

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Liquid Oxygen	Trade Name: Liquid Oxygen, Medipure®
Product Use: Many.	
Chemical Name: Oxygen	Synonym: Oxygen, cryogenic liquid.
Chemical Formula: O ₂	Chemical Family: Not applicable.
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. Hazards Identification

Emergency Overview

WARNING! Extremely cold, oxidizing liquid and gas under pressure. Vigorously accelerates combustion. Combustibles in contact with liquid may explode on ignition or impact. May cause dizziness and drowsiness. Self-contained breathing apparatus and protective clothing may be required by rescue workers. Can cause severe frostbite.

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

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION: Breathing 80% or more oxygen at atmospheric pressure for more than a few hours may cause nasal stuffiness, cough, sore throat, chest pain and breathing difficulty. Breathing oxygen at higher pressure increases the likelihood of adverse effects within a shorter time period. Breathing pure oxygen under pressure may cause lung damage and also central nervous system effects resulting in dizziness, poor coordination, tingling sensation, visual and hearing disturbances, muscular twitching, unconsciousness and convulsions. Breathing of oxygen under pressure may cause prolongation of adaptation to darkness and reduced peripheral vision.

SKIN CONTACT: No harm expected from vapour. Liquid may cause frostbite.

SKIN ABSORPTION: No harm expected from vapour. Liquid may cause severe frostbite.

SWALLOWING:

This product is a gas at normal temperature and pressure. An unlikely route of exposure, but frostbite of the lips and mouth may result from contact with the liquid.

EYE CONTACT:

No harm expected from vapour. Liquid may cause frostbite.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE:

No evidence of adverse effects from available information.

OTHER EFFECTS OF OVEREXPOSURE:

See "Notes to Physician", in the "First Aid" section.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:

See "Notes to Physician", in the "First Aid" section.

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

None currently known.

CARCINOGENICITY:

Not listed as carcinogen by OSHA, NTP or IARC.

3. Composition and Information on Ingredients
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COMPONENTS**CAS
NUMBER****CONCENTRATION
% by Mole**

Oxygen

7782-44-7

100

4. First Aid Measures

INHALATION:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. Get medical attention. Keep patient warm and at rest..

SKIN CONTACT:

Immediately warm frostbite area with warm water (not to exceed 40 C). In case of massive exposure, remove clothing and shoes while showering with warm water. Get medical attention immediately.

SWALLOWING:

This product is a gas at normal temperature and pressure.

EYE CONTACT:

See a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN:

Supportive treatment should include immediate sedation, anti-convulsive therapy if needed, and rest. Animal studies suggest that the administration of certain drugs, including phenothiazine drugs and chloroquine, increase the susceptibility to toxicity from oxygen at high concentrations or pressures. Animal studies also indicate that vitamin E deficiency may increase susceptibility to oxygen toxicity. Airway obstruction during high oxygen tension may cause alveolar collapse following absorption of the oxygen. Similarly, occlusion of the eustachian tubes may cause retraction of the eardrum and obstruction of the paranasal sinuses may produce "vacuum-type" headache. Newborn premature infants exposed to high oxygen concentrations may suffer delayed retinal damage, which can progress, to retinal detachment and blindness (retrolental fibroplasia). Retinal damage can also occur in adults exposed to 100% oxygen under greater than atmospheric pressure, particularly in individuals whose retinal circulation has been previously compromised.

All individuals exposed for only periods to oxygen at high pressure and all that exhibit overt oxygen toxicity should have ophthalmologic examination.

5. Fire Fighting Measures

FLAMMABLE : No.**IF YES, UNDER WHAT CONDITIONS?**

Vigorously accelerates combustion.

EXTINGUISHING MEDIA:

Vigorously accelerates combustion. Use media appropriate for surrounding fire. Water (i.e., safety shower) is the preferred extinguishing media for clothing fires.

PRODUCTS OF COMBUSTION:

None.

PROTECTION OF FIREFIGHTERS:

WARNING! Evacuate all personnel from danger area. Immediately deluge cylinders with water from maximum distance until cool; then move them away from fire area if without risk. Do not discharge water sprays into liquid.

