTK Substance No: 1707 Description: Clear, slightly yellow or green liquid with a strong Chlorine odor

HAZARD DATA					
Hazard Rating Firefighting		R	Reactivity		
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1 ERG Guide # Hazard Clas	y 791 #: 154	 Sodium Hypochlorite is not combustible but is a STRONG OXIDIZER which enhances the combustion of other substances. Use dry chemical, CO₂, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sodium Oxide</i> and <i>Chlorine</i>. Use water spray to keep fire-exposed containers cool. Sodium Hypochlorite may ignite combustibles (wood, paper and oil). 	 Sodium Hypochlorite may react violently or explosively with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ACID COMPOUNDS (such as ALUMINUM CHLORIDE, FERRIC CHLORIDE and ALUM); ACID-BASED CLEANING COMPOUNDS (such as BRICK and CONCRETE CLEANERS); and AMMONIA COMPOUNDS (such as AMMONIUM HYDROXIDE, AMMONIUM CHLORIDE and QUATERNARY AMMONIUM SALTS) to release <i>Chlorine</i> and other toxic gases. Sodium Hypochlorite may react violently with ORGANIC MATERIALS (such as SOLVENTS, FUELS, ALCOHOLS, GLYCOLS and INSECTICIDES); AMINES; and ORGANIC POLYMERS to form <i>Chlorinated Organic compounds</i>, explosive compounds and <i>Chlorine gas</i>. Sodium Hypochlorite is not compatible with HYDROGEN PEROXIDE and METALS (such as COPPER, NICKEL, COBALT and IRON), and should not be handled in equipment or piping containing STAINLESS STEEL, ALUMINUM, CARBON STEEL or OTHER COMMON METALS. The reaction may release <i>Oxygen gas</i> and can cause container rupture. The reaction of Sodium Hypochlorite and REDUCING AGENTS (such as SODIUM BISULFITE and SODIUM THIOSULFATE) gives off heat. 		
		SPILL/LEAKS		PHYSICAL PROPERTIES	
Isolation Distance:Small Spill: 30 meters (100 feet)Large Spill: 100 meters (300 feet)Fire: 800 meters (1/2 mile)Neutralize with Sodium Bisulfite, cover with Soda Ash and place into covered containers for disposal or wash with plenty of water.DO NOT wash into sewer.Sodium Hypochlorite is toxic to aquatic organisms.			Odor Threshold:Chlorine-likeFlash Point:NoncombustibleSpecific Gravity:1.1, 5% solution (water = 1)Water Solubility:SolubleBoiling Point:DecomposesMolecular Weight:74.4pH:10.8 to 11.4 (5.25% solution in water)		
		POSURE LIMITS		PROTECTIVE EQUIPMENT	
NIOSH: AIHA: IDLH:	2 m	opm, 15-min Ceiling (as <i>Chlorine</i>) g/m ³ , 15-min WEEL pm (as <i>Chlorine</i>)		Gloves: Butyl, Nitrile, Neoprene, Natural Rubber and Viton (>8-hr breakthrough for 30 to 70% solutions) Coveralls: Tychem® SL, CPF 3, Responder®; Zytron® 300; and ONESuit® TEC (>8-hr breakthrough for 30 to 70% solutions) Respirator: >2 mg/m³ - full facepiece APR with Acid gas cartridge and N100 prefilters >20 mg/m³ or >5 ppm Chlorine - Supplied air	
	HE	ALTH EFFECTS		FIRST AID AND DECONTAMINATION	
Eyes: Skin: Inhalation:	Severe Nose, f and se edema	n, burns and possible eye damage irritation, burns, rash and blisters throat and lung irritation, with coughing vere shortness of breath (Pulmonary) che, dizziness, nausea and vomiting		 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. Medical observation is recommended as symptoms may be delayed. 	





Common Name: SODIUM NITRITE

Synonyms: Anti-Rust; Diazoting Salts; Erinitrit CAS No: 7632-00-0 Molecular Formula: NaNO₂ RTK Substance No: 2258

Description: Odorless, yellowish white, crystalline granule, rod or powder

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
2 - Health 0 - Fire	Sodium Nitrite is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.	Sodium Nitrite may explode on heating above 986°F (530°C) or on contact with CYANIDES; PHOSPHORUS; TIN (II) CHLORIDE; COMBUSTIBLES; and REDUCING AGENTS (such		
1 - Reactivity	Use water only. DO NOT USE dry chemical, Halon® or CO ₂ as	as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES). Sodium Nitrite reacts with STRONG ACIDS (such as		
DOT#: UN 1500 ERG Guide #: 140	extinguishing agents. HYDROC POISONOUS GASES ARE PRODUCED Dioxide a	HYDROCHLORIC, SULFURIC and NITRIC) to form <i>Nitrogen</i> <i>Dioxide</i> and reacts with <i>liquid</i> AMMONIA and other AMMONIUM COMPOUNDS to form reactive and explosive substances.		
Hazard Class: 5.1 (Oxidizer)	Sulfur Oxides. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Sodium Nitrite may ignite combustibles (wood, paper and oil).	Sodium Nitrite is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); CELLULOSE; AMINES; CHEMICALLY ACTIVE METALS (such as POTASSIUM, MAGNESIUM and ZINC); METALS, METAL SALTS; and many other chemicals.		

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance:	Odor Threshold:	Odorless	
Spill: 25 meters (75 feet)	Flash Point:	Nonflammable	
Fire: 800 meters (1/2 mile)	Auto Ignition Temp:	1,000°F (538°C)	
Collect powdered material in the most convenient and	Vapor Density:	<1 (air = 1)	
safe manner and place into sealed containers for	Specific Gravity:	2.2 (water = 1)	
disposal.	Water Solubility:	Soluble	
DO NOT wash into sewer.	Boiling Point:	608°F (320°C) (Decomposes)	
For water spills add <i>Soda Ash</i> and <i>Calcium</i>	Melting Point:	520°F (271°C)	
<i>Hypochlorite</i> to adjust pH to 7.	Molecular Weight:	69	
Sodium Nitrite is toxic to aquatic life.	pH:	9 (in solution)	

EXPOSURE LIMITS

The Protective Action Criteria values are: $PAC-1 = 6.4 \text{ mg/m}^3$ $PAC-2 = 71 \text{ mg/m}^3$ PAC-3 = 240 mg/m³

		PROTECTIVE EQUIPMENT
	Gloves:	Nitrile and Natural Rubber
	Coveralls: Respirator:	Tyvek® >0.15 mg/m³ - full facepiece APR with High efficiency
	Respirator.	filters
		>1 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

lips

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Methemoglobinemia with headache, fatigue and blue color to the skin and lips

HEALTH EFFECTS



Common Name: SODIUM SULFIDE

Synonyms: Sodium Monosulfide CAS No: 1313-82-2 Molecular Formula: Na₂S RTK Substance No: 1728 Description: White, yellow to red or pink, crystalline solid or flake which discolors on exposure to air

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Finely divided Sodium Sulfide can explode spontaneously in air.	ELEVATED TEMPERATURES (1,688°F, 920°C) or FRICTION can cause explosive decomposition.
1 - Fire 1 - Reactivity DOT#: UN 1385 ERG Guide #: 135 Hazard Class: 4.2 (Spontaneously Combustible)	Use flooding quantities of water, foam or dry powder as extinguishing agents. DO NOT use CO ₂ fire extinguishers. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Sulfide</i> and <i>Sulfur Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Sodium Sulfide reacts violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALUMINUM POWDER; CARBON; and DIAZONIUM SALTS. Sodium Sulfide reacts with WATER to form <i>Hydrogen</i> <i>Sulfide gas</i> .
		DO NOT ALLOW Sodium Sulfide to become completely dry as it may ignite spontaneously.

SPILL/LEAKS

Isolation Distance:

Spills:	25 meter (75 feet)
Fire: 8	300 meters (1/2 mile)

Keep finely divided Sodium Sulfide out of confined

spaces, such as sewers, because of the possibility of an explosion.

May be hazardous to the environment and harmful to aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established.

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns, skin allergy with itching and rash
Inhalation:	Nose, throat and lung irritation with

coughing, and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Rotten eggs
Flash Point:	Spontaneously combustible when heated
Auto Ignition Temp:	>896°F (>480°C)
Specific Gravity:	1.86 (water = 1)
Water Solubility:	Slightly soluble
Melting Point:	1,688° to 1,742°F (920° to 950°C)
Molecular Weight:	78.05

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H®
Coveralls:	DuPont Tychem® CPF 1, QC, CPF 2 and SL for <i>dry</i> Sodium Sulfide and DuPont Tychem®, CSM, Responder® and TK for Sodium Sulfide solution
Respirator:	Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention. **Begin** artificial respiration if breathing has stopped and CPR if

Transfer to a medical facility.

necessary.



Common Name: STANNOUS CHLORIDE

Synonyms: Tin Chloride; Tin Dichloride CAS No: 7772-99-8 Molecular Formula: SnCl₂ RTK Substance No: 1733 Description: White to off-white flake or crystalline solid

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Stannous Chloride itself does	Stannous Chloride reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,		
0 - Fire	not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Tin Oxide fumes</i> . Use water spray to keep fire-exposed containers cool.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ETHYLENE OXIDE; HYDRAZINE HYDRATE; and CALCIUM		
0 - Reactivity				
DOT#: UN 1759		CARBIDE.		
ERG Guide #: 154		Stannous Chloride is not compatible with METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC);		
Hazard Class: 8		METAL CARBIDES; and COMBUSTIBLE MATERIALS.		
(Corrosive)		Stannous Chloride is MOISTURE and AIR sensitive.		

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance:	Flash Point:	Noncombustible	
Spill: 25 meters (75 feet)	Vapor Pressure:	0 mm Hg at 68°F (20°C)	
Fire: 800 meters (1/2 mile)	Specific Gravity:	3.95 (water = 1)	
	Water Solubility:	Soluble	
Collect powdered material in the most convenient and safe manner and place into sealed containers for	Boiling Point:	1,206°F (652°C)	
disposal.	Melting Point:	475°F (246°C)	
DO NOT wash into sewer.	Molecular Weight:	189.6	

EXPOSURE LIMITS

OSHA:	2 mg/m³, 8-hr TWA	
NIOSH:	2 mg/m ³ , 10-hr TWA	
ACGIH:	2 mg/m ³ , 8-hr TWA	
IDLH:	100 mg/m ³	
	(All of the above are for Tin)	
The Protective Action Criteria values are:		
PAC-1 = 9.6 mg/m ³		
PAC-2 = 50 mg/m ³		
PAC-3	$3 = 160 \text{ mg/m}^3$	

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>2 mg/m ³ - full facepiece APR with High efficiency filters >10 mg/m ³ - SCBA

HEALTH EFFECTS		FIRST AID AND DECONTAMINATION
Eyes: Skin: Inhalation:	Irritation and burns Irritation and burns Nose and throat irritation with coughing and wheezing Headache, nausea and vomiting.	 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.

January 2010



Common Name: STODDARD SOLVENT

Synonyms: White Spirits, Varsol, Mineral Spirits CAS No: 8052-41-3 Molecular Formula: Mixture RTK Substance No: 1736 Description: Clear colorless liquid with a Kerosene-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	COMBUSTIBLE LIQUID	Stoddard Solvent reacts with OXIDIZING AGENTS (such as PERCHLORATES,
2 - Fire	Use dry chemical, CO_2 , or foam as extinguishing agents.	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	NITRATES, CHLORINE, BROMINE and
_	Use water spray to keep fire-exposed containers cool.	FLUORINE) to cause fires and explosions.
DOT#: UN 1268	Vapor is heavier than air and may travel a distance to	
ERG Guide #: 128	cause a fire or explosion far from the source.	
Hazard Class: 3		
(Flammable)		

SPILL/LEAKS

Isolation Distance:

Small Spills: 50 meters (150 feet)

Large Spills: 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. If released into water, shoreline fouling may occur.

PHYSICAL PROPERTIES

Odor Threshold:	1 to 30 ppm
Flash Point:	100° to 140°F (38° to 60°C)
LEL:	0.9%
UEL:	6%
Auto Ignition Temp:	450°F (232°C)
Vapor Density:	4.8 (air = 1)
Vapor Pressure:	2 mm Hg at 68°F (20°C)
Specific Gravity:	0.8 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	309° to 399°F (154° to 204°C)
Molecular Weight:	approximately 140

EXPOSURE LIMITS

OSHA:	2,900 mg/m ³ (500 ppm), 8-hr TWA
NIOSH:	350 mg/m ³ (61 ppm), 10-hr TWA; 1,800 mg/m ³ (314 ppm), 15-min Ceiling
ACGIH:	525 mg/m ³ (100 ppm), 8-hr TWA
IDLH:	20,000 mg/m ³ (3,493 ppm)

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, rash, redness and skin ulcers
Inhalation:	Nose and throat irritation, headache, dizziness and passing out

Gloves:	Neoprene, Silver Shield®/4H®, Viton and Nitrile (>8-hr breakthrough)
Coveralls:	DuPont Tychem® CPF 4, BR, LV, Responder®, CSM, and TK; Kappler Zytron® 300; and Saint-Gobain ONESuit®TEC or equivalent (>8-hr breakthrough)
Respirator:	>350 mg/m ³ - APR with an Organic vapor cartridge >3,500 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: STRONTIUM NITRATE

Synonyms: Strontium Dinitrate CAS No: 10042-76-9 Molecular Formula: Sr(NO₃)₂ RTK Substance No: 1743 Description: Odorless, colorless or white, crystalline powder

	HAZARD DATA		
Hazard Rating	Firefighting	Reactivity	
2 - Health	Strontium Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of	Strontium Nitrate and ALKYL ESTERS may form explosive <i>Alkyl Nitrates</i> .	
0 - Fire	other substances.	Strontium Nitrate may react violently with	
0 - Reactivity	Use water only. DO NOT USE CHEMICAL, FOAM or CO_2 as extinguishing agents.	REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).	
DOT#: UN 1507	POISONOUS GASES ARE PRODUCED IN FIRE,	Strontium Nitrate is not compatible with	
ERG Guide #: 140	including Nitrogen Oxides.	COMBUSTIBLE MATERIALS; ORGANIC	
Hazard Class: 5.1 (Oxidizer)	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Strontium Nitrate may ignite combustibles (wood, paper and oil). Prolonged exposure to heat, shock or friction may cause Strontium Nitrate to explode.	MATERIALS; HALOGENS; METALS; METAL SALTS; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).	

SPILL/LEAKS

Isolation Distance:

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Strontium Nitrate can persist indefinitely in water.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Strontium Nitrate**.

The Protective Action Criteria values are:

 $PAC-1 = 30 \text{ mg/m}^{3}$

 $PAC-2 = 250 \text{ mg/m}^3$

PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES		
Odor Threshold:	Odorless	
Flash Point:	Nonflammable	
Specific Gravity:	2.98 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	1,193°F (645°C)	
Melting Point:	1,058°F (570°C)	
Molecular Weight:	211.6	

PROTECTIVE EQUIPMENT

Coveralls: Tyvek®

Respirator:

: Full facepiece APR with High efficiency filters >30 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: STYRENE MONOMER

Synonyms: Cinnamene; Ethenylbenzene; Phenylethylene; Vinyl Benzene CAS No: 100-42-5 Molecular Formula: C_8H_8 RTK Substance No: 1748

Description: Clear, colorless to yellow, oily liquid, with a sweet odor at low concentrations

HAZARD DATA			
Hazard Rating	Firefighting		Reactivity
2 - Health 3 - Fire 2- Reactivity DOT#: UN 2055 ERG Guide #: 128P Hazard Class: 3 (Flammable)	 Styrene Monomer is a FLAMMABLE Use dry chemical, CO₂, water spray of extinguishing agents. POISONOUS GASES ARE PRODUC CONTAINERS MAY EXPLODE IN FI Use water spray to keep fire-exposed Vapor is heavier than air and may tracause a fire or explosion far from the back. Styrene Monomer can POLYMERIZ uncontrolled reactions. These reactive explosive. Styrene Monomer may accumulate and the section of the section of the section of the section. 	or foam as CED IN FIRE. IRE. d containers cool. vel a distance to a source and flash E resulting in ons may be	Unstabilized Styrene Monomer can POLYMERIZE VIOLENTL' on exposure to HEAT; LIGHT; OXIDIZING AGENTS (such as PERCHLORATES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); OXYGEN; PEROXIDES (such as <i>Dibenzoyl</i> <i>Peroxide</i>) or when CONTAMINATED. Styrene Monomer can form unstable <i>Peroxides</i> in AIR that ma explode spontaneously. Styrene Monomer reacts violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC, NITRIC and OLEUM) and METAL SALTS (such as IRON CHLORIDE and ALUMINUM CHLORIDE). Styrene Monomer attacks RUBBER, COPPER and COPPER ALLOYS.
SPI	LL/LEAKS		PHYSICAL PROPERTIES
 Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. Use only non-sparking tools and equipment, especially when opening and closing containers of Styrene Monomer. Ground and bond containers when transferring Styrene Monomer. Keep Styrene Monomer out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer. Styrene Monomer is toxic to aquatic organisms. 		Odor Threshold: Flash Point: LEL: UEL: Auto Ignition Ten Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Poten Molecular Weigh	88°F (31°C) 1% 7% 914°F (490°C) 3.6 (air = 1) 5 mm Hg at 68°F (20°C) 0.91 (water = 1) Very slightly soluble 293°F (145°C) -23°F (-31°C) tial: 8.4 eV
EXPO	SURE LIMITS		PROTECTIVE EQUIPMENT
600 ppm, 5-m NIOSH: 50 ppm, 10-hr	; 100 ppm Ceiling TWA; 40 ppm Ceiling iteria values are: AC-2 = 130 ppm	Gloves: Coveralls: Respirator:	Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough) Tychem® F, CPF3, BR, CSM and TK; Trellchem® HPS and VPS (>8-hr breakthrough) >20 ppm - full facepiece APR with <i>Organic vapor</i> cartridges >200 ppm - SCBA
HEAL	TH EFFECTS	FIRS	T AID AND DECONTAMINATION
feeling of Skin: Irritation Inhalation: Nose and Headach passing of	d throat irritation e, dizziness, lightheadedness, and	Flush eyes with la lenses. Quickly remove of amounts of soap Begin artificial res	on from exposure. arge amounts of water for at least 15 minutes. Remove contact contaminated clothing and wash contaminated skin with large and water. spiration if breathing has stopped and CPR if necessary. y to a medical facility.



Common Name: STYRENE OXIDE

Synonyms: (Epoxyethyl)Benzene; Epoxy Styrene; Phenyl Oxirane CAS No: 96-09-3 Molecular Formula: C₈H₈O RTK Substance No: 1749 Description: Colorless to pale, straw-colored liquid with a pleasant, sweet odor

	HAZARD DATA			
Hazard Rating	Firefighting			Reactivity
3 - Health 2 - Fire 0 - Reactivity DOT#: UN 3082 ERG Guide #: 171 Hazard Class: 9 (Miscellaneous Hazardous Material)	COMBUSTIBLE LIQUID Use dry chemical, CO ₂ , water spray, alcohol- resistant foam or other foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.		nguishing CED IN IRE.	Styrene Oxide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE). Styrene Oxide may polymerize violently and release heat with compounds which easily release <i>Hydrogen</i> (such as WATER) when ACIDS, BASES, and some SALTS are also present.
SPI	LL/LEAKS			PHYSICAL PROPERTIES
Isolation Distance: Small Spills: 60 meters (200 feet) Large Spills: 270 meters (900 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer. Degrades in water. Bioconcentration should not be significant.			Odor Thr Flash Poi LEL: UEL: Auto Igni Vapor De Vapor Pre Specific O Water So Boiling P Melting P Molecula	nt: 165°F (74°C) 1.1% 22% tion: 929°F (498°C) nsity: 4.3 (air = 1) essure: 0.3 mm Hg at 68°F (20°C) Gravity: 1.1 (water = 1) lubility: Slightly soluble oint: 382°F (194°C) oint: -34°F (-37°C)
EXPOS	SURE LIMITS			PROTECTIVE EQUIPMENT
OSHA:100 ppm, 8-hr TWA; 200 ppm, Ceiling; and 600 ppm, for 5-mins in any 3-hour periodNIOSH:50 ppm, 10-hr TWA, 100 ppm STELACGIH:20 ppm, 8-hr TWA, 40 ppm STELIDLH:700 ppm (All of the above are for Styrene)			Gloves: Coveralls Respirato	and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>Aromatic</i> <i>Hydrocarbons</i>)
HEAL	TH EFFECTS		F	RST AID AND DECONTAMINATION
Inhalation: Nose, t coughir breath Headag	n n, itching and rash hroat and lung irritation with ng, wheezing and shortness of che, dizziness and passing out (liver) in animals		Flush eye contact le Quickly re large amo Begin arti necessar	he person from exposure. Is with large amounts of water for at least 15 minutes. Remove enses if worn. emove contaminated clothing and wash contaminated skin with bunts of soap and water. ficial respiration if breathing has stopped and CPR if y. to a medical facility.



