SIGMA-ALDRICH

Material Safety Data Sheet

Date Printed: 03/03/2007
Date Updated: 02/02/2006
Version 1.70

Section 1 - Product and Company Information

Product Name Propylene oxide, ReagentPlus®, 99%
Product Number 110205
Brand Sigma-Aldrich

Company Sigma-Aldrich
Street Address 3050 Spruce Street
City, State, Zip, Country SAINT LOUIS, MO 63103 US
Technical Phone: 800-325-5832 **Emergency Phone:** 314-776-6555
Fax: 800-325-5052

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313	EC no	Annex I Index Number
PROPYLENE OXIDE	75-56-9	Yes	200-879-2	603-055-00-4

Formula C3H6O
Synonyms AD 6 (suspending agent), Epoxypropane, 1,2-Epoxypropane, 1,2-Epoxypropane (ACGIH:OSHA), 2,3-Epoxypropane, Ethylene oxide, methyl-, Methyl ethylene oxide, Methyloxacyclopropane, Methyl oxirane, NCI-C50099, Oxirane, methyl-, Oxyde de propylene (French), Propane, epoxy-, Propene oxide, Propylene epoxide, Propylene oxide, 1,2-Propylene oxide, Propylene oxide (DOT:OSHA)

Section 3 - Hazards Identification

Emergency Overview
Flammable (USA) Extremely Flammable (EU). Toxic.
May cause cancer. Causes burns. Harmful by inhalation, in contact with skin and if swallowed.
Readily absorbed through skin. Target organ(s): Central nervous system. Calif. Prop. 65 carcinogen.

HMIS Rating
Health: 3* Flammability: 4 Reactivity: 1

NFPA Rating
Health: 3 Flammability: 4 Reactivity: 1

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

Oral Exposure
If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

Inhalation Exposure
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

Dermal Exposure
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

Eye Exposure
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

Flammable Hazards: Yes

Explosion Hazards
Vapor may travel considerable distance to source of ignition and flash back.
Container explosion may occur under fire conditions.

Conditions of Flammability
Under fire conditions, material may decompose to form flammable and/or explosive mixtures in air.

Flash Point: -34.6 °F -37 °C

Explosion Limits: **Lower:** 2.1 % **Upper:** 37 %

Autoignition Temp: 748 °C **Flammability:** Yes

Extinguishing Media
Suitable
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Firefighting
Protective Equipment
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s)
Flammable liquid. Vapor may travel considerable distance to source of ignition and flash back. Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

Procedure to be Followed In Case of Leak or Spill
Evacuate area. Shut off all sources of ignition.

Procedure(s) of Personal Precaution(s)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

Methods for Cleaning Up
Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

Handling
User Exposure
Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

Storage

Suitable

Keep container closed. Keep away from heat, sparks, and open flame.

Special Requirements

May develop pressure. Open carefully. Heat sensitive. Cool to 0°C before opening.

Section 8 - Exposure Controls / PPE

Engineering Controls

Safety shower and eye bath. Use nonsparking tools. Use only in a chemical fume hood.

Personal Protective Equipment

Respiratory

Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.

Hand

Compatible chemical-resistant gloves.

Eye

Chemical safety goggles.

General Hygiene Measures

Wash contaminated clothing before reuse. Wash thoroughly after handling.

Exposure Limits, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	20 PPM
USA	MSHA Standard-air	TWA	100 PPM (240 MG/M3)
USA	OSHA.	PEL	8H TWA 100 PPM (240 MG/M3)
New Zealand	OEL		
Remarks: check ACGIH TLV			
USA	NIOSH		LOWEST FEASIBLE CONCENTRTION

Section 9 - Physical/Chemical Properties

Appearance

Physical State	Color
Clear liquid	Colorless

Molecular Weight: 58.08 AMU

pH	N/A	
BP/BP Range	34 - 35 °C	
MP/MP Range	-112 °C	
Freezing Point	N/A	
Vapor Pressure	444.103 mmHg	20 °C
Vapor Density	2 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.829 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	

Water Content	< 0.1 %	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point °F	-34.6 °F	Method: closed cup
Flash Point °C	-37 °C	Method: closed cup
Explosion Limits	Lower: 2.1 %	
	Upper: 37 %	
Flammability	N/A	
Autoignition Temp	748 °C	
Refractive Index	1.366	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

Stability

Stable

Stable.

