

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Propylene oxide	Trade Name: Propylene oxide
Product Use: Many.	
Chemical Name: Propylene oxide	Synonym: Epoxypropane, Methyl ethylene oxide, Methyl oxirane, Propene oxide, 1,2-Propylene oxide, PO
Chemical Formula: CH ₃ CHCH ₂ O	Chemical Family: Alkyl epoxide
Telephone: Emergencies: * 1-800-363-0042	Supplier /Manufacture: Praxair Canada Inc. 1 City Centre Drive Suite 1200 Mississauga, ON L5B 1M2 Phone: 905-803-1600 Fax: 905-803-1682

**Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier or Praxair sales representative.*

2. Composition and Information on Ingredients

INGREDIENTS	% (VOL)	CAS NUMBER	LD ₅₀ (Species & Routes)	LC ₅₀ (Rat, 4 hrs.)	TLV-TWA (ACGIH)
Propylene oxide	100	75-56-9	Not available.	1740 ppm (mouse)	2 ppm

3. Hazards Identification

Emergency Overview

DANGER! Extremely volatile liquid. Can form explosive mixtures with air. Can cause eye and skin burns. Can irritate the respiratory tract. May cause nervous system damage. Liquid may cause frostbite. May cause dizziness and drowsiness. Symptoms may be delayed. Self-contained breathing apparatus must be worn by rescue workers.

ROUTES OF EXPOSURE: Inhalation. Swallowing. Skin absorption. Skin contact. Eye contact.

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION: Exposure to several hundred ppm may result in headache, dizziness, drowsiness, nausea, chest discomfort and cough. Exposure to high concentration, in excess of 1000 ppm, may lead to inhalation of harmful amounts of material resulting in lung injury and edema, and loss of consciousness. Lack of oxygen can cause death.

SKIN CONTACT: Brief contact of several minutes' duration may result in mild local redness. More sustained

contact, of an hour or more, will result in more marked redness and swelling, and possibly the development of chemical burns of the skin

SKIN ABSORPTION: Moderately widespread contact for several hours may lead to the absorption of potentially harmful amounts of material. Early indications of the absorption of the material may include headache, dizziness, nausea, and drowsiness.

SWALLOWING: Moderately toxic. May cause severe irritation or chemical burns of the mouth, throat, esophagus, and stomach with severe abdominal pain and chest pain or discomfort, nausea, diarrhea, vomiting, dizziness, drowsiness, weakness, faintness, headache, and loss of consciousness.

EYE CONTACT: Liquid will cause severe conjunctivitis, seen as marked excess redness and swelling of the conjunctiva. There is likely to be severe injury to the cornea, which could be permanent if treatment is not promptly started. High vapour concentrations may cause excess tear production, excess blinking, eye discomfort and excess redness of the conjunctiva.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE:

None currently known.

OTHER EFFECTS OF OVEREXPOSURE:

May cause sensitization of the skin in a small proportion of individuals, resulting in allergic contact dermatitis.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:

Due to its irritant nature, overexposure to this material may exacerbate an existing dermatitis. Overexposure to the vapour may exacerbate asthma and inflammatory or fibrotic pulmonary disease.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION:

Studies involving the repeated exposure of animals to high concentrations of vapour from this material, several hundred ppm, have shown mild liver injury. A variety of genotoxicity studies have shown, in general, that a mutagenic effect may be produced in organisms and cells grown in culture, but not in the intact animal. Numerous studies, by inhalation, swallowing, subcutaneous injection, have shown that chronic exposure to this material causes malignant tumors in experimental animals.

CARCINOGENICITY:

This material is included in the NTP list of carcinogens and is classified by IARC as possibly carcinogenic to humans.

4. First Aid Measures

INHALATION:

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

SKIN CONTACT:

Wash with soap and water. Get medical attention if discomfort persists.

SWALLOWING:

Give two glasses of water. Do not induce vomiting. Call a physician.

EYE CONTACT:

Immediately flush eyes with water for a least 15 minutes. See a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN:

The adverse health effects from this material are mainly due to markedly irritant and central nervous system depressant effects. There is no specific antidote. Treatment of over-exposure should be directed at the control of symptoms and the clinical condition.