Common Name: SULFUR

Synonyms: Brimstone; Colloidal Sulfur; Molten Sulfur CAS No: 7704-34-9 Molecular Formula: S, S₈ (Molten) RTK Substance No: 1757 Description: Pale yellow, crystalline solid (odorless when pure or faint "rotten egg" odor) or an amber-colored liquid when *molten*

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health	Molten Sulfur is a FLAMMABLE SOLID and a fire and explosion risk above 450 °F (232 °C).	Sulfur reacts explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,	
1 - Fire	Sulfur is a COMBUSTIBLE SOLID.	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).	
0 - Reactivity DOT#: UN 1350 UN 2448 (Molten) ERG Guide #: 133 Hazard Class: 4.1 (Flammable Solid)	Use water spray to fight fires and to keep fire-expose containers cool. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Sulfide, Sulfur Dioxide</i> and <i>Sulfur Trioxide</i> . CONTAINERS MAY EXPLODE IN FIRE. Flow or agitation may generate electrostatic charges. Sulfur may form an ignitable vapor/air mixture in	 Sulfur is not compatible with METALS and METAL POWDERS (such as ZINC and TIN); ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); PHOSPHORUS; AMMONIA; CHARCOAL; and HYDROGEN. Molten Sulfur reacts with HYDROCARBONS to form toxic and flammable gases such as Carbon Disulfide and Hydrogen Sulfide). Molten Sulfur can reach temperatures of 320 °F (160 °C), resulting in 	
closed tanks or containers.	the formation of flammable and toxic <i>Hydrogen Sulfide</i> , <i>Sulfur</i> <i>Dioxide</i> and <i>Sulfur Trioxide gases</i> . These gases can accumulate in the vapor space of tankers and enclosed spaces.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet) (Solid) 50 meters (150 feet) (Molten)

Fire: 800 meters (1/2 mile)

Cover *molten* **Sulfur** with dry sand, earth, or a noncombustible material and place into sealed containers for disposal.

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Use only non-sparking tools and equipment.

Keep *molten* **Sulfur** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Sulfur is dangerous to aquatic life in high concentrations

EXPOSURE LIMITS

NIOSH: 10 ppm, 10-min Ceiling for Hydrogen Sulfide

ACGIH: 1 ppm, 8-hr TWA; 5 ppm, STEL for *Hydrogen* Sulfide

The Protective Action Criteria values for **Sulfur** are: PAC-1 = 4 mg/m³ PAC-2 = 30 mg/m³

PAC-3 = 150 mg/m^3

HEALTH EFFECTS

 Eyes:
 Irritation and burns

 Skin:
 Irritation and burns

 Inhalation:
 Nose, throat and lung irritation, with coughing, wheezing and shortness of breath Headache, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Odorless to rotten egg odor
Flash Point:	405°F (207°C)
LEL:	3.3% (as Hydrogen Sulfide)
UEL:	46% (as Hydrogen Sulfide)
Auto Ignition Temp:	450°F (232°C)
Vapor Pressure:	1 mm Hg at 363°F (184°C)
Specific Gravity:	1.8 to 2.1 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	832°F (445°C)
Melting Point:	239°F (115°C)
Molecular Weight:	32.07(S), 256.81 (S ₈) (<i>molten</i>)

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile, Neoprene and Natural Rubber (for <i>solid</i> Sulfur) and Insulated materials (for <i>molten</i> Sulfur)
Coveralls:	Tyvek® for <i>solid</i> Sulfur ; use Turn out gear or heat/flame protection for <i>molten</i> Sulfur
Respirator:	Spill: full facepiece APR with N, R or P100 filters for <i>solid</i> Sulfur and SA or SCBA for <i>molten</i> Sulfur
	Fire: SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: SULFUR DIOXIDE

Synonyms: Sulfurous Oxide; Sulfur Oxide CAS No: 7446-09-5 Molecular Formula: SO₂ RTK Substance No: 1759

Description: Colorless gas with a strong, irritating odor, that is often shipped as a liquid under pressure

30 ppm

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Sulfur Dioxide itself does not	Sulfur Dioxide reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
0 - Fire	burn.	PERMANGANATES, CHLORATES, NITRATES,	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Sulfur Oxides.	CHLORINE, BROMINE and FLUORINE); SODIUM HYDRIDE; and OTHER REDUCING AGENTS (such as	
DOT#: UN 1079	CONTAINERS MAY EXPLODE IN FIRE.	LITHIUM, ZINC, ALUMINUM and their HYDRIDES).	
ERG Guide #: 125	Use water spray to keep fire-exposed containers cool and to dilute and disperse vapors.	Sulfur Dioxide is not compatible with AMMONIA; BRASS; and COPPER.	
Hazard Class: 2.3 (Toxic gas)	cool and to dilute and disperse vapors.	Sulfur Dioxide reacts with WATER or MOISTURE to form Sulfuric Acid.	

SPILL/LEAKS

Isolation Distance:

Spill (small): 60 meters (200 feet)

Spill (large): 400 meters (1,250 feet)

Fire: 1,600 meters (1 mile)

Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

Turn leaking cylinder with leak up to prevent escape of gas in liquid state.

Cover liquid spills with dry lime, sand or soda ash and place into sealed containers for disposal.

DO NOT wash into sewer.

Sulfur Dioxide is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA:	5 ppm, 8	3-hr TWA	
NIOSH:	2 ppm, 1	10-hr TWA, 5 ppm, 3	STEL
ACGIH:	0.25 ppr	n, 8-hr TWA	
IDLH:	100 ppm	ı	
The Prot	ective Act	tion Criteria values	are:
PAC-1 =	0.2 ppm	PAC-2 = 0.75 ppm	PAC-3 =

HEALTH EFFECTS

Eyes:	Irritation and burns, contact with liquid may cause frostbite
Skin:	Irritation and burns, contact with liquid may cause frostbite
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	0.3 to 5 ppm
Flash Point:	Nonflammable
Vapor Density:	2.2 (air = 1)
Vapor Pressure:	2,432 mm Hg at 68°F (20°C)
Specific Gravity:	1.46 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	14°F (-10°C)
Melting Point:	-104°F (-76°C)
Critical Temp:	315°F (157°C)
Ionization Potential:	12.3 eV
Molecular Weight:	64.07

	PROTECTIVE EQUIPMENT
Gloves:	Insulated Butyl and Neoprene (>4-hr breakthrough)
Coveralls:	Tychem® SL, BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>0.25 ppm - full facepiece APR with cartridges specific for Sulfur Dioxide
	>20 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Immerse affected part in warm water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility.



Common Name: SULFURIC ACID

Synonyms: Battery Acid; Hydrogen Sulfate; Oil of Vitriol CAS No: 7664-93-9 Molecular Formula: H₂SO₄ RTK Substance No: 1761 Description: Clear, colorless to brown, odorless liquid

Hazard Rating	Firefighting	Reactivity
3 - Health	Sulfuric Acid is not combustible, but it is a STRONG OXIDIZER that enhances the	Sulfuric Acid reacts violently with ALCOHOL and WATER to release HEAT and will also react violently or explosively with ORGANIC
0 - Fire	combustion of other substances.	MATERIALS; COMBUSTIBLES; STRONG BASES (such as SODIUM
2 -W - Reactivity	Extinguish fire using an agent suitable for type of surrounding fire. Sulfuric Acid itself does	HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and
DOT#: UN 1830	not burn. DO NOT USE WATER directly on Sulfuric	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE
ERG Guide #: 137	Acid.	and FLUORINE).
Hazard Class: 8 (Corrosive)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i> .	Sulfuric Acid reacts with MOST METALS to produce flammable and explosive <i>Hydrogen gas</i> .
	CONTAINERS MAY EXPLODE IN FIRE. Sulfuric Acid may ignite combustibles (wood, paper and oil).	Sulfuric Acid is not compatible with STRONG ACIDS (such as HYDROCHLORIC and NITRIC); MOISTURE; AMINES; and many OTHER SUBSTANCES.

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill	300 meters	(1 000 feet)
Large Opin.	JUU IIIEIEIJ	

Fire: 800 meters (1/2 mile)

Neutralize spill with crushed limestone, soda ash or lime and place into sealed containers for disposal.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Sulfuric Acid is harmful to aquatic organisms.

EXPOSURE LIMITS

 OSHA:
 1 mg/m³, 8-hr TWA

 NIOSH:
 1 mg/m³, 10-hr TWA

 ACGIH:
 0.2 mg/m³, 8-hr TWA

 IDLH:
 15 mg/m³

 ERPG-1 = 2 mg/m³, ERPG-2 = 10 mg/m³

 ERPG-3 = 120 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation and burns
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
	Headache, nausea and vomiting
Chronic:	Strong <i>inorganic acid mists</i> containing Sulfuric Acid cause cancer of the larynx in humans

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	0.001 mm Hg at 68ºF (20ºC)
Specific Gravity:	1.8 (water = 1)
Water Solubility:	Soluble (mixes)
Boiling Point:	554° to 640°F (290° to 338°C)
Melting Point:	51°F (10°C)
Molecular Weight:	98.1
pH:	0.3

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® fabrics; Zytron® 300; ONESuit®TEC; and Trellchem® HPS and VPS (>8-hr breakthrough)
Respirator:	<2 mg/m ³ - full facepiece APR with Acid gas cartridge and R or P100 prefilter
	>2 mg/m ³ - Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately.

 $\ensuremath{\textbf{Begin}}$ artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



Common Name: SULFUR TRIXOIDE

Synonyms: Sulfuric Anhydride; Sulfuric Oxide CAS No: 7446-11-9 Molecular Formula: SO₃ RTK Substance No: 1767 Description: Colorless to white, crystalline solid or a colorless gas or liquid

			HA	ZARD DA	ТА	
Hazard R	ating	Firefighting			React	tivity
3 - Health 0 - Fire 2\F - React DOT#: UN ERG Guide Hazard Cla (Corrosive)	ivity 1829 ≱#: 137	Sulfur Trioxide is not combustible but is a STRONG OXIDIZER which enhances the combustion of other substances. Use dry chemical or CO₂ as extinguishing agents. DO NOT USE WATER directly on Sulfur Trioxide as an explosion may result. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. DO NOT get water inside containers. Sulfur Trioxide may ignite combustibles (wood, paper and oil).		Sulfur 1 toxic Sa Sulfur 1 MATEF HYDRO TETRA ANHYE AGEN1 their H ¹ form to	Trioxide reacts explosively with WATER to form <i>ulfuric Acid.</i> Trioxide reacts violently with ORGANIC RIALS; STRONG BASES (such as SODIUM OXIDE and POTASSIUM HYDROXIDE); AFLUOROETHYLENE; OXYGEN DIFLUORIDE; DROUS PERCHLORIC ACID; and REDUCING TS (such as LITHIUM, SODIUM, ALUMINUM and YDRIDES) to release heat and cause fires, and xic gases Trioxide is AIR SENSITIVE.	
	SPI	LL/LEAKS			PH	YSICAL PROPERTIES
Fire: 800 m Cover spille ash, or lime Cover with water. Collect mate manner an DO NOT wa Keep Sulfu	60 meters 300 meter neters (1/2 meters ed material meters a plastic sh erial in the d deposit in ash into sev r Trioxide cause of th	rs (1,000 feet) mile) with crushed limestone, soda eet to protect from rain and most convenient and safe to sealed containers. wer. out of confined spaces, such as e possibility of an explosion.		Odor Thresh Flash Point: Vapor Densit Vapor Pressu Specific Grav Water Solubi Boiling Point Ionization Po Molecular We	y: ıre: rity: lity: : tential:	1 ppm Noncombustible 2.8 (air = 1) 73 mm Hg at 77°F (25°C) 1.9 (water = 1) Reacts 113°F (45°C) 12.8 +/- 0.04 (liquid) 80
	EXPOS	SURE LIMITS			PRO	TECTIVE EQUIPMENT
ERPG-1: ERPG-2: ERPG-3:	2 mg/m ³ 10 mg/m ³ 30 mg/m ³			Gloves: Coveralls: Respirator:	breakth DuPon and Sa <i>Oleum</i> < 2 mg	Shield®/4H® and Fluoroelastomer (>8-hr hrough for <i>Oleum</i>) It Tychem® CPF 4 and TK; Kappler® Zytron® 300; aint-Gobain ONESuit® TEC (>8-hr breakthrough for) g/m ³ - Supplied air g/m ³ - SCBA
	HEAL	TH EFFECTS	1	FIRS		D AND DECONTAMINATION
Eyes: Skin: Inhalation: Chronic:	Severe irr Nose, thro and sever edema) Headache Strong ino	ritation and burns ritation and burns pat and lung irritation with coughing re shortness of breath (pulmonary e, dizziness, nausea and vomiting prganic acid mists containing <i>icid</i> cause cancer of the lung and humans		contact lenses Quickly remove large amounts Begin artificial n Transfer promp	large amo if worn. S contamir of soap ar respiration ty to a mo	ounts of water for at least 30 minutes. Remove Seek medical attention immediately. nated clothing and wash contaminated skin with nd water. Seek medical attention immediately. n if breathing has stopped and CPR if necessary.



Common Name: SULFURYL CHLORIDE

Synonyms: Chlorosulfuric Acid; Sulfuric Dichloride; Sulfur Oxychloride CAS No: 7791-25-5 Molecular Formula: SO₂Cl₂ RTK Substance No: 1768 Description: Colorless liquid with a strong, irritating odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire	CORROSIVE AND WATER REACTIVE Extinguish fire using an agent suitable for type of surrounding fire. Sulfuryl	Sulfuryl Chloride reacts with WATER or MOIST AIR to form toxic and corrosive gases such as <i>Hydrogen Chloride</i> and <i>Sulfuric Acid</i> . Sulfuryl Chloride can react explosively with LEAD DIOXIDE and
2W - Reactivity DOT#: UN 1834 ERG Guide #: 137 Hazard Class: 8	Chloride itself does not burn. DO NOT USE WATER. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine, Hydrogen Chloride</i> , and	ETHERS (when in the presence of METAL SALTS). Sulfuryl Chloride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
(Corrosive)	Sulfur Oxides. Sulfuryl Chloride may ignite combustibles (wood, paper and oil).	NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ALCOHOLS; and AMINES. Sulfuryl Chloride attacks many METALS in the presence of WATER.

SPILL/LEAKS

Isolation Distance:

Small Spill: 30 meters (100 feet)

Large Spill: 100 meters (300 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Sulfuryl Chloride may be hazardous to the environment, especially water systems.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Sulfuryl Chloride**.

The Protective Action Criteria values are:

PAC-1 = 0.3 ppm PAC-2 = 3.7 ppm PAC-3 = 11ppm

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Strong, irritating odor
Flash Point:	Nonflammable
Vapor Density:	4.6 (air = 1)
Vapor Pressure:	105 mm Hg at 68°F (20°C)
Specific Gravity:	1.67 (water = 1)
Water Solubility:	Decomposes/Reacts
Boiling Point:	156°F (69°C)
Freezing Point:	-65°F (-54°C)
Molecular Weight:	134.96

PROTECTIVE EQUIPMENT

Gloves:	Barrier® (>8-hr breakthrough for Inorganic Halides)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: SULPHAMIC ACID

Synonyms: Amidosulfonic Acid; Sulfamidic Acid CAS No: 5329-14-6 Molecular Formula: NH₂SO₃H RTK Substance No: 1770 Description: Odorless, white, crystalline solid

	HAZARD DATA			
Hazard Rating	Firefighting	Reactivity		
3 - Health	Sulphamic Acid may burn, but does not readily ignite.	Sulphamic Acid reacts violently with CHLORINE, NITRIC ACID, and STRONG BASES (such as SODIUM		
0 - Fire	Use dry chemical, CO_2 , water spray or foam as	HYDROXIDE and POTASSIUM HYDROXIDE).		
0 - Reactivity	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i> and <i>Ammonia</i> .	Sulphamic Acid is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,		
DOT#: UN 2967				
ERG Guide #: 154	Use water spray to keep fire-exposed containers	BROMINE and FLUORINE); AMMONIA; AMINES; and ISOCYANATES.		
Hazard Class: 8 (Corrosive)	cool.	Sulphamic Acid reacts with WATER to release heat and form Ammonium Bisulfate.		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Sulphamic Acid**.

The Protective Action Criteria values are:

PAC-1 = 40 mg/m³ PAC-2 = 250 mg/m³

 $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Severe irritation and burnsSkin:Severe irritation and burnsInhalation:Nose, throat and lung irritation, with
coughing, and severe shortness of
breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Specific Gravity:	2.15 (water = 1)
Water Solubility:	Moderately soluble
Melting Point:	392°F (200°C) (Decomposes)
Molecular Weight:	97.1
pH:	1.18 (1% solution)

PROTECTIVE EQUIPMENT

Gloves: Butyl, Neoprene and Natural Rubber	
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- Coveralls: Tyvek® (for *solids*); Tychem® BR, Responder® and TK; Trellchem® HPS and VPS (for *solutions*)
- **Respirator:** Full facepiece APR with High *efficiency filters* >40 mg/m³ SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: TALC (NOT CONTAINING ASBESTOS FIBERS)

Synonyms: Hydrous Magnesium Silicate; Steatite Talc CAS No: 14807-96-6 Molecular Formula: $Mg_3H_2(SiO_3)_4$ RTK Substance No: 1773 Description: Odorless white to grayish-white, crystalline powder

	HAZARD DA	ТА
Hazard Rating	Firefighting	Reactivity
1 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Talc itself does not burn.	No incompatibilities or reactivities reported.
0 - Fire		
0 - Reactivity		
DOT#: None		
ERG Guide #: None		
Hazard Class: None		

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

EXPOSURE LIMITS

OSHA: 20 mppcf, 8-hr TWA NIOSH: 2 mg/m³, 10-hr TWA (*respirable dust*) ACGIH: 2 mg/m³, 8-hr TWA (*respirable fraction*) IDLH: 1,000 mg/m³ The Protective Action Criteria values are: PAC-1 = 2 mg/m³ PAC-2 = 10 mg/m³ PAC-3 = 500 mg/m³

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation and rash
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	2.7 to 2.8 (water = 1)
Water Solubility:	Insoluble
Melting Point:	1,652°F (900°C) to 1,832°F (1,000°C)
Molecular Weight:	379.3

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>2 mg/m ³ - full facepiece APR with <i>High efficiency filters</i> >10 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: TELLURIUM

Synonyms: Aurum Paradoxum; Telloy CAS No: 13494-80-9 Molecular Formula: Te RTK Substance No: 1777 Description: Odorless, silvery-white crystalline solid or a dark gray to brown powder

Hazard Rating	Firefighting	Reactivity
3 - Health	<i>Finely divided</i> Tellurium is a FLAMMABLE SOLID and can form explosive mixtures in air.	Tellurium may react violently with OXIDIZING AGENTS and HALOGENS (such as PERCHLORATES,
3 - Fire	Use dry chemical powder, sand, graphite or other	PEROXIDES, PERMANGANATES, CHLORATES,
0 - Reactivity	extinguishing agents appropriate for metal fires. POISONOUS GASES ARE PRODUCED IN FIRE.	NITRATES, CHLORINE, BROMINE and FLUORINE) and SILICIDES.
DOT#: UN 7325	including <i>Tellurium Oxide</i> and <i>Hydrogen Telluride</i> .	Tellurium is not compatible with STRONG ACIDS (such
ERG Guide #: 133	Use water spray to keep fire-exposed containers	as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and
Hazard Class: 5.1	cool.	POTASSIUM HYDROXIDE); CHEMICALLY ACTIVE
(Flammable solid)		METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); and METAL SALTS.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Keep *finely divided* **Tellurium** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 0.1 mg/m³, 8-hr TWA **NIOSH:** 0.1 mg/m³, 10-hr TWA **IDLH:** 25 mg/m³

The Protective Action Criteria values are: PAC-1 = 0.3 mg/m^3 PAC-3 = 25 mg/m³ PAC-2 = 20 mg/m³

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema) Headache, fatigue, dizziness, drowsiness and weakness

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Auto Ignition Temp:	944°F (340°C)
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	6.1 to 6.3 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	1,814°F (990°C)
Melting Point:	842°F (450°C)
Molecular Weight:	127.6

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber

Coveralls: Tyvek®

Respirator: >0.3 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: TERPHENYLS (mixed isomers)

Synonyms: Diphenylbenzenes CAS No: 26140-60-3 Molecular Formula: $C_6H_5C_6H_4C_6H_5$ RTK Substance No: 3650 Description: Colorless or light-yellow solids

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
1 - Health 1 - Fire 0 - Reactivity DOT#: N/A ERG Guide #: N/A Hazard Class: N/A	 May burn, but do not readily ignite. Use dry chemical, CO₂, water spray, an alcoholresistant foam or other foaming agent. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. 	- Incompatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).		

SPILL/LEAKS

Isolation Distance: 25 meters (75 feet)

- Vacuum or sweep spilled material into containers.
- This chemical can bioaccumulate in fish.