SPECIFIC PHYSICAL AND CHEMICAL HAZARDS:

Oxidizing agent, vigorously accelerates combustion. Contact with flammable materials may cause fire or explosion. Closed container may rupture due to heat of fire. Liquid will freeze water rapidly. Containers are provided with pressure relief devices that are designed to vent the contents when they are exposed to elevated temperatures. Do not walk on or roll equipment over spill as this could cause explosion. Liquid causes cryogenic "burns" (frostbite-like injury). Smoking, flames, and electric sparks in the presence of enriched oxygen atmospheres are potential explosion hazards.

SENSITIVITY TO IMPACT:

Avoid impact against container.

SENSITIVITY TO STATIC DISCHARGE:

Not applicable.

PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS:

Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

FLAMMABLE LIMITS IN AIR, % by volume:

LOWER: Not applicable.

UPPER: Not applicable.

FLASH POINT:

Not applicable.

AUTOIGNITION TEMPERATURE:

Not applicable.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:**Personal Precautions:**

WARNING! Extremely cold oxidizing liquid and gas. Immediately evacuate all personnel from danger area. Allow spilled liquid to evaporate. Do not walk on or roll equipment over spill as this could cause explosion. Contact with flammable materials may cause fire or explosion. Shut off leak if without risk. Ventilate area of leak or move leaking container to ventilated area.

Environmental Precautions:

Keep personnel away. Liquid should be dumped into an outdoor pit filled with clean, grease-free and oil-free gravel, where it will safely evaporate. If necessary, call your local supplier for assistance.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN HANDLING:

Use piping and equipment adequately designed to withstand pressures to be encountered. Ground all equipment. Store and use with adequate ventilation at all times. Use only in a closed system.

PRECAUTIONS TO BE TAKEN IN STORAGE:

Extremely cold oxidizing liquid and gas. Vigorously accelerates combustion. Contact with liquid or cold gas causes severe frostbite. Combustibles with liquid air may explode on ignition or contact. Keep oil, grease, and combustibles away. Use only with equipment conditioned for oxygen service. Use piping and equipment adequately designed to withstand the pressures and temperatures to be encountered. Do not get liquid in eyes, on skin or clothing. Store and use with adequate ventilation. Close valve when not in use and when empty. Clothing exposed to liquid air should be removed immediately and aired out to reduce the likelihood of an engulfing fire. Ignition sources, such as static electricity generated in clothing by walking, etc., should be prevented. Protect container against physical damage. Isolate from combustible gas installations and combustible materials by adequate distance or by gas-tight, fire resistive barriers. For additional information refer to CGA pamphlet P-1 (See section 16 for more details).

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:

Extremely cold oxidizing liquid and gas. 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. . Liquid can solidify air. **Vigorously accelerates combustion.** Keep oil, grease, and combustibles away. **Store and use with adequate ventilation at all times.** Close valve after each use; keep closed even when empty. Air will condense on exposed liquid or cold-gas surfaces, such as vaporizers and piping. Nitrogen, having a lower boiling point than oxygen, will evaporate first leaving an oxygen-enriched condensation on the surface. **Prevent reverse flow.** Reverse flow into cylinder may cause rupture. **When returning cylinder to supplier,** be sure valve is closed. **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.**

RECOMMENDED PUBLICATIONS:

Additional information on storage, handling, and use of this product is provided in **NFPA 55: Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders**, published by the National Fire Protection Association.

See also Praxair publication P-14-153, *Guidelines for Handling Gas Cylinders and Containers*. Obtain from your local supplier.

8. Exposure Controls/Personal Protection

INGREDIENTS	CAS NUMBER	LD ₅₀ (Species & Routes)	LC ₅₀ (Rat, 4 hrs.)	Exposure Limits
Oxygen	7782-44-7	Not applicable.	Not applicable.	None.

IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH):

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST: Use a local exhaust system, if necessary, to prevent increased oxygen concentration in the worker's breathing zone.

MECHANICAL (General): General exhaust ventilation may be acceptable if it can maintain a supply of air that is not too rich in oxygen in the worker's breathing zone.

SPECIAL: Not applicable.

OTHER: Not applicable.

PERSONAL PROTECTION:

RESPIRATORY PROTECTION: None required under normal use. However, air-supplied respirators are required while working in confined spaces with this product. Selection should be based on the current CSA standard Z94.4 "Selection, Care, and Use of Respirators". Respirators should be approved by NIOSH and MSHA.

SKIN PROTECTION: Loose-fitting cryogenic gloves. Gloves free of oil and grease.

