

Material Safety Data Sheet

PROPYLENE OXIDE

Section 1 Chemical Product & Company Identification

Product: **PROPYLENE OXIDE**

Manufactured by:

ABERCO, INC.
c/o BALCHEM CORPORATION
52 Sunrise Park Road
New Hampton, NY 10958
U.S.A.

Information Telephone: (845) 326- 5611

EMERGENCY TELEPHONE
(24 hrs./7 days per week):
In Canada: CANUTEC (613) 996-6666
In U.S.: CHEMTREC (800) 424-9300
OUTSIDE U.S. & CANADA (703) 527-3887

Section 2 Composition/Information on Ingredients

CHEMICAL NAME: Propylene Oxide
WEIGHT BY %: 100%
CHEMICAL FAMILY: Propylene Oxide
MOLECULAR FORMULA: C₃H₆O
MOLECULAR WEIGHT: 58.08
CAS NUMBER: 75-56-9
CAS NAME: Propylene Oxide
SYNONYMS: PO, 1,2-Epoxypropane; Propene Oxide, Methyl Ethylene Oxide, Methyloxirane, Propylene Epoxide, Epoxypropane
PRODUCT USES: Used primarily as an intermediate in the synthesis of other chemicals and polymers; as a fumigant for dried fruits and food stuffs; as a mixture with CO₂; as a stabilizer for methylene chloride; treating wood for termite resistance; acid scavenger; pH control agent; as a treatment chemical for removing residual from crude polyolefins.

Section 3 Hazard Identification

EMERGENCY OVERVIEW

Clear, colorless liquid with a sweet, ether-like odor. Extremely flammable liquid and vapor. Vapors may cause flash fire and can form explosive mixtures with air. May polymerize explosively when involved in a fire or in contact with incompatible materials. Corrosive. Causes severe eye, skin and gastrointestinal irritation or burns and respiratory tract irritation with central nervous system effects. Harmful if swallowed or absorbed through the skin. Possible cancer and reproductive hazard.

Statement of Hazards:

DANGER!

Extremely flammable liquid and vapor. May form explosive mixtures with air. Causes severe eye and skin irritation with possible burns. May cause allergic skin reaction. May be harmful if absorbed through the skin. Inhalation may cause respiratory irritation and central nervous system depression. Harmful if swallowed. May cause burns to the gastrointestinal tract and central nervous system depression. Aspiration may cause lung damage. Possible cancer hazard. May cause cancer based on animal data. Possible reproductive hazard.

HAZARD RATINGS: (0=minimum, 4=maximum)

HMIS Rating: Health = 3*
Flammability = 4
Reactivity = 2
Personal Protection Code =
(Consult your supervisor or standard operating procedures for special handling directions.)

NFPA Rating: Health = 3
Flammability = 4
Reactivity = 2

Exposure Limits:	<u>TWA (8-hr)</u>	<u>STEL (15-min)</u>
	OSHA ACGIH	100 ppm 2 ppm

PRIMARY ROUTES OF EXPOSURE: Inhalation; eye, skin contact/absorption, ingestion

SIGNS AND SYMPTOMS OF OVEREXPOSURE:

Effects include severe eye, skin and respiratory irritation or burns, skin rash, blistering. Effects of central nervous system depression include excitement, headache, dizziness, incoordination, narcosis, drunkenness,

nausea, vomiting, collapse, coma and respiratory arrest. Effects from swallowing may include severe irritation and burns to the gastrointestinal tract, nausea, vomiting, diarrhea, central nervous system depression and difficulty breathing.

ACUTE HEALTH EFFECTS:

INHALATION: Inhalation of vapors or mists may cause mucous membrane or upper respiratory tract irritation with central nervous system depression. Symptoms include headaches, dizziness, coughing, narcosis, drunkenness, incoordination, nausea, vomiting, and collapse. High vapor concentrations may cause unconsciousness, coma or death.