EXPOSURE LIMITS

OSHA PEL:	9 mg/m ³ Ceiling
NIOSH REL:	5 mg/m ³ Ceiling
ACGIH TLV:	5 mg/m ³ Ceiling
IDLH LEVEL:	500 mg/m ³

Eyes:	Irritation, burning
Skin:	Irritation, burning
Acute:	Nose, throat, and lung irritation with coughing, and shortness of breath
Chronic:	Cancer – Not Tested
	Can affect the liver and kidneys

PHYSICAL PROPERTIES

Odor Threshold:	No Information
Flash Point:	325 [°] F – 405 [°] F (163 [°] C – 207 [°] C)
LEL:	N/A
UEL:	N/A
Vapor Density:	7.9 (air = 1)
Vapor Pressure:	0.01 mm Hg at 68 [°] F (20 [°] C)
Water Solubility:	Insoluble
Boiling Point:	630 [°] F (332 [°] C)
Melting Point:	133°F – 415°F (56°C – 213°C)

PROTECTIVE EQUIPMENT		
Gloves:	Rubber	
Coverall:	No Information	
Boot:	No Information	
Respirator:	>5 mg/m ³ N95 (If heat is involved use an Organic Vapor Cartridge along with an N95) >50 mg/m ³ SA	

FIRST AID AND DECONTAMINATION

- Flush eyes with cool water for at least 15 minutes.
- Remove contaminated clothing and wash contaminated skin with soap and water.
- Remove person from exposure.
- Transfer to a medical facility.



Common Name: 1,1,1,2-TETRACHLORO-2,2-DIFLUOROETHANE

Synonyms: CFC112a; Halocarbon 112a; Refrigerant 112a CAS No: 76-11-9 Molecular Formula: C₂Cl₄F₂ RTK Substance No: 1807 Description: Colorless, crystalline solid with an *Ether*-like odor at room temperature, or a liquid above 105°F (41°C)

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. 1,1,1,2-Tetrachloro-2,2-	1,1,1,2-Tetrachloro-2,2-Difluoroethane reacts with CHEMICALLY ACTIVE METALS (such as POTASSIUM,			
0 - Fire	Difluoroethane itself does not burn.	SODIUM, MAGNESIUM and ZINC).			
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride, Hydrogen	1,1,1,2-Tetrachloro-2,2-Difluoroethane may react with STRONG ACIDS (such as HYDROCHLORIC,			
DOT#: None	Fluoride and Phosgene.	SULFURIC and NITRIC) and ACID FUMES to release			
ERG Guide #: None	Use water spray to keep fire-exposed containers	toxic Fluoride fumes.			
Hazard Class: None	cool.				

SPILL/LEAKS

Isolation Distance:

Solid Spill: 25 meters (75 feet)

Liquid Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Collect solid material in the most convenient and safe manner and place into sealed containers for disposal. Absorb liquids in vermiculite, dry sand, earth, or a

similar material and place into sealed containers for disposal.

1,1,1,2-Tetrachloro-2,2-Difluoroethane does not degrade in the atmosphere.

EXPOSURE LIMITS

OSHA: 500 ppm, 8-hr TWA

NIOSH: 500 ppm, 10-hr TWA

ACGIH: 100 ppm, 8-hr TWA

IDLH: 2,000 ppm

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Eyes:	Irritation	
Skin:	Irritation and rash	
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)	
	Exposure can cause headache, dizziness, confusion, tremors, lightheadedness, and passing out	

PHYSICAL PROPERTIES

Odor Threshold:	<i>Ether</i> -like odor
Flash Point:	Noncombustible
Vapor Pressure:	40 mm Hg at $68^{\circ}F(20^{\circ}C)$
Specific Gravity:	1.65 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	197°F (91.7°C)
Melting Point:	105°F (41°C)
Ionization Potential:	11.30 eV
Molecular Weight:	203.83

PROTECTIVE EQUIPMENT				
Gloves:	Viton and Barrier® (>4-hr breakthrough for <i>liquid Hydrocarbons, aliphatic</i>)			
Coveralls:	Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for <i>liquid Hydrocarbons</i> , <i>aliphatic</i>)			
Respirator:	>100 ppm - SCBA			

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: 1,1,1,2-TETRACHLOROETHANE

Synonyms: None CAS No: 630-20-6 Molecular Formula: $C_2H_2Cl_4$ RTK Substance No: 2992 Description: Colorless to yellowish-red liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	DOES NOT BURN.	1,1,1,2-Tetrachloroethane reacts with OXIDIZING AGENTS
0 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride gas</i> . Use water spray to keep fire-exposed containers cool.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); CHEMICALLY ACTIVE METALS (such as POTASSIUM,
0 - Reactivity		
DOT#: UN 1702		
ERG Guide #: 151		SODIUM, MAGNESIUM and ZINC); DINITROGEN TETRAOXIDE; 2,4-DINITROPHENYL DISULFIDE; SODIUM
Hazard Class: 6.1		TETRAOXIDE; and SODIUM POTASSIUM ALLOY.
(Poison)		Prevent contact with HOT SURFACES.

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

1,1,1,2-Tetrachloroethane is harmful to aquatic organisms.

EXPOSURE LIMITS

OSHA: None

NIOSH:	Lowest feasible concentration
ACGIH:	1 ppm, 8-hr TWA (as <i>1,1,2,2,-</i>
IDLH:	Tetrachloroethane) None

HEALTH EFFECTS		
Eyes:	Irritation	
Skin:	Irritation and drying and cracking with redness	
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath	
	Headache, nausea, dizziness, seizures and passing out.	
Chronic:	Cancer (liver) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	Unknown		
Flash Point:	Nonflammable		
Vapor Density:	1.5 (air = 1)		
Vapor Pressure:	14 mm Hg at 77°F (25°C)		
Specific Gravity:	1.54 (water = 1)		
Water Solubility:	Insoluble		
Boiling Point:	267°F (130°C)		
Freezing Point:	-94°F (-70°C)		
Ionization Potential:	11 +/- 0.2 eV		
Molecular Weight:	167.8		

PROTECTIVE EQUIPMENT

Gloves:	Viton (>8-hr breakthrough)
Coveralls:	DuPont Tychem® BR, LV, Responder® and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough for <i>1,1,2,2-Tetrachloroethane</i>)
Respirator:	>1 ppm - full facepiece APR with Organic vapor cartridge >10 ppm - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 1,1,2,2-TETRACHLOROETHANE

Synonyms: Acetylene Tetrachloride; Tetrachloroethane CAS No: 79-34-5 Molecular Formula: C₂H₂Cl₄ RTK Substance No: 1809 Description: Clear, colorless to pale yellow liquid with a sweet odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
3 - Health 0 - Fire	Extinguish fire using an agent suitable for type of surrounding fire. 1,1,2,2-Tetrachloro- ethane itself does not burn.	1,1,2,2-Tetrachloroethane is decomposed by HEAT, AIR, ULTRAVIOLET LIGHT and MOISTURE to form toxic <i>Hydrogen Chloride</i> and <i>Phosgene gases</i> .	
0 - Reactivity DOT#: UN 1702 ERG Guide #: 151 Hazard Class: 6.1	 POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phosgene</i> and <i>Hydrogen</i> <i>Chloride</i>. Use water spray to keep fire-exposed containers cool. 	 1,1,2,2-Tetrachloroethane reacts violently with ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM) and their ALLOYS to produce <i>Chloroacetylene</i> and <i>Dichloroacetylene</i> gases that can ignite or explode in AIR. 1,1,2,2-Tetrachloroethane reacts violently with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM) 	
(Poison)		HYDROXIDE) and POWDERED METALS. 1,1,2,2-Tetrachloroethane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); FUMING SULFURIC ACID; and AMINES.	

SPILL/LEAKS

Isolation Distance:

Spill:	50 meters	(150 feet)
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Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

1,1,2,2-Tetrachloroethane is a marine pollutant.

EXPOSURE LIMITS

OSHA:5 ppm, 8-hr TWANIOSH:1 ppm, 10-hr TWAACGIH:1 ppm, 8-hr TWAIDLH:100 ppmThe Protective Action Criteria values are:

PAC-1 = 3 ppm PAC-2 = 30 ppm PAC-3 = 100 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema) Headache, nausea, vomiting and fatigue
Chronic:	Cancer (liver) in animals

PHYSICAL PROPERTIES

0.5 to 1.5 ppm

5.79 (air = 1)

Noncombustible

Odor Threshold: Flash Point: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Potential: Molecular Weight:

5 mm Hg at 65°F (20°C) 1.6 (water = 1) Very slightly soluble 295°F (146°C) -33°F (-44°C) 11.1 eV 167.86

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol and Viton (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>1 ppm - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: TETRACHLOROETHYLENE

Synonyms: Ethene, Tetrachloro-; Ethylene Tetrachloride; Perchloroethylene CAS No: 127-18-4 Molecular Formula: Cl₂C=CCl₂ RTK Substance No: 1810 Description: Clear, colorless liquid with a sweet *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire.	Tetrachloroethylene reacts violently with <i>finely dispersed</i> or <i>finely divided</i> METALS (such as ALUMINUM, BARIUM, LITHIUM,	
0 - Fire	Tetrachloroethylene itself does not burn.	BERYLLIUM and ZINC).	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i>	Tetrachloroethylene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES,	
DOT#: UN 1897	and Phosgene.	CHLORATES, NITRATES, CHLORINE, BROMINE and	
ERG Guide #: 160	Use water spray to keep fire-exposed	FLUORINE); SULFURIC ACID; NITRIC ACID; SODIUM	
EKG Guide #. 100	containers cool.	HYDROXIDE; and POTASSIUM HYDROXIDE.	
Hazard Class: 6.1		Tetrachloroethylene slowly decomposes in WATER to form acids	
(Toxic)		such as Hydrogen Chloride.	
		Tetrachloroethylene decomposes slowly with heating, and with exposure to ultraviolet light or on contact with hot surfaces, to form toxic <i>Hydrogen Chloride</i> and <i>Phosgene gases</i> .	

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance:	Odor Threshold:	5 to 50 ppm
Spill: 50 meters (150 feet)	Flash Point:	Noncombustible
Fire: 800 meters (1/2 mile)	Vapor Density:	5.8 (air = 1)
· · · · · · · · · · · · · · · · · · ·	Vapor Pressure:	14 mm Hg at 68°F (20°C)
Absorb liquids in dry sand, earth, or a similar material	Specific Gravity:	1.62 (water = 1)
and place into sealed containers for disposal.	Water Solubility:	Very slightly soluble
DO NOT wash into sewer.	Boiling Point:	250°F (121°C)
Tetrachloroethylene is toxic to aquatic organisms and	Freezing Point:	-2°F (-19°C)
may cause long term effects on the aquatic environment.	Ionization Potential:	9.32 eV
	Molecular Weight:	165.8

EXPOSURE LIMITS				PROTECTIVE EQUIPMENT
OSHA:100 ppm, 8-hr TWA; 200 ppm, Ceiling; 300 ppm, PeakNIOSH:Lowest feasible concentrationACGIH:25 ppm, 8-hr TWA; 100 ppm, STELIDLH:150 ppm		Glov	/es:	Polyvinyl Alcohol, Silver Shield $(0,4H)$, Viton, Viton/Butyl and Barrier $(0,>8$ -hr breakthrough)
		Cov	eralls:	Tychem® F, CPF3, BR and CSM; Trellchem® HPS and VPS (>8-hr breakthrough)
The Protective Action Criteria values are: PAC-1 = 35 ppm PAC-2 = 230 ppm PAC-3 = 1,200 ppm		Res	pirator:	<25 ppm - full facepiece APR with Organic vapor filters Spills or Fire - SCBA
	· · · · · ·			
	HEALTH EFFECTS		FIRS	T AID AND DECONTAMINATION
Eyes:	HEALTH EFFECTS	Rem	-	ST AID AND DECONTAMINATION
		Flus	ove the pers	son from exposure. arge amounts of water for at least 15 minutes. Remove
Eyes:	Irritation and burns	Flusi conta Quic large	ove the pers h eyes with la act lenses if kly remove of amounts of	son from exposure. large amounts of water for at least 15 minutes. Remove worn. contaminated clothing and wash contaminated skin with f soap and water.
Eyes: Skin:	Irritation and burns Irritation and burns (skin absorbable) Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary	Flusi conta Quic large Begin Trans	ove the pers h eyes with la act lenses if kly remove of a amounts of n artificial res sfer prompti	son from exposure. arge amounts of water for at least 15 minutes. Remove worn. contaminated clothing and wash contaminated skin with



Common Name: TETRAETHYLENEPENTAMINE

Synonyms: TEP; Tetraethylpentylamine CAS No: 112-57-2 Molecular Formula: C₈H₂₃N₅ RTK Substance No: 1816 Description: Thick, yellow liquid with an Ammonia-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health	Tetraethylenepentamine may burn, but does not readily ignite.	Tetraethylenepentamine reacts with WATER to release heat and may result in the violent formation of steam.	
 1 - Fire 0 - Reactivity DOT#: UN 2320 ERG Guide #: 153 	Use dry chemical, CO ₂ , water spray or alcohol- resistant foam as extinguishing agents. Water or foam may cause frothing and solid streams of water may be ineffective in fighting fire. POISONOUS GASES ARE PRODUCED IN FIRE,	Tetraethylenepentamine reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); NITROGEN COMPOUNDS; CHLORINATED	
Hazard Class: 8 (Corrosive)	including <i>Ammonia, Amines,</i> and <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool.	HYDROCARBONS (such as METHYLENE CHLORIDE); ACRYLATES; ALDEHYDES; ALCOHOLS, and KETONES.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Tetraethylenepentamine is toxic to aquatic organisms and may cause long-term damage to the aquatic environment.

EXPOSURE LIMITS

No occupational exposure limits have been established for Tetraethylenepentamine.

The Protective Action Criteria values are:

 $PAC-1 = 6.5 \text{ ppm} (50 \text{ mg/m}^3)$

 $PAC-2 = 45 \text{ ppm} (350 \text{ mg/m}^3)$

 $PAC-3 = 65 \text{ ppm} (500 \text{ mg/m}^3)$

HEALTH EFFECTS

Irritation and burns Eyes: Skin: Irritation and burns (skin absorbable) Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, nausea and vomiting

PHYSICAL PROPERTIES		
Odor Threshold:	0.1 ppm	
Flash Point:	325°F (163°C)	
LEL:	0.8%	
UEL:	4.6%	
Auto Ignition Temp:	610°F (321°C)	
Vapor Density:	6.53 (air = 1)	
Vapor Pressure:	<0.01 mm Hg at 68°F (20°C)	
Specific Gravity:	0.99 (water = 1)	
Water Solubility:	Soluble	
Boiling Point:	631° to 644°F (333° to 340°C)	
Freezing Point:	-40°F (-40°C)	
Molecular Weight:	189.3	

PROTECTIVE EQUIPIVIENT		
Gloves:	Butyl, Neoprene and Viton (>8-hr breakthrough)	
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for	

Ethylene Diamine) **Respirator:** SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: TETRAETHYL LEAD

Synonyms: Tetraethylplumbane; TEL CAS No: 78-00-2 Molecular Formula: $C_8H_{20}Pb$ RTK Substance No: 1817 Description: Colorless, oily liquid with a sweet, musty odor

	HAZARD DATA				
Hazard Rating	Firefighting			Reactivity	
3 - Health 2 - Fire 2-W - Reactivity DOT#: UN 1649 ERG Guide #: 131 Hazard Class: 6.1 (Poison)	FirefightingTetraethyl Lead is a COMBUSTIBLE LIQUID.Use dry chemical, CO2, alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires.POISONOUS GASES ARE PRODUCED IN FIRE, including Lead Oxides.CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.Vapors may travel to a source of ignition and flash back.Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.		tant foam or other nts, as water may CED IN FIRE, IRE. I containers cool. tion and flash ivel a distance to	Tetraethyl Lead will react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to cause fires and explosions. Tetraethyl Lead is not compatible with RUST; SULFURYL CHLORIDE; POTASSIUM PERMANGANATE; METALS; METAL OXIDES; and COMBUSTIBLES. Tetraethyl Lead will attack RUBBER, some PLASTICS, and COATINGS. Forms explosive mixtures in air above 200°F (93°C).	
SPII			PHYSICAL PROPERTIES		
similar material and d Toxic to aquatic organ	ers (900 feet) niculite, dry sand, earth, or a leposit in sealed containers.	Odor: Flash Point: LEL: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Ionization Potenti Molecular Weight		: 1.66 (water = 1) : Insoluble 228°F (109°C) tial: 11.1 eV	
EXPOS	EXPOSURE LIMITS PROTECTIVE EQUIPMENT		ROTECTIVE EQUIPMENT		
NIOSH: 0.075 ACGIH: 0.1 m	5 mg/m ³ , 8-hr TWA (as <i>Lead</i>) 5 mg/m ³ , 10-hr TWA (as <i>Lead</i>) ng/m ³ , 8-hr TWA (as <i>Lead</i>) ng/m ³ (as <i>Lead</i>)	r i	Coveralls: D (Boots: N	o information uPont Tychem® CPF-3, BR and LV, and TK >8-hr breakthrough) o information 0.075 mg/m ³ - Supplied air	
HEALT	TH EFFECTS		FIRST	AID AND DECONTAMINATION	

	HEALIH EFFECIS		
Eyes:	Irritation, possible loss of vision		
Skin:	Irritation		
Acute:	Headache, irritability, upset stomach, and weakness		
Chronic:	Lead compounds may cause lung cancer in humans		
	Limited evidence of damage to male reproductive system		
	Metallic taste, colic, muscle cramps Damage to the nervous system		

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

- **Remove** contaminated clothing and wash contaminated skin with soap and water.
- **Begin** rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.

Transfer to a medical facility.



Common Name: TETRAMETHRIN

Synonyms: Duracide®; TTM CAS No: 7696-12-0 Molecular Formula: C₁₉H₂₅NO₄ RTK Substance No: 3745

Description: Colorless to white, crystalline powder, Pyrethroid insecticide with a faint odor

	HAZARD DATA				
Hazard Rating	Firefighting	Reactivity			
2 - Health	Tetramethrin does not burn, however, it is often	Tetramethrin is not compatible with OXIDIZING AGENTS			
1 - Fire	dissolved in a liquid carrier that may be flammable or combustible.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,			
0 - Reactivity	Use dry chemical, CO ₂ , water spray or foam as	CHLORINE, BROMINE and FLUORINE); STRONG			
DOT#: UN 2588	extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE.	ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM			
ERG Guide #: 151	including Nitrogen Oxides.	HYDROXIDE and POTASSIUM HYDROXIDE).			
Hazard Class: 9 (Environmentally Hazardous Material)	Use water spray to keep fire-exposed containers cool.				

SPILL/LEAKS

Isolation Distance:

Spill (solid): 25 meters (75 feet) (liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

Moisten solid spilled material first or use

a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Tetramethrin is very toxic to aquatic life and bees.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Tetramethrin**.

Odor Threshold:	Faint odor	
Flash Point:	Flammable/Combustible in solution	
Vapor Pressure:	7 x 10 ⁻⁶ mm Hg at 86°F (30°C)	
Specific Gravity:	1.1 (water = 1)	
Water Solubility:	Insoluble	
Boiling Point:	356° to 374°F (180° to 190°C)	
Melting Point:	140° to 176°F (60° to 90°C)	
Molecular Weight:	331.4	

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile (for <i>solid</i> Tetramethrin) Silver Shield®/4H® and Barrier® (>8-hr breakthrough for Tetramethrin in <i>solution</i>)
Coveralls:	Tyvek® (for solid Tetramethrin) Tychem® BR, CSM and TK (>8-hr breakthrough for Tetramethrin in <i>solution</i>)
Respirator:	Spill: full facepiece APR with <i>Organic vapor</i> and <i>P100</i> cartridges Fire: SCBA

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HEAL	 	1.0

Eyes:	Irritation and burns
Skin:	Irritation, burns, itching, rash and redness (skin absorbable)

Inhalation: Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, dizziness, fatigue, muscle

Headache, dizziness, fatigue, muscle weakness, nausea and vomiting

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: TETRAMETHYL LEAD

Synonyms: Lead Tetramethyl; TML CAS No: 75-74-1 Molecular Formula: Pb(CH₃)₄ RTK Substance No: 1831 Description: Colorless liquid with a slightly fruity or musty odor.

HAZARD DATA

Hazard Rating	Firefighting	Reactivity Tetramethyl Lead decomposes in WATER to	
3 - Health	Use dry chemical, CO ₂ , water spray or foam as extinguishing agent.	produce heat and may explode.	
3 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE, including Lead Oxides.	Tetramethyl Lead reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
3 ₩ - Reactivity	CONTAINERS MAY EXPLODE IN FIRE.	PERMANGANATES, CHLORATES, NITRATES,	
DOT#: UN 1649	Use water spray to keep fire-exposed containers cool.	CHLORINE, BROMINE and FLUORINE); TETRACHLOROTRIFLUOROMETHYL	
ERG Guide #: 131	Vapors may travel to a source of ignition and flash	PHOSPHORANE; SULFURYL CHLORIDE and	
Hazard Class: 6.1 (Poison)	back. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to cause fires and explosions.	
		Tetramethyl Lead is not compatible with COMBUSTIBLES; RUBBER; METALS; and METAL OXIDES	

SPILL/LEAKS

Isolation Distance: 25 to 50 meters (80 to 160 feet)

Absorb liquid in sand or inert absorbent.

