Material Safety Data Sheet

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Version 1.6
According to 91/155/EEC

1 - Product and Company Information

Product Name	(+/-)-PROPYLENE OXIDE
Product Number	82320
Company	Sigma-Aldrich Company Ltd. The Old Brickyard New Road, Gillingham SP8 4XT United Kingdom
Technical Phone #	44-(0)-1747-833000
Fax	44-(0)-1747-833313
Emergency Phone #	44-(0)-1747-833100

2 - Composition/Information on Ingredients

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

Formula	C3H6O
Molecular Weight	58.08 AMU
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)

3 - Hazards Identification

SPECIAL INDICATION OF HAZARDS TO HUMANS AND THE ENVIRONMENT

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. Carc. Cat.2 Muta. Cat.2

4 - First Aid Measures

AFTER INHALATION

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

AFTER SKIN CONTACT

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

AFTER EYE CONTACT

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.

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

5 - Fire Fighting Measures

CONDITIONS OF FLAMMABILITY
Under fire conditions, material may decompose to form flammable and/or explosive mixtures in air.

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.

SPECIAL RISKS
Specific Hazard(s): Flammable liquid. Vapor may travel considerable distance to source of ignition and flash back. Emits toxic fumes under fire conditions.
Explosion Hazards: Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

6 - Accidental Release Measures

PERSONAL PRECAUTION PROCEDURES 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.

7 - Handling and Storage

HANDLING
Directions for Safe Handling: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Conditions of Storage: 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.

8 - Exposure Controls / Personal Protection

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

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS - DENMARK

Source	Type	Value
OEL	TWA	12 mg/m3
		5 ppm

Remarks: HK

EXPOSURE LIMITS - GERMANY

Source	Type	Value
TRGS 900	OEL	6 mg/m3
		2.5 ppm

Remarks: 4
Remarks: H,TRK,TRGS 901-19

EXPOSURE LIMITS - NORWAY

Source	Type	Value
	OEL	2 mg/m3
		1 ppm

Remarks: HAK

EXPOSURE LIMITS - SWEDEN

Source	Type	Value
	LLV (Level	5 mg/m3
		2 ppm

Remarks: K

EXPOSURE LIMITS - SWITZERLAND

Source	Type	Value
OEL	OEL	6 mg/m3
		2.5 ppm

Remarks: K

EXPOSURE LIMITS - UNITED KINGDOM

Source	Type	Value
OEL	OEL	12 mg/m3
		5 ppm

PERSONAL PROTECTIVE EQUIPMENT
Respiratory Protection: 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 Protection: Compatible chemical-resistant gloves.
Eye Protection: Chemical safety goggles.

9 - Physical and Chemical Properties

Appearance	Physical State: Clear liquid
	Color: Colorless

Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	34.0 - 35.0 °C	
MP/MP Range	- 112.0 °C	
Flash Point	- 37.0 °C	Method: closed cup
Flammability	N/A	
Autoignition Temp	748 °C	
Oxidizing Properties	N/A	
Explosive Properties	N/A	
Explosion Limits	Lower: 2.1 % Upper: 37 %	
Vapor Pressure	444.103 mmHg	20 °C
SG/Density	0.829 g/cm3	
Partition Coefficient	N/A	
Viscosity	N/A	
Vapor Density	2 g/l	
Saturated Vapor Conc.	N/A	
Evaporation Rate	N/A	
Bulk Density	N/A	
Decomposition Temp.	N/A	
Solvent Content	N/A	
Water Content	< 0.1 %	
Surface Tension	N/A	
Conductivity	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

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

11 - Toxicological Information

RTECS NUMBER: TZ2975000

ACUTE TOXICITY

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

LC50
Inhalation
Rat
4,000 ppm
4H
Remarks: Lungs, Thorax, or Respiration:Dyspnea. 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.

LD50
Intraperitoneal
Rat
150 MG/KG

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

LC50
Inhalation
Mouse
1,740 ppm
4H
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.

LD50
Intraperitoneal
Mouse
175 MG/KG

LD50
Skin
Rabbit
1500 UL/KG

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

LD50
Oral
Mammal
440 mg/kg

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

SIGNS AND SYMPTOMS OF EXPOSURE

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

ROUTE OF EXPOSURE

Skin Contact: Causes burns.
Skin Absorption: Readily absorbed through skin. Harmful if 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 INFORMATION

Central nervous system.

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
Route of Application: Oral
Exposure Time: 2Y
Result: Gastrointestinal:Tumors. Tumorigenic:Carcinogenic by RTECS criteria.

Mouse
Route of Application: Inhalation
Exposure Time: 6H/2Y
Result: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors. Tumorigenic:Carcinogenic by RTECS criteria.

Rat
Route of Application: Inhalation
Exposure Time: 7H/2Y
Result: Endocrine:Tumors. Tumorigenic:Neoplastic by RTECS criteria.