Conditions to Avoid

Heat.

Materials to Avoid

Oxidizing agents, Copper, Copper alloys, Strong acids, Strong bases, Peroxides, Alkali, Amines.

Hazardous Decomposition Products

Hazardous Decomposition Products

Carbon monoxide, Carbon dioxide.

Hazardous Polymerization

Hazardous Polymerization

May occur, Product may explode if polymerization is initiated in closed containers.

Section 11 - Toxicological Information

Route of Exposure

Skin Contact

Causes burns.

Skin Absorption

Harmful if absorbed through skin. Readily absorbed through skin.

Eye Contact

Causes burns.

Inhalation

Harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.

Ingestion

Harmful if swallowed.

Target Organ(s) or System(s)

Central nervous system.

Signs and Symptoms of Exposure

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may result in spasm, inflammation and edema of the larynxand bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Can cause CNS depression.

RTECS Number: TZ2975000

Toxicity Data

Oral - Rat: 380 mg/kg (LD50)
Remarks: Behavioral:Excitement.
Behavioral:Ataxia.
Lungs, Thorax, or Respiration:Respiratory stimulation.

Inhalation - Rat: 4,000 ppm (LC50)
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Other changes.
Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation.
Lungs, Thorax, or Respiration:Dyspnea.

Intraperitoneal - Rat: 150 MG/KG (LD50)

Oral - Mouse: 440 mg/kg (LD50)
Remarks: Behavioral:Excitement.
Behavioral:Ataxia.
Lungs, Thorax, or Respiration:Respiratory stimulation.

Inhalation - Mouse: 1,740 ppm (LC50)
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Other changes.
Lungs, Thorax, or Respiration:Dyspnea.
Gastrointestinal:Changes in structure or function of salivary glands.

Intraperitoneal - Mouse: 175 MG/KG (LD50)

Skin - Rabbit: 1500 UL/KG (LD50)

Oral - Guinea pig: 660 mg/kg (LD50)
Remarks: Behavioral:Somnolence (general depressed activity).
Liver:Other changes.
Kidney, Ureter, Bladder:Other changes.

Oral - Mammal: 440 mg/kg (LD50)

Irritation Data

Skin - Rabbit: 415 mg
Remarks: Open irritation test

Skin - Rabbit: 50 mg 6M
Remarks: Severe irritation effect

Eyes - Rabbit: 20 mg
Remarks: Severe irritation effect

Eyes - Rabbit: 20 mg 24H
Remarks: Moderate irritation effect

Chronic Exposure - Carcinogen
Result: This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Rat - Oral: 10798 MG/KG 2Y I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Gastrointestinal:Tumors.

Mouse - Inhalation: 400 PPM 6H/2Y I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat - Inhalation: 100 PPM 7H/2Y I
Result: Tumorigenic:Neoplastic by RTECS criteria. Endocrine:Tumors.

Rat - Subcutaneous: 1500 MG/KG 46W I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Tumorigenic:Facilitates action of known carcinogens.

Mouse - Inhalation: 400 PPM 6H/2Y I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Mouse - Subcutaneous: 272 MG/KG 95W I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Mouse - Subcutaneous: 3640 MG/KG 91W I
Result: Tumorigenic:Neoplastic by RTECS criteria. Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Mouse - Subcutaneous: 868 MG/KG 95W I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Mouse - Subcutaneous: 2912 MG/KG 95W I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Mouse - Subcutaneous: 6616 MG/KG 95W I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Rat - Oral: 2714 MG/KG 2Y I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal:Tumors.

Rat - Inhalation: 400 PPM 6H/2Y I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat - Inhalation: 300 PPM 6H/2.3Y I
Result: Tumorigenic:Neoplastic by RTECS criteria. Skin and Appendages: Other: Tumors.