Toxic to aquatic organisms.

Hazardous to the environment and persists in the environment.

EXP	OSUF	RELIN	лтс
LAF	0301		

OSHA: NIOSH: ACGIH:

IDLH LEVEL:

0.075 mg/m , 8-hr TWA
0.075 mg/m ³ , 10-hr TWA
0.15 mg/m ³ , 8-hr TWA
40 mg/m ³ (as <i>Lead</i>)

Eyes:	Irritation, possible loss of vision
Skin:	Irritation
Acute:	Headache, irritability, upset stomach, and weakness
Chronic:	<i>Lead compounds</i> may cause lung cancer in humans Metallic taste, colic and muscle cramps Damage to the nervous system

PHYSICAL PROPERTIES		
Boiling Point:	230°F (110°C)	
Flash Point:	100 ^o F (37.8 ^o C)	
LEL:	1.8%	
UEL:	No information	
Specific Gravity:	1.9 (water = 1)	
Relative Vapor Density:	6.5 (air =1)	
Vapor Pressure:	23 mm Hg at 68 ⁰ F (20 ⁰ C)	
Solubility:	Insoluble	
Melting Point:	-17.5°F (-27.5°C)	

	PROTECTIVE EQUIPMENT
Gloves: Coveralls:	No information DuPont Tychem® Responder®, CSM, and TK for heavy <i>liquid toxics</i> and <i>corrosives</i>
Boots: Respirator:	No information >0.075 mg/m³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: TETRASODIUM PYROPHOSPHATE

Synonyms: Sodium Pyrophosphate; Tetron CAS No: 7722-88-5 Molecular Formula: Na₄O₇P₂ RTK Substance No: 1837 Description: Odorless, white powder or granular solid

HAZARD DATA					
Hazard Rating	Firefighting	Reactivity			
2 - Health		Tetrasodium Pyrophosphate is not compatible with			
0 - Fire	itself does not burn.	STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such a			
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Phosphorus Oxides</i> and <i>Sodium</i>	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and			
DOT#: None	Oxides.	FLUORINE); ETHYL ALCOHOL; ALUMINUM; and			
ERG Guide #: 154		MAGNESIUM.			
Hazard Class: None					

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance:	Odor Threshold:	Odorless	
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible	
Fire: 800 meters (1/2 mile)	Vapor Pressure:	0 mm Hg at 68°F (20°C)	
Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.	Specific Gravity:	2.5 (water = 1)	
	Water Solubility:	Soluble	
Thoroughly wash area after clean-up with water and detergent.	Boiling Point:	Decomposes	
	Melting Point:	1,810°F (993°C)	
	Molecular Weight:	265.9	
	pH:	10.2 (1% solution)	

EXPOSURE LIMITS

NIOSH: 5 mg/m³, 10-hr TWA

The Protective Action Criteria values are:

PAC-1 = 15 mg/m^3

 $PAC-2 = 25 \text{ mg/m}^{3}$

 $PAC-3 = 500 \text{ mg/m}^3$

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing.

PROTECTIVE EQUIPMENT

Gloves: Nitrile, Neoprene and Natural Rubber

Coveralls: Tyvek®

Respirator:

>5 mg/m³ - Full facepiece APR with *High efficiency filters* >25 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.



Common Name: THIRAM

Synonyms: Bis(Dimethylthiocarbamoyl)Disulfide; TMTD; Tetramethylthiuram Disulfide CAS No: 137-26-8 Molecular Formula: $C_6H_{12}N_2S_4$ RTK Substance No: 1854 Description: White to light yellow, odorless powder or the commercial product may be dyed blue

HAZARD DATA Hazard Rating Firefighting Reactivity COMBUSTIBLE SOLID Thiram will react with STRONG ACIDS (such as 2 - Health HYDROCHLORIC, SULFURIC and NITRIC) to form toxic Use dry chemical, CO₂, water spray or foam as 2 - Fire Carbon Disulfide and Hydrogen Sulfide gases. extinguishing agents. Thiram is not compatible with OXIDIZING AGENTS (such POISONOUS GASES ARE PRODUCED IN FIRE, 0 - Reactivity as PERCHLORATES, PEROXIDES, including Nitrogen Oxides and Sulfur Oxides. DOT#: UN 2771 PERMANGANATES, CHLORATES, NITRATES, Use water spray to keep fire-exposed containers CHLORINE, BROMINE and FLUORINE); REDUCING ERG Guide #: 151 cool. AGENTS (such as LITHIUM, SODIUM, ALUMINUM and Hazard Class: 6.1 their HYDRIDES); COPPER; and NITRATING AGENTS. (Toxic)

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Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Absorb **Thiram** in *solution* in dry sand, earth, or a similar material and place into sealed containers for disposal.

Moisten spilled *solid* material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.

DO NOT wash into sewer.

Thiram is toxic to aquatic life at very low concentrations.

EXPOSURE LIMITS

OSHA: 5 mg/m^3 , 8-hr TWA NIOSH: 5 mg/m^3 , 10-hr TWA ACGIH: 0.05 mg/m^3 , 8-hr TWA IDLH: 100 mg/m^3 The Protective Action Criteria values are: PAC-1 = 10 mg/m^3 PAC-2 = 75 mg/m^3 PAC-3 = 100 mg/m^3

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, dizziness, confusion, nausea and vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	280°F (138°C)
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	1.29 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	264°F (129°C) Decomposes
Melting Point:	311°F (155°C) (Pure)
Molecular Weight:	240.4

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Nitrile and Viton (>4-hr breakthrough for <i>Carbamates</i>)
Coveralls:	Tyvek® (<i>solid</i> Thiram); Tychem® BR, Responder® and TK (>8-hr breakthrough for Thiram in <i>solution</i>)
Respirator:	 >0.05 mg/m³ - full facepiece APR with Organic vapor cartridge and P100 prefilter >10 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: TIN TETRACHLORIDE

Synonyms: Stannic Chloride; Tin Perchloride CAS No: 7646-78-8 Molecular Formula: SnCl₄ RTK Substance No: 1859 Description: Colorless or slightly yellow liquid which fumes in moist air

HAZARD DATA					
Hazard Rating 3 - Health 0 - Fire 1 - Reactivity DOT#: UN 1827 ERG Guide #: 137 Hazard Class: 8 (Corrosive)	Firefighting Extinguish fire using an agent surrounding fire. Tin Tetrach burn. DO NOT USE WATER. POISONOUS GASES ARE PI including <i>Hydrogen Chloride</i> Use water spray only to keep containers cool. Tin Tetrachloride may ignite (wood, paper and oil).	RODU and <i>T</i> fire-e>	e itself does not JCED IN FIRE, <i>in Oxides.</i> kposed	Tin Te MOIS gas, a violen Tin Te (such HYDF PERC CHLC FLUC ALKY fires a Tin Te	etivity etrachloride reacts vigorously with WATER or of AIR to produce corrosive <i>Hydrogen Chloride</i> and contact with ETHYLENE OXIDE may cause at polymerization (self-reaction). etrachloride reacts violently with STRONG BASES as SODIUM HYDROXIDE and POTASSIUM ROXIDE); OXIDIZING AGENTS (such as CHLORATES, PEROXIDES, PERMANGANATES, DRATES, NITRATES, CHLORINE, BROMINE and DRINE); ORGANIC MATTER; TURPENTINE; 'L NITRATES; ALCOHOLS; and AMINES to cause and explosions. etrachloride attacks METALS, PLASTIC FINGS, and RUBBER.
SPI	LL/LEAKS			PH)	SICAL PROPERTIES
	mile) and or earth, or cover with dry place in covered containers for R OR WET METHOD. wer.		Flash Point: Vapor Density Vapor Pressur Specific Gravi Water Solubili Boiling Point: Melting Point: Molecular Wei	e: ty: ty:	Not combustible 9 (air = 1) 18 mm at 68°F (20°C) 2.2 (water = 1) Soluble - water reactive 237°F (114°C) -27.4°F (-33°C) 260.5
EXPOS	SURE LIMITS			PRO	
NIOSH: 2 m ACGIH: 2 m IDLH LEVEL: 100 All	ng/m ³ , 8-hr TWA ng/m ³ , 10-hr TWA ng/m ³ , 8-hr TWA ng/m ³ of the above are for <i>inorganic</i> <i>compounds</i> . (measured as)		Gloves: Coveralls: Respirator:	DuPor Zytror ONES (>8-ht >2 mg filters	and Silver Shield®/4H® (for <i>Carbon Tetrachloride</i>) nt Tychem® Responder®, CSM and TK; Kappler n® 300, 400, and 500; Saint-Gobain Suit®TEC or equivalent for <i>corrosive liquids</i> r breakthrough) /m ³ - full facepiece APR with High efficiency g/m ³ - Supplied air
HEAL	TH EFFECTS		FIRS	Г AID	AND DECONTAMINATION
Coughii (pulmor			contact lenses Quickly remov- large amounts Begin artificial necessary. Transfer to a n	n large a if worn. e contar of water respiration nedical f	amounts of water for at least 30 minutes. Remove Seek medical attention immediately. minated clothing and wash contaminated skin with r. Seek medical attention immediately. ion if breathing has stopped and CPR if



Common Name: TITANIUM

Synonyms: Titanium Powder CAS No: 7440-32-6 Molecular Formula: Ti RTK Substance No: 1860 Description: Silvery solid or a dark gray powder

HAZARD DATA				
Hazard Rating	Firefighting	Reactivity		
1 - Health	Titanium powder is FLAMMABLE and SPONTANEOUSLY COMBUSTIBLE.	Titanium <i>powder</i> is WATER REACTIVE at 1,292°F (700°C), or when molten, and an explosion can result.		
3 - Fire	Use dry chemical, sand or lime as extinguishing	Titanium powder reacts violently or explosively with CUPRIC OXIDE,		
1 - Reactivity	agents.	LEAD OXIDE and inorganic POTASSIUM COMPOUNDS when heated.		
DOT#: UN 2546	DO NOT USE WATER on MOLTEN or BURNING TITANIUM as an explosion may occur.	Titanium <i>powder</i> reacts with NITRIC ACID or LIQUID OXYGEN resulting in an explosion on exposure to FRICTION or HEAT.		
(Powder, dry)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Titanium Oxides</i> .	Titanium powder is not compatible with STRONG ACIDS (such as		
ERG Guide #: 135	CONTAINERS MAY EXPLODE IN FIRE.	HYDROCHLORIC, SULFURIC and NITRIC); METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); METAL SALTS;		
Hazard Class: 4.2 (Spontaneously Combustible)	Use water spray to keep fire-exposed containers cool. But DO NOT get water inside containers. Titanium <i>powder</i> or <i>dust</i> can burn in atmospheres of <i>Carbon Dioxide</i> , <i>Nitrogen</i> or <i>Air</i> .	METAL OXIDES; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and HALOCARBONS (such as TRICHLOROETHYLENE).		

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Titanium**.

Keep **Titanium** out of confined spaces, such as

sewers, because of the possibility of an explosion.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Titanium**.

The Protective Action Criteria values are:

PAC-1 = 2 mg/m³ PAC-2 = 12.5 mg/m³ PAC-3 = 60 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation, with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Flammable (Spontaneously Combustible Powder)
Auto Ignition Temp: 482°F (250°C) (Powder)	
Specific Gravity:	4.5 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	5,908° to 5,945°F (3,260° to 3,285°C)
Melting Point:	3,033° to 3,047°F (1,667° to 1,675°C)
Molecular Weight:	47.9

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>2 mg/m ³ - full facepiece APR with <i>P95 filter</i> >10 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: TITANIUM DIOXIDE

Synonyms: Rutile; Titanium Oxide; Anatase; Brookite CAS No: 13463-67-7; 1317-70-0 (powder form); 1317-80-2 (powder form) Molecular Formula: TiO₂ RTK Substance No: 1861 Description: Odorless, white powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Titanium Dioxide itself does	Titanium Dioxide powders or dusts may react violently with CHEMICALLY ACTIVE METALS (such as
0 - Fire	not burn.	POTASSIUM, SODIUM, MAGNESIUM and ZINC).
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	Titanium Dioxide powders or dusts are not compatible with OXIDIZING AGENTS (such as PERCHLORATES,
DOT#: None		PEROXIDES, PERMANGANATES, CHLORATES,
ERG Guide #: None		NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC,
Hazard Class: None		SULFURIC and NITRIC).

SPILL/LEAKS	PH	YSICAL PROPERTIES
Isolation Distance:	Odor Threshold:	Odorless
Spill: 25 meters (75 feet)	Flash Point:	Noncombustible
Fire: 800 meters (1/2 mile)	Vapor Pressure:	0 mm Hg at 68°F (20°C)
Moisten spilled material first or use a HEPA-filter	Specific Gravity:	3.9 to 4.2 (water = 1)
vacuum for clean-up and place into sealed containers for disposal.	Water Solubility:	Insoluble
	Boiling Point:	4,532° to 5,432°F (2,500° to 3,000°C)
	Melting Point:	3,326° to 3,362°F (1,830° to 1,850°C)
	Molecular Weight:	79.9

EXPOSURE LIMITS

OSHA:	15 mg/m³, 8-hr TWA
NIOSH:	2.4 mg/m ³ (fine) and 0.3 mg/m ³ (ultrafine),
	10-hr TWA

- ACGIH: 10 mg/m³, 8-hr TWA
- **IDLH:** 5,000 mg/m³

The Protective Action Criteria values are: PAC-1 = 30 mg/m³ PAC-2 = 330 mg/m³ PAC-3 = 2,000 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	No information available
Inhalation: Chronic:	Nose and throat irritation Cancer (lung) in animals
	Cancer (lung) in animals

Gloves: Nitrile, Neoprene and Natural Rubber Coveralls: Tyvek® Respirator: Spill - Full facepiece APR with P100 filters

PROTECTIVE EQUIPMENT

>0.3 mg/m³ (ultrafine) or Fire – SCBA
 >2.4 mg/m³ (fine) or Fire - SCBA
 >10 mg/m³ or Fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: TOLUENE

Synonyms: Toluol; Methyl Benzene; Phenyl Methane CAS No: 108-88-3 Molecular Formula: C_7H_8 RTK Substance No: 1866 Description: A colorless liquid with a sweet, strong odor

	HAZARD DATA			
Hazard Rating	Firefighting			Reactivity
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1294 ERG Guide #: 130 Hazard Class: 3 (Flammable)	FirefightingToluene is a FLAMMABLE LIQUID.Use dry chemical, CO2, alcohol-resistant foam or other foaming agent as extinguishing agents, as water may not be effective in fighting fires.POISONOUS GASES ARE PRODUCED IN FIRE.CONTAINERS MAY EXPLODE IN FIRE.Use water spray to keep fire-exposed containers cool.Vapors may travel to a source of ignition and flash back.Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.Use water spray to reduce vapors.		agents, as fires. ED IN FIRE. RE. containers cool. on and flash rel a distance	Toluene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); METAL SALTS; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC). Toluene may accumulate static electricity.
SPIL	L/LEAKS			PHYSICAL PROPERTIES
similar material and d DO NOT wash into ser aquatic organisms. Liquid floats on water source and spread fire EXPOS OSHA: 200 ppm, 8- 500 ppm, 10 NIOSH: 100 ppm, 10 ACGIH: 20 ppm, 8- IDLH: 500 ppm ERPGs: ERPG-1 = 5	rs (900 feet) iculite, dry sand, earth, or a eposit in sealed containers. wer. Toluene is toxic to and may travel to ignition e. URE LIMITS -hr TWA; 300 ppm, STEL; and 0-min peak per 8-hr workshift 0-hr TWA; 150 ppm, STEL		Gloves: Vi (2) Coveralls: Di Ri (2) Boots: No Respirator: 22	40°F (4°C) 1.1% 7.1% 3.1 (air = 1) 21 mm Hg at 68°F (20°C) 0.87 (water = 1) Very slightly soluble 232°F (111°C) tial: 8.82 eV
HEALT	HEFFECTS	i i		AID AND DECONTAMINATION
Eyes: Irritation Skin: Irritation, Acute: Nose and and whee Headache Chronic: Cancer (N	drying, cracking and rash I throat irritation with coughing		Remove the pers Flush eyes with la contact lenses if Quickly remove of large amounts of	on from exposure. arge amounts of water for at least 15 minutes. Remove worn. contaminated clothing and wash contaminated skin with soap and water. spiration if breathing has stopped and CPR if



Common Name: TOLUENE DIISOCYANATE (mixed isomers)

Synonyms: Diisocyanatotoluene; Methylphenylene Isocyanate; TDI CAS No: 26471-62-5 Molecular Formula: $C_9H_6N_2O_2$ RTK Substance No: 3132 Description: Clear, colorless to pale yellow liquid with a strong odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire	Toluene Diisocyanate is a COMBUSTIBLE LIQUID which may explode when exposed to HEAT and FLAMES.	Toluene Diisocyanate reacts with WATER to form <i>Polyurea</i> and <i>Carbon Dioxide</i> . The reaction produces HEAT, resulting in container rupture.
3-₩ - Reactivity DOT#: UN 2078	Use dry chemical, CO ₂ , water spray (as fog, not in solid streams) or alcohol-resistant foam as extinguishing agents.	Toluene Diisocyanate can polymerize (self react) uncontrollably when in contact with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ACYL
ERG Guide #: 156	Toluene Diisocyanate is REACTIVE and a DANGEROUS EXPLOSION HAZARD.	CHLORIDES; and AMINES. Toluene Diisocyanate is not compatible with ANILINE;
Hazard Class: 6.1 (Poison)	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i> and <i>Cyanides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Use water spray to reduce vapors.	ALCOHOLS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).

SPILL/LEAKS

Isolation Distance:

Spills: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers.

Containers of *unreacted* **Toluene Diisocyanate** and WATER should be left with the bung open or the lid slightly ajar to prevent pressure build-up.

DO NOT wash into sewer.

EXPOSURE LIMITS

OSHA: 0.02 ppm, Ceiling

ACGIH: 0.001 ppm, 8-hr TWA; 0.003 ppm, 15-min STEL IDLH: 2.5 ppm The Protective Action Criteria values are:

The Protective Action Uniteria values are:

PAC-1 = 0.75 ppm, PAC-2 = 2 ppm

PAC-2 = 2 ppmPAC-3 = 2 ppm

HEALTH EFFECTS

Eyes: Skin:	Irritation and burns Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary
	edema) Headache, nausea and vomiting
Chronic:	Cancer (pancreas, liver, mammary glands) in animals

PHYSICAL PROPERTIES

Odor Threshold:	2.1 ppm
Flash Point:	250°F (121°C)
LEL:	0.9%
UEL:	9.5%
Auto Ignition Temp:	>300°F (>149°C)
Vapor Density:	6 (air = 1)
Vapor Pressure:	0.025 mm Hg at 77°F (25°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Reacts
Boiling Point:	484°F (251°C)
Melting Point:	67° to 71°F (19° to 22°C)
Molecular Weight:	174.2

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, LV, Responder® and TK (>8-hr breakthrough)
Respirator:	Supplied air or SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention

- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
- Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility



Common Name: o-TOLUIDINE

Synonyms: 2-Aminotoluene; 2-Methylaniline; 2-Methylbenzenamine CAS No: 95-53-4 Molecular Formula: $C_6H_4CH_3NH_2$ RTK Substance No: 1442 Description: Colorless to pale yellow liquid that turns dark on exposure to air or light

Use water spray to keep fire-exposed containers

Flow or agitation may generate electrostatic

HAZARD DATA Hazard Rating Firefighting Reactivity o-Toluidine is not compatible with OXIDIZING AGENTS COMBUSTIBLE 3 - Health (such as PERCHLORATES, PEROXIDES, Use dry chemical, CO₂, water spray or foam as 2 - Fire PERMANGANATES, CHLORATES, NITRATES, extinguishing agents. CHLORINE, BROMINE and FLUORINE); STRONG 0 - Reactivity POISONOUS GASES ARE PRODUCED IN FIRE, ACIDS (such as HYDROCHLORIC, SULFURIC and including Nitrogen Oxides. NITRIC); and STRONG BASES (such as SODIUM DOT#: UN 1708 CONTAINERS MAY EXPLODE IN FIRE. HYDROXIDE and POTASSIUM HYDROXIDE).

SPILL/LEAKS

charges.

cool

Isolation Distance:

ERG Guide #: 153

Hazard Class: 6.1

Spill: 50 meters (150 feet)

(Poison)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a noncombustible material and place into sealed containers for disposal. DO NOT wash into sewer.

o-Toluidine is very toxic to aquatic organisms. DO NOT allow **o-Toluidine** to enter the environment.