Rat
Route of Application: Subcutaneous
Exposure Time: 46W
Result: Tumorigenic:Facilitates action of known carcinogens. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Mouse
Route of Application: Inhalation
Exposure Time: 6H/2Y
Result: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors. Tumorigenic:Carcinogenic by RTECS criteria.

Mouse
Route of Application: Subcutaneous
Exposure Time: 95W
Result: Tumorigenic:Tumors at site or application.
Blood:Lymphomas including Hodgkin's disease.
Tumorigenic:Carcinogenic by RTECS criteria.

Mouse
Route of Application: Subcutaneous
Exposure Time: 91W
Result: Tumorigenic:Tumors at site or application.
Blood:Lymphomas including Hodgkin's disease.
Tumorigenic:Neoplastic by RTECS criteria.

Mouse
Route of Application: Subcutaneous
Exposure Time: 95W
Result: Blood:Lymphomas including Hodgkin's disease.
Tumorigenic:Tumors at site or application.
Tumorigenic:Carcinogenic by RTECS criteria.

Mouse
Route of Application: Subcutaneous
Exposure Time: 95W
Result: Blood:Lymphomas including Hodgkin's disease.
Tumorigenic:Tumors at site or application.
Tumorigenic:Carcinogenic by RTECS criteria.

Mouse
Route of Application: Subcutaneous
Exposure Time: 95W
Result: Blood:Lymphomas including Hodgkin's disease.
Tumorigenic:Carcinogenic by RTECS criteria. Tumorigenic:Tumors at site or application.

Rat
Route of Application: Oral
Exposure Time: 2Y
Result: Gastrointestinal:Tumors. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Rat
Route of Application: Inhalation
Exposure Time: 6H/2Y
Result: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Rat
Route of Application: Inhalation
Exposure Time: 6H/2.3Y
Result: Skin and Appendages: Other: Tumors.
Tumorigenic:Neoplastic by RTECS criteria.

IARC CARCINOGEN LIST

Rating: Group 2B

CHRONIC EXPOSURE - MUTAGEN
Result: Laboratory experiments have shown mutagenic effects.

Human
1850 UG/L
Cell Type: lymphocyte
Cytogenetic analysis

Human
25000 PPM
Cell Type: lymphocyte
Sister chromatid exchange

Rat
30 UMOL/L
Cell Type: liver
DNA damage

Rat
25 UG/L
Cell Type: liver
Cytogenetic analysis

Rat
300 PPM
Inhalation
5D
Dominant lethal test

Mouse
600 MG/KG
Intraperitoneal
24H
Micronucleus test

Mouse
160 PPM
48H
Cell Type: 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
Cell Type: lymphocyte

Mutation in mammalian somatic cells.

Hamster
160 MG/L
Cell Type: ovary
Cytogenetic analysis

Hamster
5 MG/L
Cell Type: ovary
Sister chromatid exchange

Hamster
2500 UMOL/L
Cell Type: lung
Sister chromatid exchange

Mammal
75 MMOL/L
Cell Type: lymphocyte
DNA damage

Mammal
100 MMOL/TUBE
Cell Type: lymphocyte
DNA

CHRONIC EXPOSURE - TERATOGEN

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

Species: Rat
Dose: 500 PPM/7H
Route of Application: Inhalation
Exposure Time: (1-16D PREG)
Result: Specific Developmental Abnormalities: Craniofacial (including nose and tongue).

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 500 PPM/7H
Route of Application: Inhalation
Exposure Time: (15D PRE/1-16D PREG)
Result: Effects on Fertility: Other measures of fertility 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).

Species: Rat
Dose: 47 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1D MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Species: Rat
Dose: 1860 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (6W MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count). Paternal Effects: Testes, epididymis, sperm duct.

Species: Monkey
Dose: 100 PPM/7H
Route of Application: Inhalation
Exposure Time: (2Y MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

CMR CAT.: Carc. Cat.2

12 - Ecological Information

No data available.

13 - Disposal Considerations

SUBSTANCE DISPOSAL
Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

14 - Transport Information

RID/ADR
UN#: 1280
Class: 3
PG: I
Proper Shipping Name: Propylene oxide

IMDG
UN#: 1280
Class: 3
PG: I
Proper Shipping Name: Propylene oxide
Marine Pollutant: No
Severe Marine Pollutant: No

IATA
UN#: 1280
Class: 3
PG: I
Proper Shipping Name: Propylene oxide
Inhalation Packing Group I: No

15 - Regulatory Information

CLASSIFICATION AND LABELING ACCORDING TO EU DIRECTIVES
ANNEX I INDEX NUMBER: 603-055-00-4
NOTA: E
INDICATION OF DANGER: F+-T
Extremely Flammable. Toxic.
R-PHRASES: 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.

S-PHRASES: 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).

COUNTRY SPECIFIC INFORMATION

Germany
WGK: 3
ID-Number: 3418
Classification according to appendix 3.

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16 - Other Information

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.

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