EYE CONTACT: Vapors and liquid may cause severe eye irritation with redness, tearing, burning, swelling of the conjunctiva and corneal burns. Damage may be permanent.

SKIN CONTACT: Contact may cause severe irritation with redness, pain and severe burns or blisters. Propylene oxide may be absorbed through the skin in harmful amounts causing systemic effects similar to those listed under ingestion and inhalation. Propylene oxide is a skin sensitizer and may cause an allergic skin reaction. Dilute solutions may be more irritating than undiluted materials.

INGESTION: Swallowing may cause severe burns to the mouth, throat and stomach with nausea, vomiting and diarrhea. May cause central nervous system depression with headache, dizziness, drowsiness, drunkenness and collapse. May be fatal due to respiratory failure. Aspiration may occur during swallowing or vomiting resulting in lung damage.

CHRONIC HEALTH EFFECTS:

SKIN CONTACT: Prolonged or repeated exposure may cause delayed secondary burns, ulcers or superficial scarring.

EYE CONTACT: No datum on chronic effects is available.

INHALATION: Studies with animals have shown chronic effects such as growth depression, lung and slight liver injury.

INGESTION: Studies with animals have shown chronic effects such as loss of body weight, gastric irritation and slight liver injury.

CARCINOGENICITY:

OSHA: Not classified.

ACGIH: Classified as "A3" – Confirmed Animal Carcinogen with Unknown Relevance to Humans.

NTP: Classified as "Reasonably Anticipated To Be a Human Carcinogen" (RAHC).

IARC: Classified as a Group 2B carcinogen (possibly carcinogenic to humans).

NIOSH: Classified as a potential occupational carcinogen.

Section 4 First Aid Measures

EYE CONTACT: Immediately flush eyes thoroughly with large amounts of water for at least 15-20 minutes, occasionally lifting upper and lower lids. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing and shoes. Immediately wash exposed area with large amounts of mild soap and water. Flush with lukewarm water for at least 15 minutes. Get prompt medical attention. Launder contaminated clothing before reuse.

INHALATION: Remove exposed person to fresh air. If breathing has stopped, give artificial respiration then have qualified personnel administer oxygen, if needed. Get immediate medical attention.

INGESTION: If patient is conscious and responsive, give 4 – 8 ounces of water or milk to dilute. **DO NOT INDUCE VOMITING.** Keep head lower than hips to avoid aspiration, should vomiting occur. Get immediate medical attention. Do not give anything to an unconscious or drowsy person.

MEDICAL CONDITIONS AGGRAVATED BY

EXPOSURE: Persons with pre-existing skin, kidney, liver and respiratory disorders may be at increased risk from exposure to this substance.

NOTE TO PHYSICIANS: Propylene oxide is an irritant that may cause coughing, dyspnea, noncardiogenic pulmonary edema, or chemical pneumonitis. Cyanosis has occurred. Lung injury has been observed in experimental animals. Respiratory effects may be delayed. Evaluate for respiratory distress. Consider oxygen administration. If a chemical burn is present, decontaminate skin and treat as any thermal burn. No specific antidote is known, however, consider gastric lavage and administration of a charcoal slurry.

Section 5 Fire Fighting Measures

FLASHPOINT (Test Method):

Tag Closed Cup: -35°F (-37.2°C)
Tag Open Cup: <-35°F (<-37.2°C)

FLAMMABLE LIMITS IN AIR (% BY VOLUME):

Upper flammable limit: 38.5%
Lower flammable limit: 1.7%

NFPA HAZARD RATING:

Health: 3; Flammability: 4; Reactivity: 2

AUTOIGNITION TEMPERATURE:

869°F (465°C)

SPECIAL FIRE-FIGHTING PROCEDURES: Wear NIOSH-approved self-contained breathing apparatus (SCBA) operated in the pressure-demand mode and full chemical-resistant protective clothing. Evacuate all personnel from spill area and keep upwind. Fight fire from maximum distance or use unmanned hose holder. Immediately cool containers with flooding quantities until well after the fire is out. Refer to the most current edition of the "North American Emergency Response Guidebook" for isolation and evacuation distances.