EXPOSURE LIMITS

OSHA:5 ppm, 8-hr TWANIOSH:Lowest feasible concentrationACGIH:2 ppm, 8-hr TWAIDLH:50 ppmThe Protective Action Criteria values are:

PAC-1 = 5 ppm PAC-2 = 5 ppm PAC-3 = 50 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation, with tightness in the chest and shortness of breath
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)
Chronic:	Cancer (bladder and liver) in animals

PHYSICAL PROPERTIES

Odor Threshold:	0.25 to 6.6 ppm
Flash Point:	185°F (85°C)
LEL:	1.5%
Auto Ignition Temp:	900°F (482°C)
Vapor Density:	3.7 (air = 1)
Vapor Pressure:	0.3 mm Hg at 68°F (20°C)
Specific Gravity:	1.01 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	391°F (200°C)
Melting Point:	-3°F (-16°C)
Critical Temperature:	790°F (421°C)
Ionization Potential:	7.44 eV
Molecular Weight:	107.2

Protect from AIR and LIGHT.

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Viton and Viton/Butyl (>8-hr breakthrough)
Coveralls:	Tychem® F, BR, CSM and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.



Common Name: TRICHLORFON

Synonyms: Dylox®; Proxol®; Trichlorohydroxyethyldimethylphosphonate CAS No: 52-68-6 Molecular Formula: $C_4H_8CI_3O_4P$ RTK Substance No: 1882 Description: White, crystalline solid when pure

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Trichlorfon may burn, but does not readily ignite. However, it is often dissolved in a liquid carrier	Trichlorfon is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
0 - Fire	that may be flammable or combustible.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers	CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and
DOT#: UN 2783		NITRIC); and STRONG BASES (such as SODIUM
ERG Guide #: 152	cool.	HYDROXIDE and POTASSIUM HYDROXIDE).
Hazard Class: 6.1 (Poison)		

SPILL/LEAKS	PHYSICAL PROPERTIES	
Isolation Distance: Spill (solid): 25 meters (75 feet) Spill (liquid): 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in dry sand, earth, or a noncombustible	Flash Point: Vapor Pressure: Specific Gravity: Water Solubility:	242°F (117°C) (Solution) 7.8 x 10 ⁻⁶ mm Hg at 68°F (20°C) 1.73 (water = 1) Slightly soluble
material and place into sealed containers for disposal. Moisten solid material first or use a HEPA-filter	Boiling Point:	$212^{\circ}F(100^{\circ}C)$
vacuum for clean-up and place into sealed containers for disposal. DO NOT wash into sewer.	Melting Point: Molecular Weight:	181º to 183ºF (83º to 84ºC) 257.4
Trichlorfon is very toxic to aquatic organisms.		

EXPOSURE LIMITS

ACGIH: 1 mg/m³; 8-hr TWA

	PROTECTIVE EQUIPMENT
Gloves:	Nitrile and Neoprene (>8-hr breakthrough for Organophosphorus compounds)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for Organophosphorus compounds)
Respirator:	>1 mg/m ³ - full facepiece APR with Organic vapor cartridges and High efficiency prefilters
	>10 mg/m ³ - SCBA

HF	ALT	H	FFF	FC	TS
					10

Eyes:IrritationSkin:Irritation (skin absorbable)

Inhalation: Headache, sweating, nausea and vomiting, loss of coordination, and death (*Organophosphate poisoning*)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Shampoo hair immediately if contaminated.



Common Name: 1,1,2-TRICHLOROETHANE

Synonyms: Ethane Trichloride; Vinyl Trichloride CAS No: 79-00-5 Molecular Formula: C₂H₃Cl₃ RTK Substance No: 1889 Description: Colorless liquid with a sweet, pleasant odor

HAZARD DATA			
Hazard Rating	Firefighting	Reactivity	
2 - Health 1 - Fire	 1,1,2-Trichloroethane may burn, but does not readily ignite. Use dry chemical, CO₂, water spray or foam 	1,1,2-Trichloroethane may react violently with CHEMICALLY ACTIVE METALS (such as ALUMINUM, POTASSIUM, SODIUM, MAGNESIUM and ZINC).	
0 - Reactivity DOT#: UN 3082	as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Phosgene</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	1,1,2-Trichloroethane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE)	
ERG Guide #: 171		STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).	
Hazard Class: 9 (Environmentally Hazardous Substance)		1,1,2-Trichloroethane will decompose on contact with HOT SURFACES or FLAMES to form toxic <i>Hydrogen Chloride</i> and <i>Phosgene gases</i> .	
		1,1,2-Trichloroethane may attack RUBBER and STEEL.	

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

1,1,2-Trichloroethane is harmful to aquatic life at very low concentrations.

EXPOSURE LIMITS

OSHA:	10 ppm, 8-hr TWA
NIOSH:	10 ppm, 10-hr TWA
ACGIH:	10 ppm, 8-hr TWA

IDLH: 100 ppm

The Protective Action Criteria values are:

PAC-1 = 10 ppm PAC-2 = 15 ppm PAC-3 = 100 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, lightheadedness,
and passing outChronic:Cancer (liver, adrenal gland) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Sweet, pleasant odor
Flash Point:	Nonflammable
LEL: 6	5%
UEL: 1	15.5%
Vapor Density: 4	4.63 (air = 1)
Vapor Pressure:	19 mm Hg at 68°F (20°C)
Specific Gravity:	1.44 (water = 1)
Water Solubility:	/ery slightly soluble
Boiling Point: 2	237°F (114°C)
Melting Point: -	34°F (-37°C)
Ionization Potential:	11 eV
Molecular Weight: 1	133.4

PROTECTIVE EQUIPMENT

Viton (>8-hr breakthrough)

Coveralls: Tychem® CSM, BR and TK (>8-hr breakthrough)

Respirator: >10 ppm - SCBA

Gloves:

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: TRICHLOROETHYLENE

Synonyms: Ethylene Trichloride; TCE; Trichloroethene CAS No: 79-01-6 Molecular Formula: C₂HCl₃ RTK Substance No: 1890 Description: Clear, colorless liquid with a sweet, Chloroform-like odor

HAZARD DATA Hazard Rating Firefighting Reactivity Trichloroethylene will react explosively with *finely divided* or Trichloroethylene may burn, but does not 3 - Health powdered BARIUM, BERYLLIUM, and MAGNESIUM. readily ignite. 1 - Fire Trichloroethylene reacts with ACTIVE METALS (such as Use dry chemical, CO₂, water spray or LITHIUM, SODIUM and TITANIUM) to cause flashing and alcohol-resistant foam as extinguishing 0 - Reactivity sparks. agents. DOT#: UN 1710 Trichloroethylene will react with STRONG BASES (such as POISONOUS GASES ARE PRODUCED SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and IN FIRE, including Hydrogen Chloride ERG Guide #: 160 EPOXIDES to form spontanously flammable and Phosgene. Hazard Class: 6.1 Dichloroacetylene. CONTAINERS MAY EXPLODE IN FIRE. (Poison) Trichloroethylene is not compatible with STRONG ACIDS Use water spray to keep fire-exposed (such as HYDROCHLORIC, SULFURIC and NITRIC); containers cool. ISOCYANATES; EPICHLOROHYDRIN; ALCOHOLS; and Use water spray to reduce vapors. GLYCOLS. Trichloroethylene accumulates static charge. SPILL/LEAKS PHYSICAL PROPERTIES **Odor Threshold:** 1.4 ppm **Isolation Distance:** Flash Point: >200°F (93°C) Spill: 50 meters (150 feet) LEL: 8% Fire: 800 meters (1/2 mile) UEL: 10.5% Absorb liquids in vermiculite, dry sand, earth, fly ash or 788°F (420°C) Auto Ignition Temp: cement powder and place into sealed containers for Vapor Density: 4.5 (air = 1) disposal. Vapor Pressure: 58 mm Hg at 68°F (20°C) DO NOT wash into sewer. **Specific Gravity:** 1.5 (water = 1)Use only non-sparking tools and equipment, especially Water Solubility: Slightly soluble when opening and closing containers of Trichloroethylene. **Boiling Point:** 189°F (87°C) Metal containers should be grounded and bonded **Melting Point:** -99°F (-73°C) as Trichloroethylene accumulates static charge. 9.5 eV **Ionization Potential:** Trichloroethylene is slightly toxic to aquatic life. Molecular Weight: 131.4 **PROTECTIVE EQUIPMENT** EXPOSURE LIMITS ACGIH: 10 ppm, 8-hr TWA; 25 ppm, 15-min STEL Gloves: Silver Shield®/4H®. Viton and Barrier® (>8-hr IDLH: 1,000 ppm breakthrough) The Protective Action Criteria values are: Tychem® F, BR, LV, Responder®, and TK; Zytron® 500; Coveralls: ONESuit® TEC; and Trellchem® HPS and VPS (>8-hr PAC-1 = 130 ppm breakthrough) PAC-2 = 450 ppm PAC-3 = 3,800 ppm **Respirator:** >10 ppm - Supplied air or SCBA HEALTH EFFECTS FIRST AID AND DECONTAMINATION Remove the person from exposure. Eyes: Irritation and burns Flush eyes with large amounts of water for at least 15 minutes. Remove Skin: Irritation and burns contact lenses if worn. Seek medical attention. Inhalation: Headache, dizziness, lightheadedness, Quickly remove contaminated clothing and wash contaminated skin with visual disturbances, nausea and large amounts of soap and water. Seek medical attention. vomiting, and passing out Begin artificial respiration if breathing has stopped and CPR if necessary. **Chronic:** Cancer (liver, kidney, and lung) in Transfer promptly to a medical facility. animals



Common Name: TRICHLOROISOCYANURIC ACID

Synonyms: Symclosene; TCCA; Trichloro-s-Triazinetrione CAS No: 87-90-1 Molecular Formula: $C_3Cl_3N_3O_3$ RTK Substance No: 1892 Description: White, crystalline powder with a *Chlorino* like of

Description: White, crystalline powder with a Chlorine-like odor, often used in granular or powder form

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health	REACTIVE SOLID	Trichloroisocyanuric Acid may explode on HEATING and reacts violently with COMBUSTIBLES.	
0 - Fire	Trichloroisocyanuric Acid is not combustible, but it is a STRONG OXIDIZER that enhances the	Trichloroisocyanuric Acid reacts slowly with WATER to	
2 - Reactivity	combustion of other substances.	release toxic <i>Chlorine gas</i> , <i>Cyanuric Acid</i> , and highly reactive <i>Nitrogen Trichloride</i> .	
DOT#: UN 2468	Use water in flooding quantities only. DO NOT USE CHEMICAL or CO ₂ extinguishing agents.	Trichloroisocyanuric Acid reacts violently with AMMONIA; AMMONIUM SALTS; AMINES; CALCIUM HYPOCHLORITE; HYDROGEN PEROXIDE; SODIUM	
ERG Guide #: 140	POISONOUS GASES ARE PRODUCED IN FIRE,		
Hazard Class: 5.1 (Oxidizer)		CARBONATE; COMBUSTIBLE MATERIALS; and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to cause fires and explosions.	
	Trichloroisocyanuric Acid may ignite combustibles (wood, paper and oil).	Trichloroisocyanuric Acid reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form toxic <i>Chlorine gas</i> .	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed dry containers for disposal. Keep **Trichloroisocyanuric Acid** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

Trichloroisocyanuric Acid is very toxic to aquatic organisms.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Trichloroisocyanuric Acid**.

The Protective Action Criteria values are: PAC-1 = 75 mg/m³ PAC-2 = 500 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES					
hold:	Chlorine-like				

Odor Threshold:	Chlorine-like
Flash Point:	Noncombustible
Vapor Density:	2.07 (air = 1)
Vapor Pressure:	Negligible
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Reacts slowly
Melting Point:	437°F (225°C) (Decomposes)
Molecular Weight:	232.4

	PROTECTIVE EQUIPMENT	
Gloves:	Butyl, Nitrile, Neoprene, Viton and Barrier® (>8-hr breakthrough for <i>Hydrogen Chloride</i>)	
Coveralls:	Tychem® SL, CPF3, BR, Responder® and TK, and Trellchem® HPS and VPS (>8-hr breakthrough for <i>Hydrogen Chloride</i>)	
Respirator:	Small Spill: full facepiece APR with <i>Acid gas</i> cartridges and <i>P100 filters</i> >75 mg/m ³ - SCBA	
FIRST AID AND DECONTAMINATION		
FIR	ST AID AND DECONTAMINATION	
	ST AID AND DECONTAMINATION erson from exposure.	
Remove the p Flush eyes wi		
Remove the p Flush eyes wi contact lenses Quickly remov	erson from exposure. th large amounts of water for at least 15 minutes. Remove	
Remove the p Flush eyes wi contact lenses Quickly remov large amounts	erson from exposure. th large amounts of water for at least 15 minutes. Remove s if worn. Seek medical attention. ve contaminated clothing and wash contaminated skin with	



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Common Name: 1,2,3-TRICHLOROPROPANE

Synonyms: Allyl Trichloride; Trichlorohydrin CAS No: 96-18-4 Molecular Formula: $C_3H_5CI_3$ RTK Substance No: 1902 Description: Colorless to straw-colored liquid with a Chloroform-like odor

HAZARD DATA

	H	A	ZARD DA	ГА	
Hazard Rating	Firefighting		Reactivity		
3 - Health 2 - Fire 1 - Reactivity DOT#: UN 2810 ERG Guide #: 153 Hazard Class: 6.1 (Poison)	LIQUID. Use dry chemical, CO ₂ , or alcohol- as extinguishing agents. Fine water spray may be used to bl POISONOUS GASES ARE PRODU including <i>Hydrogen Chloride</i> and <i>F</i> CONTAINERS MAY EXPLODE IN	,3-Trichloropropane is a COMBUSTIBLE QUID. e dry chemical, CO ₂ , or alcohol-resistant foam extinguishing agents. e water spray may be used to blanket the fire. DISONOUS GASES ARE PRODUCED IN FIRE, cluding <i>Hydrogen Chloride</i> and <i>Phosgene</i> . DNTAINERS MAY EXPLODE IN FIRE. e water spray to keep fire-exposed containers		1,2,3-Trichloropropane reacts violently with POWDERED METALS. 1,2,3-Trichloropropane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); RESINS; and WAXES.	
SPI	LL/LEAKS			PH	YSICAL PROPERTIES
similar material and d DO NOT wash into se	rs (1,200 feet) mile) iculite, dry sand, earth, or a eposit in sealed containers. wer. ne is a marine pollutant and may		Odor Thresho Flash Point: LEL: UEL: Auto Ignition Vapor Density Vapor Pressu Specific Grav Water Solubil Boiling Point Molecular We	Temp: y: ire: ity: ity:	Chloroform odor $160^{\circ}F (71^{\circ}C)$ 3.2% 12.6% $579^{\circ}F (304^{\circ}C)$ 5.1 (air = 1) $3 mm Hg at 68^{\circ}F (20^{\circ}C)$ 1.4 (water = 1) Very slightly soluble $313^{\circ}F (156^{\circ}C)$ 147.4
EXPOS	SURE LIMITS			PRO	TECTIVE EQUIPMENT
OSHA: 50 ppm, 8-h NIOSH: 10 ppm, 10 ACGIH: 10 ppm, 8-h IDLH: 100 ppm	-hr TWA		Gloves: Coveralls: Respirator:	DuPon Kapple (>8-hr	Polyvinyl Alcohol and Viton t Tychem® BR, LV, Responder®, and TK; er® Zytron® 300; and Saint-Gobain ONESuit® TEC, breakthrough for <i>Aliphatic Halogens</i>) m - Supplied air
HEAL	TH EFFECTS		FIRS	ST AI	D AND DECONTAMINATION
Skin: Irritation and crac Inhalation: Nose, th coughin breath Headach lighthea	and burns and burns with redness, drying cking. moat and lung irritation with g, wheezing and shortness of he, dizziness and dedness (liver, mouth and stomach) in		contact lenses Quickly remo- skin with large Begin artificia	th large a s if worn. ve conta e amount l respirat	amounts of water for at least 15 minutes. Remove
animals					June 2008



Common Name: TRICHLOROSILANE

Synonyms: Silicochloroform; Trichloromonosilane CAS No: 10025-78-2 Molecular Formula: SiHCl₃ RTK Substance No: 1903

Headache, nausea, vomiting, diarrhea and

abdominal pain

RTK Substance No: 1903 Description: Colorless liquid with a sharp, choking odor							
		НА	ZÆ		ΤА		
Hazard Rati	ing	Firefighting			Re	activity	,
3 - Health 4 - Fire 2W - Reactivity DOT#: UN 129 ERG Guide #: Hazard Class: (Water Reactive/ Dangerous When	95 139 4.3	 FLAMMABLE and REACTIVE LIQUID Use only Alcohol-Resistant Aqueous Film Forming Foam (AR-AFFF) at medium expansion. Apply foam carefully by <i>floating</i> it onto the spill to form a continuous layer. USE WATER ONLY TO KNOCK DOWN VAPORS. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride, Phosgene</i> and <i>Chlorosilanes</i>. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool but DO NOT get water inside containers. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back. Flow or agitation may generate electrostatic charge. 			Trichlorosilane reacts violently with WATER; SOLUTIONS CONTAINING WATER; STEAM; and MOISTURE IN AIR to release heat and flammable and corrosive gases such as <i>Hydrogen</i> and <i>Hydrogen Chloride</i> . Trichlorosilane reacts violently with ALCOHOLS; ACETONE; ORGANIC ACIDS (such as ACETIC ACID); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and AMINES. Trichlorosilane is incompatible with COMBUSTIBLES and METALS.		
	SP	ILL/LEAKS	Π			PHYS	ICAL PROPERTIES
Isolation Distance:Small Spill: 30 meters (100 feet)Large Spill: 60 meters (200 feet)Fire: 800 meters (1/2 mile)For small spills, absorb liquids in vermiculite, dry sand or earth.DO NOT stack or heap contaminated sorbents as the heatgenerated may cause auto ignition.Apply AR-AFF Foam on small spills to suppress vapors and blanketrelease. Carefully float foam onto spill and reapply as necessary.For large spills vapor ignition is possible.Use only non-sparking tools and equipment, and ground and bondall containers when transferring liquid.Neutralize spills using Sodium Hydroxide with a 1 to 1 ratio ofSodium Hydroxide to Chlorosilane.Keep Trichlorosilane out of confined spaces, such as sewers, because of the possibility of an explosion.			Odor Thres Flash Poin LEL: UEL: Auto Ignitia Vapor Den Vapor Pres Specific Gr Water Solu Boiling Poi Freezing P Critical Ter Molecular	on T sity: ssure ravit ubilit int: coint: mp:	emp: e: y: y:	Sharp, choking odor -18° to $7^{\circ}F$ (-28° to $-14^{\circ}C$) 1.2% 90.5% $220^{\circ}F$ ($104^{\circ}C$) 4.7 (air = 1) 20.4 mm Hg at $70^{\circ}F$ ($21^{\circ}C$) 1.34 (water = 1) Reacts (Violent decomposition) $90^{\circ}F$ ($32^{\circ}C$) $-196^{\circ}F$ ($-127^{\circ}C$) $403^{\circ}F$ ($206^{\circ}C$) 135.5	
l	EXPC	SURE LIMITS			Р	ROTE	CTIVE EQUIPMENT
OSHA/NIOSH: ACGIH: IDLH: The Protective A PAC-1 = 0.6 pp	5 ppm, 2 ppm, 50 ppm Action Cri	Ceiling (as Hydrogen Chloride) Ceiling (as Hydrogen Chloride) (as Hydrogen Chloride)		Gloves: Coveralls: Respirator:	-	Viton and E compound	Barrier® (>8-hr breakthrough for Organo-Silicon
Eyes: S Skin: S Inhalation: N	Severe irr Severe irr Nose, thro vheezing	THEFFECTS itation, burns and possible eye damage itation, burns and blisters bat and lung irritation with coughing, and severe shortness of breath y edema)		Remove the Flush eyes v contact lense Quickly remo	perso with la es if v ove c	on from exp arge amour vorn. Seel ontaminate	ND DECONTAMINATION

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE

Synonyms: Freon®113; Genetron®113 CAS No: 76-13-1 Molecular Formula: C₂Cl₃F₃ RTK Substance No: 1904

Description: Colorless liquid with a faint, sweet or Ether-like odor at high concentrations

HAZARD DATA

Hazard Rating	Firefighting	Reactivity		
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. 1,1,2-Trichloro-	1,1,2-Trichloro-1,2,2-Trifluoroethane may react violently with CHEMICALLY ACTIVE METALS (such as POTASSIUM,		
0 - Fire	1,2,2-Trifluoroethane itself does not burn.	SODIUM, MAGNESIUM and ZINC) and their ALLOYS.		
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> ,	Contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) releases toxic <i>Chlorine gas</i> .		
DOT#: None	Hydrogen Fluoride, and Phosgene.	1,1,2-Trichloro-1,2,2-Trifluoroethane is not compatible with		
ERG Guide #: 171	Use water spray to keep fire-exposed	FINELY POWDERED METALS and OXIDIZING AGENTS		
Hazard Class: None	containers cool.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).		