5. Fire Fighting Measures

FLAMMABLE : Yes.	IF YES, UNDER WHAT CONDITIONS?	Not available. Forms explosive mixtures with air and oxidizing agents.	
FLASH POINT (test method)	OPEN CUP: -37.2°C (-35°F).	AUTOIGNITION TEMPERATURE	465°C (869°F)
FLAMMABLE LIMITS IN AIR, % by volume:	LOWER: 2.1	UPPER:	36

EXTINGUISHING MEDIA:

Use DRY chemicals, CO₂, water spray or foam.

SPECIAL FIRE FIGHTING PROCEDURES:

DANGER! Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool containers with water spray from maximum distance taking care not to extinguish flames. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive re-ignition may occur; therefore, appropriate measures should be taken; e.g., total evacuation. Re-approach with extreme caution. Reduce corrosive vapours with water spray or fog. Reverse flow into cylinder may cause rupture. Stop flow of gas if without risk while continuing water spray. Remove all containers from area if without risk. Allow fire to burn out.

UNUSUAL FIRE AND EXPLOSION HAZARD:

Forms explosive mixture with air and oxidizing agents. Container may rupture due to heat of fire. Do not extinguish flames due to possibility of explosive re-ignition. Flammable vapours may spread from spill. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with appropriate device. No part of a container should be subjected to a temperature higher than 52 C. Vapours from this product may travel or be moved by air currents and ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharges, or other ignition sources at locations distant from product handling point. Most containers are provided with a pressure relief device designed to vent contents when they are exposed to elevated temperature.

HAZARDOUS COMBUSTION PRODUCTS:

These products are carbon oxides (CO, CO₂).

SENSITIVITY TO IMPACT:

Avoid impact against container.

SENSITIVITY TO STATIC DISCHARGE:

Possible, ground all equipment before use.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

DANGER! Forms explosive mixtures with air. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus operated in the pressure demand mode and appropriate protective clothing. Remove all sources of ignition if without risk. Reduce vapours with fog or fine water spray. Shut off leak if without risk. Ventilate area of leak or move leaking container to well ventilated area. Flammable vapours may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.

WASTE DISPOSAL METHOD:

Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, provincial, and local regulations. If necessary, call your local supplier for assistance.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN STORAGE:

Store and use with adequate ventilation. Separate flammable cylinders from oxygen, chlorine, and other oxidizers by at least 6 m or use a barricade of non-combustible material. This barricade should be at least 1.5 m high and have a fire resistance rating of at least ½ hour. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Post "No Smoking or Open Flames" signs in storage and use areas. There must be no sources of ignition. All electrical equipment in storage areas must be explosion-proof. Storage areas must meet national electric codes for Class 1 hazardous areas. Store only where temperature will not exceed 52 C. Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

PRECAUTIONS TO BE TAKEN IN HANDLING:

Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. For other precautions, see Section 16.

For additional information on storage and handling, refer to Compressed Gas Association (CGA) pamphlet P-1, *Safe Handling of Compressed Gases in Containers*, available from the CGA. Refer to Section 16 for the address and phone number along with a list of other available publications.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:

Extremely flammable liquid and gas under pressure. Do not get liquid or vapours in eyes, on skin, or clothing. Safety showers and eyewash fountains should be immediately available. Use only in a closed system. Use piping and equipment adequately designed to withstand pressures to be encountered. Use only spark-proof tools and explosion-proof equipment. Keep away from heat, sparks, and open flame. **Forms explosive mixtures with air.** Ground all equipment. Store and use with adequate ventilation at all times. Close valve after each use; keep closed even when empty. **Prevent reverse flow.** Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. **When returning cylinder to supplier, be sure valve is closed, then install valve outlet plug tightly. Never work on a pressurized system.** If there is a leak, close the cylinder valve. Vent the system down in a safe and environmentally sound manner in compliance with all federal, provincial, and local laws; then repair the leak. **Never place a compressed gas cylinder where it may become part of an electrical circuit.**

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST: An explosion-proof local exhaust system is acceptable. See SPECIAL.

MECHANICAL (general): Acceptable. See SPECIAL.

SPECIAL: Use only in a closed system.

OTHER: See SPECIAL.

PERSONAL PROTECTION:

RESPIRATORY PROTECTION: For concentrations up to 10 times the applicable exposure limit any NIOSH/MSHA approved supplied air respirator is recommended. Up to 50 times the TLV, a NIOSH/MSHA approved respirator with a full-face piece or self-contained breathing apparatus is recommended. For higher concentration use only self-contained breathing apparatus operated in the pressure demand mode. Select in accordance with the provincial regulations or guidelines and should also be based on the current CSA standards Z94.4, "Selection care and use of respirators". Respirators should be approved by NIOSH/MSHA.