EXTINGUISHING MEDIA: Use carbon dioxide, dry chemical, alcohol resistant foam or water spray for small fires. Water spray, water fog or alcohol resistant foams for large fires. Water spray may be used to keep fire exposed containers cool, protect personnel attempting to stop leaks and to disperse vapors. Do not use a straight stream of water to fight fire. Liquid will float and may reignite on the surface of the water.

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition may yield carbon monoxide, carbon dioxide and acrid smoke and fumes.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Propylene oxide vapors are heavier than air and may travel long distances to sources of ignition and flashback. Vapor-air mixtures are explosive above the flashpoint. May polymerize violently if involved in a fire. Liquid propylene oxide is lighter than water and will float on water surfaces. Vapors are extremely flammable and are readily ignited by static charge, sparks and flames.

Section 6 Accidental Release Measures

PRECAUTIONS: Treat any propylene oxide leak as an emergency. All cleanup personnel must wear full

protective equipment. Evacuate all personnel from the area except those directly engaged in stopping the leak or in cleaning up.

SPILL CLEANUP: Remove all ignition sources and ventilate spill site. Blanket spill area with water fog or alcohol foam to reduce vapors. Contain and recover liquid if possible. Use non-sparking tools and equipment. Collect with an inert absorbent such as dry sand or earth and place into an appropriate container for disposal. Do not use clay-based absorbents or combustible materials. Do not flush to the sewer.

ENVIRONMENTAL: Dike runoff water, if possible, to prevent contaminated water from entering sewers, ditches, streams and ponds. It is mandatory to call the National Response Center (800-424-8802) if 100 pounds (45.4 kg) or more are spilled or released to the environment.

Section 7 Handling and Storage

HANDLING AND STORAGE PRECAUTIONS: Wear all recommended protective clothing and devices when handling this material. Wash thoroughly after handling. Use only in well ventilated areas. Do not get in eyes, on skin or on clothing. Do not ingest or inhale. Do not eat, drink or smoke in work areas. Shower, dispose of outer clothing and change into clean garments at the end of the shift. Avoid cross-contamination of street clothes. Keep product away from heat, sparks, flames and all other sources of ignition. Ground and bond containers when transferring material. Use non-sparking tools and equipment, including explosion proof ventilation. Empty containers retain product residues and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, sparks or open flames. Have established handling and emergency response procedures in place prior to use.

ENGINEERING CONTROLS: All electrical devices used in area processing and handling must be engineered and designed to all applicable local electrical and/or fire codes. Safeguards can include designing electrical devices as explosion-proof and/or intrinsically safe. ATTENTION: Propylene oxide vapors are colorless and odorless above the OSHA PEL. An air monitoring system is recommended to determine airborne exposure limits.

STORAGE SEGREGATION: Store propylene oxide in a cool, dry well-ventilated area, away from incompatible chemicals and ignition sources. Store only in tightly closed containers. Protect against physical damage.

Storage and use areas should be No Smoking areas. Outside or detached storage preferred.

INCOMPATIBILITIES: Avoid acids, bases, peroxides, oxidizing agents, clay-based absorbents, polymerization catalysts, epoxy resins, anhydrous metal chlorides, copper and copper alloys, brass, bronze and other acetylide forming metals.

SHIPPING AND STORAGE CONTAINERS: (See 49 CFR 173.201) Propylene oxide is shipped and stored in DOT specification cylinders or UN 1A1 specification drums.