SPILL/LEAKS	PH	PHYSICAL PROPERTIES			
Isolation Distance:Spill: 50 meters (150 feet)Fire: 800 meters (1/2 mile)Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.Wash all contaminated surfaces with <i>alcohol</i> followed by washing with a strong soap and water solution.DO NOT wash into sewer.1,1,2-Trichloro-1,2,2-Trifluoroethane is toxic to aquatic life and impacts the ozone layer.	Odor Threshold: Flash Point: Auto Ignition Temp: Vapor Density: Vapor Pressure: Specific Gravity: Water Solubility: Boiling Point: Freezing Point: Ionization Potential:	45 ppm Noncombustible 1,256°F (680°C) 6.5 (air = 1) 285 mm Hg at 68°F (20°C) 1.57 (water = 1) Insoluble 118°F (48°C) -31°F (-35°C) 11.99 eV			
	Molecular Weight:	187.4			

EXPOSURE LIMITS	PROTECTIVE EQUIPMENT		
OSHA: 1,000 ppm, 8-hr TWA NIOSH: 1,000 ppm, 10-hr TWA; 1,250 ppm STEL ACGIH: 1,000 ppm, 8-hr TWA; 1,250 ppm STEL IDLH: 2,000 ppm The Protective Action Criteria values are: PAC-1 = 1,250 ppm PAC-2 = 1,500 ppm PAC-3 = 2,000 ppm	Gloves:Insulated Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough)Coveralls:Tychem® BR, Responder® and TK (>8-hr breakthrough)Respirator:>1,000 ppm - SCBA		
HEALTH EFFECTS	FIRST AID AND DECONTAMINATION		

Eves: Irritation Skin: Irritation, frostbite, burns, rash and redness Inhalation: Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema) Headache, dizziness, confusion, recent memory loss, convulsions, and passing out. Very high levels can cause trouble breathing, irregular heart rhythms collapse and even death.

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Immerse affected part in warm water. Seek medical attention.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.





Common Name: TRICRESYL PHOSPHATE

Synonyms: Cresyl Phosphate; Tritolyl Phosphate CAS No: 1330-78-5 Molecular Formula: $C_{21}H_{21}O_4P$ RTK Substance No: 3130 Description: Colorless, odorless liquid that is a mixture of three different isomers

HAZARD DATA

Hazard RatingFirefightingReactivity1 - HealthTricresyl Phosphate may burn, but does not readily ignite.Tricresyl Phosphate reacts with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to form highly toxic and flammable Phosphine gas.1 - FireExtinguish fire using an agent suitable for type of surrounding fire.Tricresyl Phosphate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES), PERMANGANATES, CHLORATES, NITRATES, including Phosphorus Oxides and Phosphine. (Poison)Tricresyl Phosphate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE), especially when heated.
readily ignite.readily ignite.(such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to form highly toxic and flammable Phosphine gas.1 - FireExtinguish fire using an agent suitable for type of surrounding fire.(such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to form highly toxic and flammable Phosphine gas.DOT#: UN 2574Water may not be effective in fighting fires. POISONOUS GASES ARE PRODUCED IN FIRE, including Phosphorus Oxides and Phosphine.Tricresyl Phosphate is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE), especially when heated.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer.

Tricresyl Phosphate is expected to be very toxic to aquatic life.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	437°F (225°C)
Auto Ignition Temp:	770°F (410°C)
Vapor Density:	2.7 (air = 1)
Vapor Pressure:	1.7 x 10 ⁻⁶ mm Hg at 77°F (25°C)
Specific Gravity:	1.16 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	770°F (410°C)
Freezing Point:	-27°F (-33°C)
Molecular Weight:	368

EXPOSURE LIMITS	E)	(P	Ο	S	U	R	Ε	L	IM	11	ΤS	
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OSHA: 0.1 mg/m³ (0.0066 ppm), 8-hr TWA

- NIOSH: 0.1 mg/m³ (0.0066 ppm), 10-hr TWA
- **ACGIH:** 0.1 mg/m³ (0.0066 ppm), 8-hr TWA
- **IDLH:** 40 mg/m³ (2.65 ppm)

(All of the above are for Tri-o-Cresyl Phosphate)

HEALTH EFFECTS

Eyes:IrritationSkin:IrritationInhalation:Nose and throat irritation

	PROTECTIVE EQUIPMENT
Gloves:	Butyl, Polyvinyl Alcohol, Polyvinyl Chloride and Viton (>8- hr breakthrough)
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough for Organophosphorus compounds)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: TRIETHANOLAMINE DODECYLBENZENE-SULFONATE

Synonyms: Dodecylbenzenesulfonic Acid. Triethanolamine Salt CAS No: 27323-41-7 Molecular Formula: C₁₈H₂₀O₃S•C₆H₁₅NO₃ RTK Substance No: 1905 Description: White colored, waxy solid that is often in a liquid solution

HAZARD DATA

Hazard Rating	Firefighting	Reactivity					
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Triethanolamine	Triethanolamine Dodecylbenzene-Sulfonate is not compatible with OXIDIZING AGENTS (such as					
1 - Fire	Dodecylbenzene-Sulfonate itself does not	PERCHLORATES, PEROXIDES, PERMANGANATES,					
0 - Reactivity	burn, or burns with difficulty. POISONOUS GASES ARE PRODUCED IN	CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS (such as LITHIUM,					
DOT#: None	FIRE, including <i>Nitrogen Oxides</i> and <i>Sulfur</i>	SODIUM, ALUMINUM and their HYDRIDES),					
ERG Guide #: 171 Hazard Class: None	Oxides. Use water spray to keep fire-exposed containers cool.	ISOCYANATES; and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).					

SPILL/LEAKS

Isolation Distance:

Spill (Solid): 25 meters (75 feet)

Spill (Liquid): 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Collect solid material in the most convenient and safe manner and place into sealed containers for disposal. DO NOT wash into sewer.

Triethanolamine Dodecylbenzene-Sulfonate is hazardous to waterfowl and most fish.

EXPOSURE LIMITS

No occupational exposure limits have been established for Triethanolamine Dodecylbenzene-Sulfonate.

HEALTH EFFECTS

Eyes:	Irritation and burns

Irritation and burns

Skin:

Inhalation: Nose, throat and lung irritation, with coughing, wheezing and shortness of breath

PHYSICAL PROPERTIES

Flash Point:	>200°F (93°C)
Vapor Pressure:	Negligible
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Soluble
Boiling Point:	>507°F (264°C)
Molecular Weight:	475.6 (Solution)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber (<i>solid</i>) Butyl, Viton and SilverShield®/4H (<i>solutions</i>)
Coveralls:	Tyvek® (<i>solid</i>) Tychem® BR, Responder® and TK (<i>solutions</i>)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: TRIETHYLAMINE

Synonyms: (Diethylamino)Ethane; TEA CAS No: 121-44-8 Molecular Formula: $C_6H_{15}N$ RTK Substance No: 1907 Description: Clear, colorless liquid with an *Ammonia* or fish-like odor

Hazard Rating	Firefighting	Reactivity					
3 - Health	FLAMMABLE LIQUID Use dry chemical, CO ₂ , water spray or alcohol-	Triethylamine is a strong base which may react violently with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and					
3 - Fire	resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN	OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE					
0 - Reactivity	FIRE, including <i>Nitrogen Oxides</i> .	and FLUORINE).					
DOT#: UN 1296	CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Triethylamine reacts with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to form flammable and explosive <i>Hydrogen gas</i> . Triethylamine is not compatible with ISOCYANATES; EPOXIDES;					
ERG Guide #: 132	Vapor is heavier than air and may travel a						
Hazard Class: 3	distance to cause a fire or explosion far from the source. Triethylamine may form an ignitable vapor/air mixture in closed tanks or containers.	PHENOLS; and ACID HALIDES (such as TRICHLOROACETIC ACID).					
(Flammable)		Triethylamine may form an ignitable vapor/air mixture in closed tanks or containers.	Triethylamine can form toxic <i>N-Ntrosoamines</i> when in contact with NITRIC ACID, NITRATES or atmospheres with high NITROUS OXIDE concentrations.				
		Triethylamine is CORROSIVE to ALUMINUM, COPPER and ZINC and their ALLOYS in the presence of MOISTURE.					

SPILL/LEAKS

Isolation Distance:

Spill:

Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.

DO NOT wash into sewer.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Triethylamine**.

Triethylamine is harmful to aquatic organisms.

EXPOSURE LIMITS

ACGIH: 1 ppm, 8-hr TWA; 3 ppm STEL IDLH: 200 ppm

The Protective Action Criteria values are:

PAC-1 = 3 ppm PAC-2 = 3 ppm PAC-3 = 200 ppm

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burns

Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	0.1 to 0.48 ppm
Flash Point:	16°F (-9°C)
LEL:	1.2%
UEL:	8%
Auto Ignition Temp:	480°F (249°C)
Vapor Density:	3.5 (air = 1)
Vapor Pressure:	54 mm Hg at 68°F (20°C)
Specific Gravity:	0.73 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	193°F (89°C)
Freezing Point:	-175°F (-115°C)
Ionization Potential:	7.5 eV
Molecular Weight:	101.2

	PROTECTIVE EQUIPMENT				
Gloves:	Nitrile, Polyvinyl Alcohol, Viton and Barrier® (>8-hr breakthrough)				
Coveralls:	Tychem® fabrics; Trellchem® HPS and VPS (>8-hr breakthrough)				
Respirator:	>1 ppm - SCBA				

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: TRIETHYLENE TETRAMINE

Synonyms: 1,4,7,10-Tetrazadecane; Trientine CAS No: 112-24-3 Molecular Formula: $C_6H_{18}N_4$ RTK Substance No: 1908 Description: Colorless to yellow liquid with an *Ammonia* odor

HAZARD DATA						
Hazard Rating	g Firefighting			Reactivity		
3 - Health 1 - Fire 0 - Reactivity DOT#: UN 2259 ERG Guide #: 19 Hazard Class: 8 (Corros	CORROSIVE and COMBUSTIE LIQUID, but it does not readily Use dry chemical, CO ₂ , water s alcohol-resistant foam as exting agents. POISONOUS GASES ARE PRO IN FIRE, including <i>Nitrogen Ox</i> Use water spray to keep fire-exp	CORROSIVE and COMBUSTIBLE LIQUID, but it does not readily ignite Use dry chemical, CO ₂ , water spray alcohol-resistant foam as extinguish agents. POISONOUS GASES ARE PRODU IN FIRE, including <i>Nitrogen Oxides</i> . Use water spray to keep fire-expose		Triethylene Te with STRONG and NITRIC); A OXIDIZING AO PERMANGAN BROMINE and Triethylene Te COPPER, COF and ZINC); CY CHLOROFOR	etramine is not compatible with METALS (such as PPER ALLOYS, NICKEL, COBALT, ALUMINUM (ANIDES; NITRILES; EPOXIDES; MATES; KETONES; and CHLORINATED ONS (such as METHYLENE CHLORIDE and	
	SPILL/LEAKS			PH	YSICAL PROPERTIES	
SPILL/LEAKS Isolation Distance: Spill: 50 meters (150 feet) Fire: 800 meters (1/2 mile) Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer. Triethylene Tetramine may cause long-term adverse effects in the aquatic environment.		r	Flasi LEL: UEL: Auto Vapo Spec Wate Boili Melti pH:		Ammonia odor 275°F (135°C) 1% 6.5% 640°F (338°C) 5.04 (air = 1) <0.01 mm Hg at 68°F (20°C) 0.98 (water = 1) Soluble 511°F (266°C) 54°F (12°C) 10 (1% aqueous solution) 146.3	
EX	POSURE LIMITS			PRO	TECTIVE EQUIPMENT	
AIHA: 1 ppm, 8-l	hr WEEL		Glov	es: Butyl,	Nitrile and Neoprene (>8-hr breakthrough)	
The Protective Action Criteria values are: PAC-1 = 7.5 ppm PAC-2 = 60 ppm PAC-3 = 150 ppm				HPS a	m® BR, Responder®, and TK; and Trellchem® Ind VPS (>8-hr breakthrough for <i>Amines, aliphatic</i> y and <i>Polyamines</i>)	
HE	ALTH EFFECTS			FIRST AI	D AND DECONTAMINATION	
Skin: Irri Inhalation: No co bre Ex	evere irritation and burns tation and burns ose, throat and lung irritation with ughing, wheezing and shortness of eath posure to hot vapors can cause itching d swelling of the face	1	 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. 			



Common Name: TRIFLURALIN

Synonyms: Crisalin; Treflan CAS No: 1582-09-8 Molecular Formula: $C_{13}H_{16}F_3N_3O_4$ RTK Substance No: 1918 Description: Odorless, yellow or bright orange, crystalline solid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity						
2 - Health	COMBUSTIBLE SOLID Use dry chemical, CO ₂ , water spray or foam as	Trifluralin reacts violently with OXIDIZING AGENTS						
1 - Fire	extinguishing agents.	(such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,						
0 - Reactivity	Trifluralin may be dissolved in a liquid carrier that is flammable.	CHLORINE, BROMINE and FLUORINE).						
DOT#: NA 3077	POISONOUS GASES ARE PRODUCED IN FIRE,							
ERG Guide #: 171	including Nitrogen Oxides and Hydrogen Fluoride.							
Hazard Class: 9	Use water spray to keep fire-exposed containers cool.							
(Environmentally								
Hazardous Substance)								

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Dampen spill with 60% to 70% *Ethyl Alcohol* and place into sealed containers for disposal.

Wash spill area with 60% to 70% Ethyl Alcohol.

DO NOT wash into sewer.

Trifluralin is toxic to honeybees, fish, and other aquatic organisms, and can bioaccumulate.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Trifluralin**.

The Protective Action Criteria values are: PAC-1 = 0.075 mg/m^3 PAC-2 = 0.6 mg/m^3

 $PAC-3 = 300 \text{ mg/m}^3$

0

HEALTH EFFECTS

Eyes: Skin:	Irritation
Skin:	Irritation and rash
Inhalation:	Nose and throat irritation with coughing and wheezing.
Chronic:	Cancer (urinary tract, thyroid) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless	
Flash Point:	>185°F (>85°C)	
Vapor Pressure:	1.9 x 10 ⁻⁴ mm Hg at 85⁰F (29⁰C)	
Specific Gravity:	1.3 (water = 1)	
Water Solubility:	Very slightly soluble	
Boiling Point:	282° to 284°F (139° to 140°C) (Decomposes)	
Melting Point:	115° to 117°F (46° to 47°C)	
Molecular Weight:	335.3	

	PROTECTIVE EQUIPMENT
Gloves:	Neoprene
Coveralls:	Tyvek®
Respirator:	Full facepiece APR with <i>P100 filter</i> >300 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 2,4,6-TRINITROPHENOL

Synonyms: Picric Acid; Carbazotic Acid; Phenol Trinitrate CAS No: 88-89-1 Molecular Formula: C₆H₃N₃O₇ RTK Substance No: 1946 Description: Odorless, yellow-orange, crystalline solid when dry, or a bright yellow liquid when dissolved in water or an organic solvent

	F	AZARD D	ATA	
Hazard Rating	Firefighting		Reacti	ivity
3 - Health 4 - Fire 4 - Reactivity DOT#: UN 0154 ERG Guide #: 112 Hazard Class: 1.1D (Explosive)	FIRETIGNTING FLAMMABLE and REACTIVE SOLID WHEN DRY and a DANGEROUS FIRE and EXPLOSION HAZARD. 2,4,6-Trinitrophenol may explosively decompose with heat, shock, friction or concussion. Water solutions of 2,4,6-Trinitrophenol are not combustible. Use dry chemical, CO ₂ , water spray, alcohol-resistant foam or other foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Nitrogen Oxides. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Flow or agitation may generate electrostatic charges. 2,4,6-Trinitrophenol may form an ignitable vapor/air mixture in closed tanks or containers.		 Reactivity 2,4,6-Trinitrophenol must be kept wet or in solution at all times as <i>dry</i> or <i>crystallized</i> 2,4,6-Trinitrophenol can be detonated by HEAT, SHOCK, FRICTION, STATIC ELECTRICITY or CONCUSSION. 2,4,6-Trinitrophenol will react with METALS (such as COPPER, IRON, LEAD, MERCURY and ZINC) to form <i>metal picrates</i> that are extremely shock sensitive and can be detonated by the slightest movement or vibration. 2,4,6-Trinitrophenol may react violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); AMMONIA; CONCRETE; PLASTER; GELATIN; and NITROGEN CONTAINING COMPOUNDS. 	
SPI	LL/LEAKS		PH	YSICAL PROPERTIES
feet). For <i>dry</i> 2,4,6-Trinitrophe trained in the clean-up of Absorb liquids in dry sand place into sealed contain Use only non-sparking to opening and closing con Keep spill wet at all times DO NOT wash into sever	e) smitters within 100 meters (330 nol , consult a Specialist specifically explosive materials. I, earth, or a similar material and ers for disposal. ols and equipment, especially when tainers of 2,4,6-Trinitrophenol .	Odor Thresh Flash Point: Auto Ignition Vapor Densit Vapor Press Specific Grav Water Solubi Boiling Point Melting Point Molecular Wa	Temp: y: ure: vity: lity: ::	Odorless 302°F (150°C) 572°F (300°C) 7.9 (air = 1) <1 mm Hg at 68°F (20°C) 1.8 (water = 1) Slightly soluble Explodes above 572°F (300°C) 252°F (122°C) 229.1
EXPOS	SURE LIMITS		PRO	TECTIVE EQUIPMENT
ACGIH: 0.1 mg/m ³ , 8-1 IDLH: 75 mg/m ³ The Protective Action Crit	-hr TWA; 0.3 mg/m ³ , STEL hr TWA teria values are: PAC-2 = 15 mg/m ³	Gloves: Coveralls: Respirator:	Tycher >0.1 m	and Neoprene (1 to 4-hr breakthrough) m® Responder® (>8-hr breakthrough for <i>solutions</i>) ng/m ³ - full facepiece APR with <i>P100 filters</i> /m ³ - SCBA
HEAL	TH EFFECTS	FIR	ST AII	D AND DECONTAMINATION
Skin: Irritation a Inhalation: Nose and	and burns and burns I throat irritation e, dizziness, nausea and vomiting	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. 		



Common Name: 2,4,6-TRINITROTOLUENE

Synonyms: 1-Methyl-2,4,6-Trinitrobenzene; TNT CAS No: 118-96-7 Molecular Formula: C₇H₅N₃O₆ RTK Substance No: 1948

Description: Odorless, colorless to pale yellow, crystalline solid that may be transported in a slurry

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	2,4,6-Trinitrotoluene is an EXPLOSIVE that can be detonated by HEAT, LIGHT, FRICTION or	2,4,6-Trinitrotoluene, especially <i>hot liquid</i> 2,4,6-Trinitrotoluene may explosively decompose with
4 - Fire	SHOCK.	SHOCK, FRICTION, IMPACT or HEAT (above 464°F
4 - Reactivity	2,4,6-Trinitrotoluene is a FLAMMABLE and REACTIVE SOLID.	(240°C)). 2,4,6-Trinitrotoluene reacts violently or explosively with
DOT#: UN 0209	Use water or dirt for small fires. DO NOT attempt	OXIDIZING AGENTS (such as PERCHLORATES,
ERG Guide #: 112	to extinguish large fires. POISONOUS GASES ARE PRODUCED IN FIRE.	PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE);
Hazard Class: 1	including Nitrogen Oxides.	AMMONIA; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); STRONG
(Explosive)	CONTAINERS MAY EXPLODE IN FIRE.	BASES (such as SODIUM HYDROXIDE and
	Use water spray to keep fire-exposed containers cool.	POTASSIUM HYDROXIDE); NITRIDES; NITRIC ACID; LEAD; IRON; and ORGANIC SOLVENTS.

SPILL/LEAKS

Isolation Distance:

Spill: 500 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

DO NOT CLEAN-UP or DISPOSE of unless supervised by a specialist in explosives.

Keep spilled 2,4,6-Trinitrotoluene WET!

Use only non-sparking tools and equipment, especially when opening and closing containers of 2,4,6-Trinitrotoluene. Metal containers involving the transfer of

2,4,6-Trinitrotoluene should be grounded and bonded. DO NOT wash into sewer.

DO NOT OPERATE RADIO TRANSMITTORS within 100 meters (330 feet) of ELECTRICAL DETONATORS.

2,4,6-Trinitrotoluene is toxic to aquatic organisms and may cause long-term effects.