IARC Carcinogen List

Rating
Group 2B

NTP Carcinogen List

Rating	*Species*	*Route*
Clear evidence.	Mouse	Inhalation
Some evidence.	Rat	Inhalation
Anticipated to be a carcinogen.		

Chronic Exposure - Teratogen

Species	*Dose*	*Route of Application*	*Exposure Time*
Rat	500 PPM/7H	Inhalation	(7-16D PREG)
Result:Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.			
Rat	500 PPM/7H	Inhalation	(1-16D PREG)
Result:Specific Developmental Abnormalities: Craniofacial (including nose and tongue).			

Chronic Exposure - Mutagen

Species	*Dose*			*Cell Type*	*Mutation test*
Result: Laboratory experiments have shown mutagenic effects.					
Human	1850 UG/L			lymphocyte	Cytogenetic analysis
Human	25000 PPM			lymphocyte	Sister chromatid exchange
Rat	30 UMOL/L			liver	DNA damage
Rat	25 UG/L			liver	Cytogenetic analysis
Rat	300 PPM	Inhalation	5D		Dominant lethal test
Mouse	600 MG/KG	Intraperitoneal	24H		Micronucleus test
Mouse	160 PPM		48H	lymphocyte	specific locus test
Mouse	200 MG/KG	Intraperitoneal			DNA damage
Mouse	349 MG/KG	Intraperitoneal			Cytogenetic analysis
Mouse	232 MG/KG	Intraperitoneal			Sister chromatid exchange
Mouse	400 UG/L			lymphocyte	Mutation in mammalian somatic cells.
Hamster	160 MG/L			ovary	Cytogenetic analysis
Hamster	5 MG/L			ovary	Sister chromatid exchange
Hamster	2500 UMOL/L			lung	Sister chromatid exchange
Mammal	75 MMOL/L			lymphocyte	DNA damage
Mammal	100 MMOL/TUBE			lymphocyte	DNA

Chronic Exposure - Reproductive Hazard

Species	*Dose*	*Route of Application*	*Exposure Time*
Rat	500 PPM/7H	Inhalation	(15D PRE/1-16D PREG)

Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Fertility: Other measures of fertility

Rat	47 MG/KG	Intraperitoneal	(1D MALE)

Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Rat	1860 MG/KG	Intraperitoneal	(6W MALE)

Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count). Paternal Effects: Testes, epididymis, sperm duct.

Monkey	100 PPM/7H	Inhalation	(2Y MALE)

Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

Appropriate Method of Disposal of Substance or Preparation
Contact a licensed professional waste disposal service to dispose of this material.
Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Propylene oxide
UN#: 1280
Class: 3
Packing Group: Packing Group I
Hazard Label: Flammable liquid
PIH: Not PIH

IATA
Proper Shipping Name: Propylene oxide
IATA UN Number: 1280
Hazard Class: 3
Packing Group: I

Section 15 - Regulatory Information

EU Directives Classification
Symbol of Danger: F+ T
Indication of Danger
Extremely Flammable. Toxic.
Risk Statements **R:** 45 46 12 20/21/22 36/37/38
May cause cancer. May cause heritable genetic damage. Extremely flammable. Harmful by inhalation, in contact with skin and if swallowed. Irritating to eyes, respiratory system and skin.
Safety Statements **S:** 53 45
Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US Classification and Label Text
Indication of Danger
Flammable (USA) Extremely Flammable (EU). Toxic.
Risk Statements
May cause cancer. Causes burns. Harmful by inhalation, in contact with skin and if swallowed.
Safety Statements
Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. In case of contact with eyes, rinse immediately with

plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
US Statements
Readily absorbed through skin. Target organ(s): Central nervous system. Calif. Prop. 65 carcinogen.

United States Regulatory Information
SARA Listed: Yes
Deminimis: 0.1 %
Notes: This product is subject to SARA section 313 reporting requirements.

TSCA Inventory Item: Yes

United States - State Regulatory Information
California Prop - 65
This product is or contains chemical(s) known to the state of California to cause cancer. This product is or contains chemical(s) known to the state of California to cause cancer.

Canada Regulatory Information
WHMIS Classification
This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

Disclaimer
For R&D use only. Not for drug, household or other uses.

Warranty
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.