Section 8 Exposure Controls / Personal Protection

EXPOSURE LIMITS:

OSHA ACTION LEVEL (8 HR. TWA):	Not applicable
OSHA PEL (8 HR. TWA):	100 ppm; 240 mg/m ³
OSHA 15 MINUTE EXCURSION LIMIT:	None established
ACGIH TLV/TWA:	2 ppm; 4.8 mg/m ³
IDLH:	400 ppm

RESPIRATORY PROTECTION: Wear a NIOSH approved supplied air respirator with a full facepiece or NIOSH approved self-contained breathing apparatus (SCBA) operated in a positive-pressure mode. Air purifying respirators are ineffective and must not be used. Refer to OSHA respiratory regulations cited at 29 CFR 1910.134 for further information

EYE PROTECTION: Always wear protective eyewear. If splashing may occur, wear a full face shield as a supplementary protective measure over safety goggles.

SKIN PROTECTION: Wear impervious gloves, boots; aprons; head cover; and clean impervious body-covering clothing to prevent any possibility of skin contact. Clean contaminated equipment after each use.

VENTILATION: Install and operate general and local exhaust ventilation systems powerful enough to maintain airborne levels of propylene oxide below TLV/TWA in the worker's breathing area. Ventilation systems must be of maximum explosion-proof design. Emission controls must be in compliance with Federal, State and local regulations.

SAFETY SHOWERS: Have eyewash stations, emergency deluge showers, and washing facilities available in all work areas.

OTHER PROTECTION: Design all engineering systems to be explosion-proof in any area where this substance may be present. Container and system must be electronically grounded/bonded before unloading. Practice good personal hygiene; always wash thoroughly

after using this material. Do not eat, drink or smoke in work area.

Section 9 Physical and Chemical Properties

Boiling Point:	94°F (34.2°C)
Freezing Point:	-169°F (-111.7°C)
Specific Gravity:	0.833 at 20°C (68°F)
Vapor Pressure:	455 mm Hg 20°C (68°F)
Vapor Density (Air=1):	2.0
Solubility in Water:	39.5% 20°C (68°F)
Molecular Weight:	58.08 grams/mole
Percent Volatile by Volume:	100%
Evaporation rate (Butyl Acetate=1):	33.70
pH:	Not applicable
Appearance and Odor:	Clear, colorless liquid with a sweet ether-like odor. Odor threshold: 200 ppm*
Log Octanol/Water Partition Coefficient (log Kow):	0.03

- Even though/ the median of detectable odor concentration of propylene oxide is reported to be 200 ppm, its odor cannot be used as a warning concentration.

Section 10 Stability and Reactivity

HAZARDOUS POLYMERIZATION: Polymerization may occur due to high temperatures or contamination with alkalis, aqueous acids, amines & acidic alcohols or contact with highly active catalytic surfaces.

STABILITY: Stable under ordinary storage and use conditions.

CONDITIONS TO AVOID: Keep away from heat, sparks, open flames and other sources of ignition. Avoid acids, bases, peroxides, oxidizing agents, clay-based absorbents, anhydrous metal chlorides, and other acetylide forming metals.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may yield carbon monoxide, carbon dioxide and acrid smoke and fumes. .

Section 11 Toxicological Information

TOXICOLOGICAL – EYE: Standard Draize test, rabbit – 20 mg – severe irritation.

TOXICOLOGICAL – ACUTE DERMAL: ; Standard Draize test, rabbit – 50 mg/6 minutes – severe irritation. The acute dermal rabbit LD₅₀ for this product is 1245 mg/kg.

TOXICOLOGICAL – ACUTE INGESTION: The acute oral rat LD₅₀ for this product is 380 mg/kg.

TOXICOLOGICAL – ACUTE INHALATION: The acute inhalation rat LC₅₀ for this product is: 4000 ppm/4 hours. Various mammalian species exposed to lethal concentrations of propylene oxide had symptoms of mucous membrane irritation, central nervous system depression, lacrimation, dyspnea, changes in salivary glands, nausea, vomiting, iritis and muscle weakness.

TOXICOLOGICAL – CHRONIC INHALATION: Symptoms of chronic exposure are similar to those observed in acute studies, including dyspnea, pulmonary effects, diarrhea, weight loss and nervous system depression.