EXPOSURE LIMITS

OSHA: 1.5 mg/m³, 8-hr TWA NIOSH: 0.5 mg/m³, 10-hr TWA ACGIH: 0.1 mg/m³, 8-hr TWA IDLH: 500 mg/m³

The Protective Action Criteria values are: PAC-1 =1.25 mg/m³ PAC-2 = 7.5 mg/m³

 $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation	
Skin:	Irritation	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, fatigue and blue color to the skin and lips (methemoglobinemia)	
Chronic:	Cancer (bladder) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	Odorless	
Flash Point:	Flammable Solid (Explodes)	
Auto Ignition Temp:	887°F (474°C)	
Vapor Pressure:	0.0002 mm Hg at 68°F (20°C)	
Specific Gravity:	1.65 (water = 1)	
Water Solubility:	Very slightly soluble	
Boiling Point:	464°F (240°C) (Explodes)	
Melting Point:	176°F (80°C)	
Ionization Potential:	10.59 eV	
Molecular Weight:	227.15	

PROTECTIVE EQUIPMENT

Gloves:	Butyl (>8-hr breakthrough for <i>liquid Nitro compounds</i>)
Coveralls:	Tychem® CSM (>2-hr breakthrough for <i>liquid Nitro compounds</i>) Flash protection or Turn-Out gear
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: 2,3,5-TRIS(1-AZIRIDINYL)-p-BENZOQUINONE

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
2 - Health	2,3,5-Tris(1-Aziridinyl)-p-Benzoquinone may burn, but does not readily ignite.	2,3,5-Tris(1-AziridinyI)-p-Benzoquinone may react with OXIDIZING AGENTS (such as PERCHLORATES,	
1 - Fire	Use dry chemical, CO_2 , water spray or foam as	PEROXIDES, PERMANGANATES, CHLORATES,	
0 - Reactivity	extinguishing agents. POISONOUS GASES ARE PRODUCED IN	NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC,	
DOT#: None	FIRE.	SULFURIC and NITRIC); ISOCYANATES; and	
ERG Guide #: None	Use water spray to keep fire-exposed containers	ANHYDRIDES.	
Hazard Class: None	cool.	2,3,5-Tris(1-Aziridinyl)-p-Benzoquinone may react with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to produce flammable <i>Hydrogen gas</i> .	

SPILL/LEAKS PHYSICAL PROPERTIES **Isolation Distance:** Flash Point: May be combustible Spill: 25 meters (75 feet) Water Solubility: Slightly soluble Fire: 800 meters (1/2 mile) **Melting Point:** 324°F (180°C) Moisten spilled material first or use a HEPA-filter **Molecular Weight:** 231.25 vacuum for clean-up and place into sealed containers for disposal. Clean spill area with Acetone, followed by washing with soap and water.

EXPOSURE LIMITS

No occupational exposure limits have been established for **2,3,5-Tris(1-AziridinyI)-p-Benzoquinone**.

PROTECTIVE EQUIPMENT

Gloves: Nitrile, Neoprene and Natural Rubber

Coveralls: Tyve

Respirator:

Tyvek®

ttor: Spill: full facepiece APR with *P100 filters* Fire: SCBA

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Headache, nausea, vomiting, and dizziness

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: URETHANE

Synonyms: Ethyl Carbamate; Ethylurethane; Carbamic Acid, Ethyl Ester CAS No: 51-79-6Molecular Formula: $C_3H_7NO_2$ RTK Substance No: 1986 Description: Odorless, colorless, crystalline solid or a white powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity	
3 - Health	Urethane is a COMBUSTIBLE SOLID. Use dry chemical, CO ₂ , water spray or alcohol-	Urethane reacts with PHOSPHORUS PENTACHLORIDE to form an explosive product.	
2 - Fire 0 - Reactivity	resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE,	Urethane is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,	
DOT#: UN 3077	including <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool.	PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); CHLORAL HYRATE; CAMPHOR; MENTHOL; GALLIUM; 2-NAPHTHOL; and THYMOL.	
ERG Guide #: 171			
Hazard Class: 9 (Miscellaneous Hazardous Substance)			

SPILL/LEAKS	PHYSICAL PROPERTIES		
Isolation Distance:	Odor Threshold:	Odorless	
Spill: 25 meters (75 feet)	Flash Point:	198°F (92°C)	
	Vapor Density:	3.07 (air = 1)	
Fire: 800 meters (1/2 mile) Moisten spilled material first or use a HEPA-filter vacuum for clean-up and place into sealed containers for disposal.	Vapor Pressure:	5 mm Hg at 150.4°F (66°C)	
	Specific Gravity:	0.98 (water = 1)	
	Water Solubility:	Slightly soluble	
DO NOT wash into sewer.	Boiling Point:	360° to 363°F (182° to 184°C)	
	Melting Point:	118° to 122°F (48° to 50°C)	
	Molecular Weight:	89.09	

EXPOSURE LIMITS

No occupational exposure limits have been established for **Urethane**.

The Protective Action Criteria values are:

- PAC-1 = 500 mg/m³
- $PAC-2 = 500 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation (skin absorbable)
Inhalation:	Nose and throat irritation
	Headache, dizziness, lightheadedness and passing out
Chronic:	Cancer (lung, liver, and blood) in animals

PROTECTIVE EQUIPMENT

Coveralls: Tyvek®

Respirator:

Full facepiece APR with *P100 filters* >500 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.



Common Name: VANADIUM PENTOXIDE

Synonyms: Vanadic Anhydride; Vanadium Oxide CAS No: 1314-62-1 Molecular Formula: V_2O_5 RTK Substance No: 1993 Description: Odorless, yellow to rust-brown crystalline solid or fume

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Vanadium Pentoxide itself does	Vanadium Pentoxide may react violently with CHLORINE TRIFLUORIDE; LITHIUM; and PEROXYFORMIC ACID.
0 - Fire	not burn.	
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including Vanadium Oxide fumes.	Vanadium Pentoxide is not compatible with ALUMINUM POWDER; STRONG ACIDS (such as HYDROCHLORIC,
DOT#: UN 2862	Use water spray to keep fire-exposed containers	SULFURIC and NITRIC); HALOGENS; and ALKALI
ERG Guide #: 151	cool.	METALS (such as LITHIUM, SODIUM and POTASSIUM).
Hazard Class: 6.1		Mixtures of Vanadium Pentoxide with CALCIUM,
(Poison)		SULFUR and WATER may ignite spontaneously.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Vanadium Pentoxide is toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

EXPOSURE LIMITS

NIOSH: 0.05 mg/m³, 15-min Ceiling

ACGIH: 0.05 mg/m³, 8-hr TWA

IDLH: 35 mg/m³ (as Vanadium)

The Protective Action Criteria values are:

- PAC-1 = 1 mg/m^3
- PAC-2 = 1 mg/m^3
- PAC-3 = 35 mg/m³

HEA	LTH	EFF	ECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, nausea and vomiting
Chronic:	Cancer (lung) in animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Pressure:	0 mm Hg at 68°F (20°C) (approx.)
Specific Gravity:	3.56 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	3,182°F (1,750°C)
Melting Point:	1,274°F (690°C)
Molecular Weight:	181.9

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek®
Respirator:	>0.05 mg/m ³ - Full facepiece APR with <i>High efficiency</i> <i>filters</i> >1 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Common Name: VINYL CHLORIDE

Synonyms: Chloroethylene; Monochloroethylene; VCM CAS No: 75-01-4 Molecular Formula: CH₂ = CHCl RTK Substance No: 2001

Description: Colorless gas, with a sweet odor at high concentrations, that is usually handled as a liquid under pressure

	H	HAZ	AF	rd da ⁻	ГА		
Hazard Rating	Firefighting	Firefighting			Reactivity		
4 - Health 4 - Fire 2 - Reactivity DOT#: UN 1086 ERG Guide #: 116F Hazard Class: 2.1 (Flammable Gas)	Firefighting FLAMMABLE AND REACTIVE GAS that can EXPLOSIVELY POLYMERIZE if not inhibited. DO NOT attempt to extinguish fire unless flow can be stopped. Shut off supply or let burn. Use dry chemical or CO2 for small fires. POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride and Phosgene. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to reduce vapors and to keep containers cool. Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source or flash back. Flow or agitation may generate electrostatic charges. Vinyl Chloride may form an ignitable vapor/air mixture in closed tanks or containers.			E, ontainers ice to flash rges.	ReactivityVinyl Chloride can polymerize rapidly or explosively when exposed to elevated temperatures (over 125°F (52°C)), or when exposed to AIR or LIGHT in the presence of a CATALYST.Vinyl Chloride reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).Vinyl Chloride is not compatible with WATER; METALS (such as COPPER, ALUMINUM, IRON and STEEL); METAL CARBIDES; and METAL ALLOYS as fires and/or explosions may occur.Phenol should be used as an inhibitor to prevent violent polymerization of Vinyl Chloride.Vinyl Chloride may accumulate static electricity.		
	SPILL/LEAKS				PHYS	SICAL PROPERTIES	
cannot be stopped in p safe place in the open empty. Absorb liquids in dry sa place into sealed cont Keep Vinyl Chloride of because of the possib Turn leaking cylinder w liquid state. Use nonsparkling tools when transferring Vin g	tion Distance: 100 meters (330 feet) 300 meters (1/2 mile) low of gas. If source of leak is a cylinder and the leak be to be stopped in place, remove the leaking cylinder to a place in the open air, and repair leak or allow cylinder to /. b liquids in dry sand, earth, or a similar material and into sealed containers for disposal. Vinyl Chloride out of confined spaces, such as sewers, use of the possibility of an explosion. eaking cylinder with leak up to prevent escape of gas in			Flash Pe LEL: UEL: Auto Igr Vapor D Vapor P Specific Water S Boiling Freezing Ionizatio Critical	nition Temp: ensity: ressure: Gravity: olubility: Point:	>3,000 ppm -108°F (-78°C) 3.6% 33% 882°F (472°C) 2.2 (air = 1) 2,524 mm Hg at 68°F (20°C) 0.9 (water = 1) Very slightly soluble 17°F (-8.3°C) -245° to -256°F (-154° to -160°C) 9.99 eV 306° to 317.3°F (152° to 158.5°C) 62.5	
EXPO	SURE LIMITS		PROTECTIVE EQUIPMENT				
NIOSH: Lowest feasi ACGIH: 1 ppm, 8-hr The Protective Action (PAC-1 = 250 ppm	TWA	C	oves overa	alls: rator:	(>8-hr breakthr Tychem® BR, (breakthrough) >10% of the LE SCBA	CSM and TK; Trellchem HPS and VPS (8-hr	
	_TH EFFECTS	FIRST AID AND DECONTAMINATION		D DECONTAMINATION			
may ca Skin: Irritatio may ca Inhalation: Nose, f wheezi Heada passing	n and burns, contact with <i>liquid</i> or <i>gas</i> use frostbite n and burns, contact with <i>liquid</i> or <i>gas</i> use frostbite hroat and lung irritation with coughing, ng and shortness of breath che, dizziness, lightheadedness and g out (liver, brain, and lung) in humans	 Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention. Immerse affected part in warm water. Seek medical attention. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer promptly to a medical facility. 					



Common Name: VINYLIDENE CHLORIDE

Synonyms: 1-1-DCE;1,1-Dichloroethene; 1,1-Dichloroethylene CAS No: 75-35-4 Molecular Formula: $CH_2 = CCI_2$ RTK Substance No: 2006 Description: Clear colorless liquid or a gas above 89°E (32°C) with

Description: Clear, colorless liquid, or a gas above 89°F (32°C), with a mild, sweet odor HAZARD DATA Hazard Rating Firefighting Reactivity Vinylidene Chloride, when not inhibited, can violently FLAMMABLE AND REACTIVE 4 - Health polyermize (self-react), in the presence of HEAT, Vinylidene Chloride is a *peroxide forming* chemical that can 4 - Fire LIGHT, AIR and OXYGEN, to form a peroxide spontaneously decompose and become explosive with exposure to Compound that is shock-sensitive at very low air 2 - Reactivity temperatures (-40°F (-40°C)). Use dry chemical, CO₂, water spray or foam as extinguishing DOT#: UN 1303 agents. Vinylidene Chloride reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, POISONOUS GASES ARE PRODUCED IN FIRE, including ERG Guide #: 130P PERMANGANATES, CHLORATES, NITRATES, Hydrogen Chloride and Phosgene. Hazard Class: 3 CHLORINE, BROMINE and FLUORINE); OZONE; CONTAINERS MAY EXPLODE IN FIRE. ALUMINUM; ALUMINUM ALLOYS; COPPER; (Flammable) Use water spray to keep fire-exposed containers cool. COPPER ALLOYS; CHLOROSULFONIC ACID; Vapors may travel to a source of ignition and flash back. OLEUM; and NITRIC ACID. Vapor is heavier than air and may travel a distance to cause a Vinylidene Chloride may contain Monomethyl Ether of fire or explosion far from the source. Hydroquinone as an inhibitor. Vinylidene Chloride may form an ignitable vapor/air mixture in closed tanks or containers.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in cement powder, dry sand, earth, or a similar material and place into sealed containers for disposal.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Vinylidene Chloride**. Keep **Vinylidene Chloride** out of confined spaces, such as

sewers, because of the possibility of an explosion. DO NOT wash into sewer.

This substance is harmful to aquatic organisms.

EXPOSURE LIMITS

ACGIH: 5 ppm, 8-hr TWA The Protective Action Criteria values are: PAC-1 = 75 ppm PAC-2 = 500 ppm PAC-3 = 1,000 ppm

HEALTH EFFECTS

Eyes:	Irritation and burns	
Skin:	Irritation and burns	
Inhalation:	Nose and throat irritation with coughing and wheezing	
	Headache, dizziness, drowsiness, depression and a "drunken" feeling that can lead to unconsciousness	
Chronic:	Cancer (kidney) in animals	

PHYSICAL PROPERTIES

Odor Threshold:	190 to 500 ppm
Flash Point:	0°F (-18°C)
LEL:	5.6%
UEL:	16%
Auto Ignition Temp:	1,058°F (570°C)
Vapor Density:	3.25 (air = 1)
Vapor Pressure:	500 mm Hg at 68°F (20°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	89°F (32°C)
Freezing Point:	-188°F (-122°C)
Ionization Potential:	10 eV
Molecular Weight:	96.9

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H® and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder®, and TK (>8-hr breakthrough)
Respirator:	SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention .



Common Name: VINYL TOLUENE

Synonyms: Methyl Styrene; Tolyethylene CAS No: 25013-15-4 Molecular Formula: C_9H_{10} RTK Substance No: 2010 Description: Clear, colorless liquid with a strong, disagreeable odor

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health 2 - Fire 2 - Reactivity DOT#: UN 2618 ERG Guide #: 3 Hazard Class: (Flammable)	 Vinyl Toluene is a COMBUSTIBLE LIQUID. Use dry chemical, CO₂, water spray or foam as extinguishing agents. Vinyl Toluene polymerizes (self-reacts) at elevated temperatures when not stabilized. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Vinyl Toluene may form an ignitable vapor/air mixture in closed tanks or containers. 	Vinyl Toluene reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and ALUMINUM CHLORIDE. Vinyl Toluene is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and IRON SALTS.

Ionization Potential:

Molecular Weight:

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

For liquid spills use oil-skimming equipment and sorbent foams.

Keep **Vinyl Toluene** out of confined spaces, such as sewers, because of the possibility of an explosion. DO NOT wash into sewer.

EXPOSURE LIMITS	
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OSHA:	100 ppm, 8-hr TWA
NIOSH:	100 ppm, 10-hr TWA
ACGIH:	50 ppm, 8-hr TWA; 100 ppm STEL
IDLH:	400 ppm

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing

PHYSICAL PROPERTIES			
Odor Threshold:	50 ppm		
Flash Point:	127°F (53°C)		
LEL:	0.8%		
UEL:	11%		
Auto Ignition Temp:	1,000°F (538°C)		
Vapor Density:	4.1 (air = 1)		
Vapor Pressure:	1 mm Hg at 68°F (20°C)		
Specific Gravity:	0.9 (water = 1)		
Water Solubility:	Very slightly soluble		
Boiling Point:	334°F (168°C)		
Freezing Point:	-94° to -103°F (-70° to -75°C)		

PR	OTECTIVE EQUIPMENT
	er Shield®/4H®, Viton and Barrier® (>8-hr kthrough)
HPS	nem® BR, Responder®, and TK; and Trellchem® 6 and VPS (>8-hr breakthrough for <i>Hydrocarbons</i> , <i>natic</i>)
	ppm - full facepiece APR with <i>Organic Vapor filters</i>) ppm - SCBA

8.2 eV

118.18

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Remove contaminated clothing and wash contaminated skin with soap and water.



Common Name: VM & P NAPHTHA

Synonyms: Varnish Makers' and Painters' Naphtha; Light Naphtha; Benzine CAS No: 8032-32-4 Molecular Formula: (Blend of petroleum fractions) RTK Substance No: 0206 Description: A colorless to yellow, liquid petroleum product with an odor like gasoline

		HAZARD DA	ТА	
Hazard Rating	Firefighting		Reactivity	
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1268 ERG Guide #: 128 Hazard Class: 3 (Flammable)	FLAMMABLE LIQUID. Use dry chemical, CO ₂ , alcohol other foaming agent as extingu- water may not be effective in fi POISONOUS GASES ARE PR CONTAINERS MAY EXPLODE Use water spray to keep fire-ex cool. Vapors may travel to a source of back. Vapor is heavier than air and m to cause a fire or explosion far Use a vapor suppressing foam_	uishing agents, as ighting fires. CODUCED IN FIRE. E IN FIRE. cposed containers of ignition and flash may travel a distance from the source.	VM & P Naphtha is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).	
SPI	_L/LEAKS		PHYSICAL PROPERTIES	
similar material and d	rs (900 feet) iculite, dry sand, earth, or a eposit in sealed containers. a out of confined spaces, such f the possibility of an	Odor Thresh Flash Point: LEL: UEL: Auto Ignition Temperature Vapor Densit Vapor Press Specific Grav Water Solubi Boiling Point Molecular We	28° to 85°F (-2° to 29°C) 0.9% 6.7% 450°F (232°C) y: 4.1 - 4.3 (air = 1) ire: 2 to 20 mm Hg at 68°F (20°C) rity: <1 (water = 1) lity: Insoluble : 212° to 350°F (100° to 177°C)	
EXPOS	URE LIMITS		PROTECTIVE EQUIPMENT	
1,80	e ng/m ³ , 10-hr TWA) mg/m ³ , 15-min STEL) mg/m ³ , 8-hr TWA	Gloves and Coveralls: Boots: Respirator:	Nitrile, Neoprene, and Viton (>8-hr breakthrough) DuPont Tychem® BR and LV, Responder® and TK (>8-hr breakthrough) Neoprene 350 mg/m ³ - full facepiece APR with Organic Vapor cartridges	
HEALTH EFFECTS		FIRS	T AID AND DECONTAMINATION	
Acute: Irritation of coughing Headach	drying and cracking of the skin of the nose and throat with and wheezing e, dizziness and passing out. Not Classifiable)	Flush eyes w contact lense Quickly remo large amount Begin artificia necessary.	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. 	



Common Name: XYLENES

Synonyms: Dimethylbenzene; Methyl Toluene (mixed isomers); Xylol CAS No: 1330-20-7 Molecular Formula: $C_6H_4(CH_3)_2$ RTK Substance No: 2014 Description: Colorless liquids with a faint, sweet odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health 3 - Fire 0 - Reactivity DOT#: UN 1307	FLAMMABLE LIQUIDS Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool.	Xylenes react with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as
ERG Guide #: 130 Hazard Class: 3 (Flammable)		HYDROCHLORIC, SULFURIC and NITRIC).

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb *liquids* in dry sand, earth, or a similar material and place into sealed containers for disposal. Ground and bond containers when transferring **Xylenes**.

Use only non-sparking tools and equipment.

Keep **Xylenes** out of confined spaces, such as sewers, because of the possibility of an explosion.

DO NOT wash into sewer.

Xylenes are toxic to aquatic organisms.

EXPOSURE LIMITS

- **OSHA:** 100 ppm, 8-hr TWA **NIOSH:** 100 ppm, 10-hr TWA; 150 ppm, STEL
- **ACGIH:** 100 ppm, 8-hr TWA; 150 ppm, STEL **IDLH:** 900 ppm

The Protective Action Criteria values are:

PAC-1 = 130 ppm PAC-2 = 920 ppm PAC-3 = 2,500 ppm

HEALTH EFFECTS

Eyes:IrritationSkin:Irritation (skin absorbable)Inhalation:Nose and throat irritation with coughing
and wheezing
Headache, dizziness, lightheadedness,
and passing out

PHYSICAL PROPERTIES

 Odor Threshold:
 0.07 to 40 ppm

 Flash Point:
 63° to 77°F (17

 LEL:
 0.9 to 1.1%

 UEL:
 6.7 to 7%

 Auto Ignition Temp:
 867° to 984°F

 Vapor Density:
 3.7 (air = 1)

 Vapor Pressure:
 7 to 9 mm Hg s

 Specific Gravity:
 0.86 (water = 2)

 Water Solubility:
 Insoluble

 Boiling Point:
 279° to 291°F

 Freezing Point:
 -53°F (-47°C) t

 Ionization Potential:
 8.44 to 8.56 e

 Molecular Weight:
 106.2

0.07 to 40 ppm
0.07 to 40 ppm
63° to 77°F (17° to 25°C)
0.9 to 1.1%
6.7 to 7%
867° to 984°F (464° to 529°C)
3.7 (air = 1)
7 to 9 mm Hg at 68°F (20°C)
0.86 (water = 1)
Insoluble
279° to 291°F (137° to 144°C)
-53°F (-47°C) to 55.4°F (13°C)
8.44 to 8.56 eV
106.2
8.44 to 8.56 eV

PROTECTIVE EQUIPMENT		
Gloves:	Vinton/Butyl, Polyvinyl Alcohol, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)	
Coveralls:	Tychem® BR, CSM and TK (>8-hr breakthrough)	
	Use turnout gear or flash protection if ignition/fire is the greatest hazard	
Respirator:	>100 ppm - full facepiece APR with Organic vapor cartridge >900 ppm - SCBA	

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: XYLENOL (This Quick Reference can be used for all six isomers of Xylenol)

Synonyms: Cresylic Acid; Hydroxydimethylbenzene CAS No: 1300-71-6 Molecular Formula: C₈H₁₀O RTK Substance No: 2015

Description: White to yellowish-brown, crystalline solid or liquid with a sweet, tarry odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health	COMBUSTIBLE SOLID OR LIQUID	Xylenol is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES,
2 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	PERMANGANATES, CHLORATES, NITRATES,
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE.	CHLORINE, BROMINE and FLUORINE); ACID ANHYDRIDES; ACID CHLORIDES; STRONG BASES
DOT#: UN 2261	Use water spray to keep fire-exposed containers cool.	(such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and IRON.
ERG Guide #: 153		
Hazard Class: 6		
(Toxic)		

SPILL/LEAKS

Isolation Distance:

Spill (liquid): 50 meters (150 feet) (solid): 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Absorb *liquids* in dry sand, earth, or a similar material and place into sealed containers for disposal. Collect *solid* material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Xylenol**.