SKIN PROTECTION: Impervious plastic gloves.

EYE PROTECTION: Wear safety glasses when handling cylinders.

Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Protective clothing where needed. Cuffless trousers should be worn outside the shoes. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines.

9. Physical and Chemical Properties

PHYSICAL STATE: Liquid.	FREEZING POINT: -104.4°C (-155.9°F)	pH:	Not applicable.
BOILING POINT: 34.3°C (93.7°F)	VAPOUR PRESSURE: 58.6 kPa (@ 20°C)	MOLECULAR WEIGHT:	58.08 g/mole
SPECIFIC GRAVITY: 0.8304 @ 20 C LIQUID (Water = 1)	SOLUBILITY IN WATER: Appreciable		
SPECIFIC GRAVITY: Not available. VAPOUR (air = 1)	EVAPORATION RATE (Butyl Acetate=1): >1 compared to Butyl acetate.	COEFFICIENT OF WATER/OIL DISTRIBUTION:	Not applicable.
VAPOUR DENSITY: Not available.	% VOLATILES BY VOLUME: 100% (v/v).	ODOUR THRESHOLD:	Not available.
APPEARANCE & ODOUR: Colourless.		Odour: Ethereal.	

10. Stability and Reactivity

STABILITY:	The product is stable.
CONDITIONS OF CHEMICAL INSTABILITY:	Elevated temperatures, sparks, and fire..
INCOMPATIBILITY (materials to avoid):	Alkalies, acids, oxidizers, polyhydric alcohols, copper, silver, mercurus and their alloys.
HAZARDOUS DECOMPOSITION PRODUCTS:	Thermal decomposition or burning may produce carbon monoxide/carbon dioxide.
HAZARDOUS POLYMERIZATION:	May occur.
CONDITIONS OF REACTIVITY:	May polymerize with evolution of heat when in contact with highly active catalytic surfaces, such as anhydrous chlorides of iron, tin and aluminum, peroxides of iron and aluminum, and alkali metal hydroxides.

11. Toxicological Information

See section 3.

12. Ecological Information

No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals. The components of this mixture are not listed as marine pollutants by TDG Regulations.

13. Disposal Considerations

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

14. Transport Information

TDG/IMO SHIPPING NAME: Propylene oxide

HAZARD CLASS:	CLASS 3, PG I, Flammable Liquid	IDENTIFICATION #:	PRODUCT REPORTABLE QUANTITY (PROQ):
		UN1280	200 Liters

SHIPPING LABEL(s): Flammable liquid

PLACARD (when required): Flammable liquid

SPECIAL SHIPPING INFORMATION:

Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, non-ventilated compartment of a vehicle can present serious safety hazards.

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, provincial, and local regulations.

DSL (Canada) This product is on the DSL list

WHMIS (Canada) Class B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
Class D-1B: Material causing immediate and serious toxic effects (TOXIC).
Class D-2A: Material causing other toxic effects (VERY TOXIC).

International Regulations

EINECS Not available.

DSCL (EEC) R12- Extremely flammable.

International Lists No products were found.

16. Other Information

MIXTURES:

When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist, or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

HAZARD RATING SYSTEM:

HMIS RATINGS:

HEALTH 3*

FLAMMABILITY 4

PHYSICAL HAZARD 2

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	Not available.
PIN-INDEXED YOKE:	Not available.
ULTRA-HIGH-INTEGRITY CONNECTION:	Not available.

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlets V-1 and V-7 listed below.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, Fax (703) 961-1831, website: www.cganet.com.

AV-1	Safe Handling and Storage of Compressed Gas
P-1	Safe Handling of Compressed Gases in Containers
P-14	Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmosphere
SB-2	Oxygen-Deficient Atmospheres
V-1	Compressed Gas Cylinder Valve Inlet and Outlet Connections
V-7	Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures
---	Handbook of Compressed Gases, Fifth Edition

PREPARATION INFORMATION:

DATE:	October 15, 2013
DEPARTMENT:	Safety and Environmental Services
TELEPHONE:	905-803-1600

The opinions expressed herein are those of qualified experts within Praxair Canada Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair Canada Inc., it is the user's obligation to determine the conditions of safe use of the product.

Praxair Canada Inc. requests the users of this product to study this Material Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

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