TOXICOLOGICAL – CHRONIC DERMAL: No chronic dermal toxicity datum is available on this product.

TOXICOLOGICAL –CHRONIC INGESTION: A single oral study in rats showed changes in the brain, liver and lung.

CARCINOGENICITY: Propylene oxide appears to induce cancers at the site of exposure in experimental animals. Sarcomas occurred at injection sites, and nasal and GI cancers occurred with chronic exposure.

MUTAGENICITY: Propylene oxide has been found to be mutagenic in experimental animals including salmonella typhimurium, escherichia coli, drosophila spermatozoa and spermatids, and neurospora crassa assays. Human data on mutagenicity is inconclusive although propylene oxide causes DNA strand breaks in human diploid fibroblasts in vitro. The mean chromosome aberration rate in workers with more than 20 years exposure to propylene oxides was significantly increased compared to controls.

NEUROTOXICITY: In high concentrations propylene oxide has caused CNS effects, including CNS depression, headache, motor weakness, incoordination, ataxia, coma, and neuropathy in experimental animal studies. Peripheral neuropathy has been reported in chronic studies with experimental animals.

REPRODUCTIVE EFFECTS: Effects on fertility and paternal effects have been noted in experimental animals.

TERATOLOGY: Inhalation development toxicity studies with rats exposed to propylene oxide vapor at concentrations of 500 ppm showed fetotoxicity and developmental abnormalities.

TARGET ORGANS: Overexposure to this product may effect the skin, eyes, respiratory system, reproductive system and central nervous system.

Section 12 Ecological Information

ECOTOXICOLOGICAL DATA

AQUATIC TOXICITY:

Acute LC₅₀ data:

Goldfish 170 mg/L/24 hr

Mullet 89 ppm/96 hour

Material is slightly toxic to marine invertebrates.

CHEMICAL FATE INFORMATION:

5 day BODT: 8%

If released to the atmosphere, propylene oxide will react in the vapor phase with photochemically produced hydroxyl radicals with an estimated half-life of approximately 30 days. Atmospheric removal by rainfall may occur. If released to soil, propylene oxide is expected to be susceptible to leaching and chemical hydrolysis in moist soils. It is expected to evaporate relatively rapidly from dry soil surfaces. If released to water, propylene oxide will hydrolyze at estimated half-life rates of 11.6 days (at pH's 7-9) and 6.6 days (at pH 5) at 25 deg C.) Adsorption to sediment, bioconcentration in aquatic organisms and reaction with photochemically produced hydroxyl radicals in water are not expected to be environmentally important fate processes.

Section 13 Disposal Consideration

WASTE MANAGEMENT/DISPOSAL: Contaminated solids should be landfilled only at properly permitted disposal sites using registered contractors. Concentrated liquid waste may be incinerated (if safety precautions are taken because of very low flash point) in compliance with applicable air pollution control regulations. It is recommended that contaminated product, soil or water intended for disposal be handled as hazardous waste due to potentially low flashpoint. Disposal should be in accordance with applicable local, state and federal regulations. Return used containers to manufacturer only.

Section 14 Transport Information

TRANSPORTATION DATA:

DOT Proper Shipping Name:	Propylene Oxide
DOT Class or Division:	3
Identification Number:	UN 1280
Packing Group:	I
DOT Label(s):	Primary: Flammable Liquid Subsidiary: None
DOT Placard:	Primary: Flammable Liquid

Reportable Quantity (RQ): Subsidiary: None
100 lb. (45.4kg)
NAERG 2000 Guide #: 127P
DOT Packaging: See Section 7, "Handling and Storage"
IMO CLASS: 3.1
IMO LABEL(S): Flammable Liquid
TDG REGULATIONS: (Transportation between points within
Canada):
Shipping Name: Propylene Oxide
UN Number: UN 1280
Class(es): 3.1