The Protective Action Criteria values are: (Liquid) PAC-1 = 1 mg/m³ PAC-2 = 6 mg/m³ PAC-3 = 500 mg/m³ (Solid) PAC-1 = 2 mg/m³ PAC-2 = 15 mg/m³

 $PAC-3 = 125 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation and burnsInhalation:Nose, throat and lung irritation, with
coughing, wheezing and shortness of
breath
Headache, dizziness, nausea and
vomiting

PHYSICAL PROPERTIES

Odor Threshold:	Sweet, tarry odor
Flash Point:	142° to 203°F (61° to 95°C)
LEL:	1.4%
Auto Ignition Temp:	1,110°F (599°C)
Vapor Density:	4.2 (air = 1)
Vapor Pressure:	0.102 to 0.274 mm Hg at 77°F (25°C)
Specific Gravity:	1.01 (water = 1)
Water Solubility:	Slightly soluble
Boiling Point:	397° to 437°F (203° to 225°C)
Melting Point:	77° to 167°F (25° to 75°C)
Molecular Weight:	122.18

PROTECTIVE EQUIPMENT

Gloves:	Polyvinyl Alcohol, SilverShield®4/H®, Viton and Barrier® (>8-hr breakthrough for <i>Xylene</i>)
Coveralls:	Tychem® BR and TK (>8-hr breakthrough for Xylene)
Respirator:	>1 mg/m ³ - Full facepiece APR with <i>Organic vapor filters</i> >125 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention..



Common Name: ZINC

Synonyms: Blue Powder; Granular Zinc CAS No: 7440-66-6 Molecular Formula: Zn RTK Substance No: 2021 Description: Odorless, bluish-white, shiny metal or a gray to blue powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
1 - Health	Zinc is a FLAMMABLE POWDER. Use dry chemicals appropriate for extinguishing	Zinc <i>powder</i> reacts with WATER; MOIST AIR; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); and
3 - Fire 1 W - Reactivity	metal fires. DO NOT USE WATER or FOAM. POISONOUS FUMES ARE PRODUCED IN FIRE,	STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) to form flammable and explosive <i>Hydrogen gas.</i> The heat released may be sufficient to ignite the
DOT#: UN 1436 ERG Guide #: 138 Hazard Class: 4.3 (Water Reactive)	including <i>Zinc Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. DO NOT get water into containers. Flow or agitation may generate electrostatic charges.	Hydrogen formed. Zinc powder reacts violently with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SULFUR; CARBON DISULFIDE; AMMONIUM NITRATE; HYDROXYLAMINE; and many other substances. The reactions may lead to fires and explosions.
	Zinc <i>powder</i> or <i>dust</i> may form an ignitable dust/air mixture in closed tanks or containers.	

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Cover spill with dry sand, earth, or a similar material and place into sealed containers for disposal. Metal containers involving the transfer of **Zinc** *powder* should be grounded and bonded. Use only non-sparking tools and equipment. DO NOT USE WATER OR WET METHOD. DO NOT wash into sewer.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Zinc**.

The Protective Action Criteria values are: PAC-1 = 3 mg/m³ PAC-2 = 20 mg/m³ PAC-3 = 500 mg/m³

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose and throat irritation with coughing and wheezing
	Headache, fever and chills, aches, chest tightness and cough (<i>"metal fume fever"</i>)
	Symptoms may be delayed

PHYSICAL PROPERTIES

Odor Threshold:	
Auto Ignition Temp:	
Vapor Density:	
Vapor Pressure:	
Specific Gravity:	
Water Solubility:	
Boiling Point:	
Melting Point:	
Molecular Weight:	

Odorless
860°F (460°C)
7.14 (air = 1)
1 mm Hg at 909°F (487°C)
77.14 (water = 1)
Reacts
1,665°F (907°C)
786°F (419°C)
65.41

PROTE	CTIVE	EQUIPMENT	

Gloves:	Nitrile and Natural Rubber
Coveralls:	Tyvek® Use turn out gear or flash protection if ignition/fire is the greatest hazard.
Respirator:	Full facepiece APR with P100 filters >30 mg/m ³ or fire - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.



Common Name: ZINC CHLORIDE

Synonyms: Butter of Zinc; Tinning Flux; Zinc Dichloride CAS No: 7646-85-7 Molecular Formula: ZnCl₂ RTK Substance No: 2030 Description: Odorless, white, crystalline granule or powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
3 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Zinc Chloride itself does not	Zinc Chloride may react violently or explosively with POTASSIUM.
0 - Fire	burn.	Zinc Chloride is not compatible with CYANIDES:
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE,	SULFIDES; OXIDIZING AGENTS (such as
DOT#: UN 2331	including Hydrogen Chloride and Zinc Oxide fumes.	PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and
ERG Guide #: 154		FLUORINE) and STRONG BASES (such as SODIUM
Hazard Class: 8 (Corrosive)		HYDROXIDE and POTASSIUM HYDROXIDE). Zinc Chloride is corrosive to METALS.

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Zinc Chloride is a severe marine pollutant that may cause long term adverse effects to the aquatic environment.

EXPOSURE LIMITS

OSHA: 1 mg/m³, 8-hr TWA NIOSH: 1 mg/m³, 10-hr TWA; 2 mg/m³, STEL ACGIH: 1 mg/m³, 8-hr TWA; 2 mg/m³, STEL IDLH: 50 mg/m³ (All the above are for **Zinc Chloride** *fume*)

The Protective Action Criteria values are:

PAC-1 = 2 mg/m³ PAC-2 = 50 mg/m³ PAC-3 = 50 mg/m³

HEALTH EFFECTS

Eyes:	Severe irritation, burns and possible eye damage
Skin: Inhalation:	Irritation and burns Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Density:	4.7 (air = 1)
Vapor Pressure:	0 mm Hg at 68°F (20°C)
Specific Gravity:	2.9 (water = 1)
Water Solubility:	Soluble
Boiling Point:	1,349.6°F (732°C)
Melting Point:	554°F (290°C)
Molecular Weight:	136.3

	PROTECTIVE EQUIPMENT
Gloves:	Butyl
Coveralls:	Tyvek®
Respirator:	>1 mg/m ³ - full facepiece APR with High efficiency filters >10 mg/m ³ - Supplied Air or SCBA >50 mg/m ³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention immediately.

Begin artificial respiration if breathing has stopped and CPR if necessary. **Transfer** promptly to a medical facility. Medical observation is recommended as symptoms may be delayed.



Common Name: ZINC NITRATE

Synonyms: Zinc Dinitrate CAS No: 7779-88-6 Molecular Formula: Zn(NO₃)₂ RTK Substance No: 2036 Description: Colorless or white, odorless, crystalline solid or flake

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health	Zinc Nitrate is not combustible, but it is a STRONG OXIDIZER that enhances the	Zinc Nitrate may react violently with COMBUSTIBLES; REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM
0 - Fire	combustion of other substances.	and their HYDRIDES); CARBONS; COPPER; METAL SULFIDES; PHOSPHORUS; SULFUR; and ALKYL ESTERS.
0 - Reactivity	Use water only. DO NOT USE CHEMICAL or CO_2 as extinguishing agents.	Zinc Nitrate is not compatible with OXIDIZING AGENTS (such
DOT#: UN 1514	POISONOUS GASES ARE PRODUCED IN	as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); CYANIDES; METAL POWDERS; AMINES;
ERG Guide #: 140	FIRE, including <i>Nitrogen Oxides</i> and <i>Zinc</i> Oxide fumes.	
Hazard Class: 5.1 (Oxidizer)	Use water spray to keep fire-exposed containers cool.	METAL SALTS (such as TIN CHLORIDE); and ACETIC ANHYDRIDES.
	Zinc Nitrate may ignite combustibles (wood, paper and oil).	Keep away from all COMBUSTIBLES and ORGANICS.

SPILL/LEAKS

Isolation Distance:

Spill:	25 meters (75 feet)	
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Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and place into sealed containers for disposal.

DO NOT wash into sewer.

Zinc Nitrate is harmful to aquatic life in low concentrations.

EXPOSURE LIMITS

No occupational exposure limits have been established for $\ensuremath{\textbf{Zinc Nitrate}}$.

The Protective Action Criteria values are:

- $PAC-1 = 15 \text{ mg/m}^{3}$
- $PAC-2 = 125 \text{ mg/m}^3$
- $PAC-3 = 500 \text{ mg/m}^3$

HEALTH EFFECTS

Eyes:Irritation and burnsSkin:Irritation, burns and rashInhalation:Nose and throat irritation with coughing
and wheezingHeadache, dizziness, fatigue and blue
color to the skin and lips
(methemoglobinemia)

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Noncombustible
Vapor Pressure:	60 mm Hg at 1,292°F (700°C)
Specific Gravity:	2.07 (water = 1)
Water Solubility:	Soluble
Boiling Point:	221°F (105°C)
Melting Point:	97° to 108.5°F (36° to 42.5°C)
Molecular Weight:	189.39

PROTECTIVE EQUIPMENT

Gloves:	Nitrile and Natural Rubber
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Coveralls: Tyvek®

- Respirator:
- >15 mg/m³ Full facepiece APR with *High efficiency filters* >125 mg/m³ - SCBA

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water. Seek medical attention.



Common Name: ZINC POTASSIUM CHROMATE

Synonyms: Buttercup Yellow; Citron Yellow; Zinc Yellow CAS No: 11103-86-9 Molecular Formula: KZn₂ (CrO₄)₂(OH) RTK Substance No: 2042 Description: Green-yellow, odorless solid or powder

	HAZARD DA	ГА
Hazard Rating	Firefighting	Reactivity
4 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Zinc Potassium Chromate itself	Zinc Chromates are oxidizers which may react with
0 - Fire	does not burn.	REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); ALCOHOLS;
0 - Reactivity	POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Zinc Oxide</i> and <i>Dipotassium Oxide</i> .	COMBUSTIBLES; ORGANIC MATERIALS; ETHERS; HYDRAZINES; and METAL POWDERS.
DOT#: None	Use water spray to keep fire-exposed containers	
ERG Guide #: None	cool.	
Hazard Class: None		

SPILL/LEAKS

Isolation Distance:

Small Spills: 50 meters (150 feet)

Fires: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up.

This substance is very toxic to aquatic organisms.

EXPOSURE LIMITS

OSHA:	0.005 mg/m ³ , 8-hr TWA
NIOSH:	0.001 mg/m ³ , 10-hr TWA
ACGIH:	0.01 mg/m ³ , 8-hr TWA
IDLH LEVEL:	15 mg/m ³ (as <i>Chromates</i>)
	All the above are for <i>hexavalent</i>
	Chromium (Cr VI)

	HEALTH EFFECTS
Eyes:	Irritation
Skin:	Irritation, itching, rash and skin ulcers
Inhalation:	Nose, throat and lung irritation with cough, phlegm and/or shortness of breath
Chronic:	Hexavalent Chromium (or Chromium VI) compounds cause lung cancer in humans and animals

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Not combustible
Auto Ignition:	752°F (400°C)
Specific Gravity:	3.4 (water = 1) (as basic Zinc Chromate)
Water Solubility:	Insoluble
Boiling Point:	482°F (250°C) (as Chromates)
Melting Point:	600°F (316°C) (as basic <i>Zinc Chromate</i>)
Molecular Weight:	418

PROTECTIVE EQUIPMENT

Gloves:	Rubber or Nitrile
Coveralls:	DuPont Tychem® Polycoat, CPF 1, QC, CPF 2 and SL, or equivalent
Respirator:	>0.001 mg/m ³ - APR with High efficiency filters >0.01 mg/m ³ - Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer to a medical facility.



Common Name: ZINC SULFATE

Synonyms: White Vitriol; Zinc Vitriol CAS No: 7733-02-0 Molecular Formula: ZnSO₄ RTK Substance No: 2044 Description: Colorless, odorless, crystalline powder

HAZARD DATA		
Hazard Rating	Firefighting	Reactivity
2 - Health	Extinguish fire using an agent suitable for type of surrounding fire. Zinc Sulfate itself does not burn.	Zinc Sulfate reacts violently with PHOSPHORUS and FINELY DIVIDED ALUMINUM or MAGNESIUM.
0 - Fire	POISONOUS GASES ARE PRODUCED IN FIRE,	Zinc Sulfate is not compatible with STRONG BASES
0 - Reactivity	including Sulfur Oxides and Zinc Oxide.	(such as SODIUM HYDROXIDE and POTASSIUM
DOT#: UN 3077	Use water spray to keep fire-exposed containers cool.	HYDROXIDE).
ERG Guide #: 171		
Hazard Class: 9		
(Environmentally		
Hazardous)		

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material in the most convenient and safe manner and deposit in sealed containers. DO NOT wash into sewer.

Zinc may be accumulated by some organisms and may be harmful to aquatic life.

EXPOSURE LIMITS

No occupational exposure limits have been established.

PHYSICAL PROPERTIES

Flash Point: Nonflammable
Vapor Density: 1.95 (air = 1)
Vapor Pressure:60 mm Hg at 1,292°F (700°C)
Specific Gravity: 3.54 (water = 1)
Water Solubility: Soluble
Boiling Point: >932°F (>500°C)
Molecular Weight: 161.5
pH: 4.5

PROTECTIVE EQUIPMENT				
Gloves:	Rubber			
Coveralls:	DuPont Tyvek® or equivalent			
Respirator:	Full facepiece APR with High efficiency filters or Supplied air for unknown exposure levels			

HEALTH EFFECTS				
Eyes:	Irritation and burns with possible eye damage			
Skin:	Irritation and burns with rash, dryness and redness			
Inhalation:	Nose and throat irritation with coughing and wheezing			
	Headache, dizziness, nausea and vomiting			

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of water.

New Jersey Department of Health

Common Name: ZINEB

Synonyms: Zinc Ethylenebis(dithiocarbamate); Parzate; Lodacol CAS No: 12122-67-7 Molecular Formula: $C_4H_6N_2S_4Zn$ RTK Substance No: 2045 Description: Odorless, light-colored powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity				
2 - Health	Zineb is a COMBUSTIBLE SOLID.	Zineb is not compatible with STRONG BASES (such as				
2 - Fire	Use dry chemical, CO ₂ , water spray or foam as extinguishing agents.	SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and MERCURY COMPOUNDS.				
1 - Reactivity	POISONOUS GASES ARE PRODUCED IN	Zineb is unstable with exposure to HEAT, MOISTURE and LIGHT and may form toxic <i>Ethylenethiourea</i> .				
DOT#: UN 2771	FIRE, including <i>Nitrogen Oxides, Zinc Oxides</i> and <i>Sulfur Oxides</i> .					
ERG Guide #: 151	Use water spray to keep fire-exposed containers					
Hazard Class: 6.1	cool.					
(Poison)						

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Collect powdered material with a vacuum or a wet method and deposit in sealed containers.

DO NOT wash into sewer.

Zineb is moderately toxic to fish and degrades in soil in 16-23 days.

EXPOSURE LIMITS

No occupational exposure limits have been established for **Zineb**.

HEALTH EFFECTS

Eyes:	Irritation			
Skin:	Irritation, redness and rash			
Inhalation:	Nose and throat irritation with coughing and wheezing			
	Headache, dizziness, nausea and vomiting			

PHYSICAL PROPERTIES

Odor Threshold:	Odorless			
Flash Point:	194°F (90°C)			
Auto Ignition Temp:	300°F (149°C)			
Vapor Pressure:	1 x 10 ⁻⁷ mm Hg at 77°F (25°C)			
Specific Gravity:	1.74 (water = 1)			
Water Solubility:	Very slightly soluble			
Boiling Point:	Decomposes			
Melting Point:	315°F (157°C)			
Molecular Weight:	275.7			

	PROTECTIVE EQUIPMENT
Gloves:	Silver Shield®/4H®
Coveralls:	DuPont Tyvek®
Respirator:	Low exposure or outdoors - full facepiece APR with High efficiency filter or Supplied air

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
- **Quickly** remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary. **Transfer** to a medical facility.



Common Name: ZIRCONIUM

Synonyms: None CAS No: 7440-67-7 Molecular Formula: Zr RTK Substance No: 2047 Description: Soft, gray to gold solid, bluish-black powder, or grayish-white platelet or flake

HAZARD DATA

				1	
Hazard Rating	Firefighting			Reactivity	
2 - Health	Zirconium powder, dust or granule is HIGHLY		is HIGHLY	Zirconium reacts violently or explosively with BORAX;	
4 - Fire	FLAMMABLE and can EXPLOD	ЭE		CARBON TETRACHLORIDE and ALKALI METAL	
1 - Reactivity	SPONTANEOUSLY IN AIR.			HYDROXIDES (such as POTASSIUM HYDROXIDE and SODIUM HYDROXIDE) when heated, and also reacts	
DOT#: UN 1358 UN 2008	Use dry chemicals appropriate for metal fires (such as dry lime, so graphite).			violently with COPPER OXIDE and LEAD OXIDE. Dusts of pure Zirconium will ignite or explode when in contact with WATER.	
ERG Guide #: 170/135	USE WATER with care as Zirconium re-ignites in the presence of WATER and burns more violently.			Forms explosive mixtures with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) STRONG ACIDS (such as HYDROCHLORIC,	
Hazard Class:					
4.1/4.2	DO NOT USE CO2 or HALOGEN extinguishing				
(Flammable solid/	agents.			SULFURIC and NITRIC); PHOSPHORUS; OXYGEN;	
spontaneously	POISONOUS GASES ARE PRO	DU	JCED IN FIRE.	LEAD; POTASSIUM NITRATE; POTASSIUM CHLORATE; SODIUM BORATE; SULFATES;	
combustible)	CONTAINERS MAY EXPLODE IN FIRE.			MOLYBDATES; CHROMATES; and DICHROMATES.	
	Use water spray to keep fire-exp cool. DO NOT get water inside			Zirconium is incompatible with BORON; CARBON; NITROGEN; and PLATINUM.	
SPILL/LEAKS				PHYSICAL PROPERTIES	
Isolation Distance:			Odor Thresho	old: Odorless	
Solids: 25 meters (75 feet)			Flash Point:	Spontaneously combustible powder, dust or granule	

Solids: 25 meters (75 feet) Large Spill: 50 meters (160 feet) Fire: 800 meters (1/2 mile) Collect powdered material in the most convenient and safe manner and deposit in sealed containers. Use only non-sparking tools and equipment, especially when opening and closing containers of Zirconium .		V S W B N	Auto Ignition Temp: Vapor Pressure: Specific Gravity: Vater Solubility: Boiling Point: Melting Point: onization Potential: Molecular Weight:	granule 392°F (200°C) 0 mm Hg at 68°F (20°C) 6.5 (water = 1) Insoluble 6,471°F (3,577°C) 3,375°F (1,857°C) 6.6 eV 91.2			
EXPOSURE LIMITS			PRO	DTECTIVE EQUIPMENT			
OSHA: NIOSH: ACGIH: IDLH LEVEL	5 mg/m ³ , 8-hr TWA 5 mg/m ³ , 10-hr TWA; 10 mg/m ³ , STEL 5 mg/ m ³ , 8-hr TWA; 10 mg/m ³ , STEL : 25 mg/m ³	C B	Coveralls: Du Boots: No Respirator: >5	information Pont Tyvek® or equivalent information mg/m ³ - full facepiece APR with High efficiency filter 5 mg/m ³ - Supplied air			
HEALTH EFFECTS			FIRST AI	D AND DECONTAMINATION			
Eyes:IrritationSkin:Skin allergy with small nodules with repeated contactInhalation:Lung irritation with coughing and/or shortness of breath		F C R a B	 Remove the person from exposure. Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Remove contaminated clothing and wash contaminated skin with soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. 				