Section 15
Regulatory Information
U.S. REGULATIONS

CERCLA Section 103 (40 CFR 302.4): Listed
100 lb Reportable Quantity
EPA Accidental Release Prevention Toxic Substance:
Listed
10,000 lb Threshold Quantity
EPA list of Hazardous Air Contaminants: Listed
EPA list of Pesticide Chemicals (40CFR 180.491): Listed
EPA NESHAPS (40 CFR 63.360)
EPA Organic Hazardous Air Pollutant (HAP) list: Listed
OSHA (29 CFR 1910.1200): Meets criteria as a
hazardous material
OSHA Process Safety Management (29 CFR 1910.119):
Not Listed
SARA Section 302 (40 CFR 355.30): Listed
10,000 lb Threshold Planning Quantity
SARA Section 304 (40 CFR 355.40): Listed
100 lb Reportable Quantity
SARA Section 311/312 (40 CFR 370.21) Hazard
Categories met:
Acute, Chronic, Fire, Reactive
SARA Section 313 (40 CFR 372.65): Listed
TSCA status: Listed
VOC Rule: 100% VOC

STATE RIGHT-TO-KNOW REGULATIONS:

California Proposition 65: Listed; cancer hazard
California Director's List: Listed
Florida Hazardous Substance List: Listed
Massachusetts Extraordinarily Hazardous Substance
List: Listed
Minnesota Hazardous Substance List: Listed
New Jersey Hazardous Substance List: Listed
(Substance Number 1615)
Pennsylvania Right-to-know List: Listed (Special
Hazardous Substance; Environmental Hazardous
Substance)

DISCLAIMER: It is imperative that the user/reader be familiar with and adhere to OSHA regulations as well as any other applicable Federal, State, or local government regulations. Regulations listed in Section 15 of this document may not be all inclusive and are subject to change. The data in this MSDS is furnished gratuitously independent of any sale of the product, only for your investigation and independent verification. While the information is believed to be correct, ABERCO makes no representation as to the accuracy of the information contained herein. ABERCO shall in no event be responsible for damages of whatsoever nature directly or indirectly resulting from publication or use of, of reliance upon data contained herein. No warranty (either expressed or implied) of merchantability or of fitness for any purpose with respect to the product or to the data herein is made hereunder.

CANADIAN REGULATIONS:

CEPA status: Listed on DSL (Domestic Substance List)
WHMIS: Ingredient Disclosure List: Listed 1%,
item 1365 (1319)
WHMIS Classification: B2; D1B; D2A; D2B; F.

This MSDS complies with the Canadian Controlled
Product Regulations.

Section 16
Other Information

GLOSSARY OF TERMS AND ABBREVIATIONS:

ACGIH	American Conference of Governmental Industrial Hygienists
BOD _{5,10,20}	Biological Oxygen Demand, 5, 10 or 20 day
CAS	Chemical Abstract Service
CEPA	Canadian Environmental Protection Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CNS	Central Nervous System
DOT	U.S. Department Of Transportation
DSL	Domestic Substance List
EPA	U.S. Environmental Protection Agency
HAP	Hazardous Air Pollutant
HMIS	Hazardous Materials Information System
IARC	International Agency for Research in Cancer
IDL	Ingredients Disclosure List
IDLH	Immediately Dangerous to Life and Health
IMO	International Maritime Organization
LC ₅₀	Median Lethal Concentration that kills 50% of an exposed population by the inhalation route
LD ₅₀	Median Lethal Dose that kills 50% of an exposed population by the oral (or dermal) route
NAERG	North American Emergency Response Guidebook
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
ppm	parts per million
p/p	parts per part
p.s.i.g.	pounds per square inch (gauge pressure)
PVC	PolyVinyl Chloride
RCRA	Resource, Conservation and Recovery Act
SARA	Superfund Amendment and Reauthorization Act of 1990
SCBA	Self-Contained Breathing Apparatus
STEL	Short Term Exposure Limit
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average
VOC	Volatile Organic Compound
WHMIS	