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: -218.78°C (-361.8°F)	pH: Not applicable.
BOILING POINT: -182.96°C (-297.3°F)	VAPOUR PRESSURE: Not applicable.	MOLECULAR WEIGHT: 31.9988 g/mole
SPECIFIC GRAVITY: LIQUID (Water = 1) 1.14 @ -183 C	SOLUBILITY IN WATER: Negligible.	
SPECIFIC GRAVITY: VAPOUR (air = 1) 1.105 g/ml @ 21.1 C	EVAPORATION RATE (Butyl Acetate=1): High.	COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable.
VAPOUR DENSITY: 0.0013 g/ml @ 21.1 C	% VOLATILES BY VOLUME: 100% (v/v).	ODOUR THRESHOLD: Odourless.

APPEARANCE & ODOUR: Light blue cryogenic liquid. Odourless.

10. Stability and Reactivity

STABILITY:	The product is stable.
CONDITIONS OF CHEMICAL INSTABILITY:	Elevated temperatures. Oxygen reacts with many materials.
INCOMPATIBILITY (materials to avoid):	Flammable materials, hydrocarbons such as oils and grease, asphalt, ethers, alcohols, acids and aldehydes.
HAZARDOUS DECOMPOSITION PRODUCTS:	None.
HAZARDOUS POLYMERIZATION:	Will not occur.
CONDITIONS TO AVOID:	None known.
CONDITIONS OF REACTIVITY:	None known.

11. Toxicological Information

ACUTE DOSE EFFECTS: See section 2.

STUDY RESULTS:

At atmospheric concentration and pressure, oxygen poses no toxicity hazards. At high concentrations, newborn premature infants may suffer delayed retinal damage (retrolental fibroplasia) that can progress to retinal detachment and blindness. Retinal damage may also occur in adults exposed to 100% oxygen for extended periods (24 to 48 hours) or at greater than atmospheric pressure, particularly in individuals whose retinal circulation has been previously compromised. All individuals exposed for long periods to oxygen at high pressure and all who exhibit overt oxygen toxicity should have ophthalmologic examinations.

At two or more atmospheres, toxicity to the Central Nervous System (CNS) occurs. Symptoms include nausea, vomiting, dizziness or vertigo, muscle twitching, vision changes, and loss of consciousness and generalized seizures. At three atmospheres, CNS toxicity occurs in less than two hours; at six atmospheres, in only a few minutes.

Patients with chronic obstructive pulmonary disease retain carbon dioxide abnormally. If oxygen is administered, raising their blood oxygen concentration, their breathing becomes depressed and retained carbon dioxide rises to a dangerous level.

Animal studies suggest that the administration of certain drugs, including phenothiazine drugs and chloroquine, increases the susceptibility to toxicity from oxygen at high concentrations or pressures. Animal studies also indicate that vitamin E deficiency may increase susceptibility to oxygen toxicity.

Airway obstruction during high oxygen tension may cause alveolar collapse following absorption of the oxygen. Similarly, occlusion of the eustachians tubes may cause retraction of the eardrum and obstruction of the paranasal sinuses may produce vacuum-type headache.

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: Oxygen, Refrigerated Liquid

HAZARD CLASS: CLASS 2.2(5.1): Non-flammable, non-corrosive, non-toxic gas and oxidizing material

IDENTIFICATION #: UN1073

PRODUCT REPORTABLE QUANTITY(PRQ):

Any accidental release in a quantity that could pose a danger to public safety or any sustained release of 10 minutes or more.

SHIPPING LABEL(s): Special Oxidizer with Class 2 at bottom.

PLACARD (When Required): Special Oxidizer with Class 2 at bottom.

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. 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.

WHMIS (Canada): CLASS A: Compressed gas.
CLASS C: Oxidizing material.

This product is on the DSL list.

International Regulations:

EINECS: Not available.

DSCL (EEC): R8- Contact with combustible material may cause fire.

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 0

PHYSICAL HAZARD 2

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: CGA-440 (cryogenic liquid withdrawl)

PIN-INDEXED YOKE: Not applicable.

ULTRA-HIGH-INTEGRITY CONNECTION: Not applicable.

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 Gases
- AV-8 Characteristics and Safe Handling of Cryogenic Liquid and Gaseous Oxygen
- G-4 Oxygen
- G-4.1 Cleaning Equipment for Oxygen Service
- G-4.3 Commodity Specification for Gaseous and Liquid Oxygen
- P-1 Safe Handling of Compressed Gases in Containers
- P-2 Characteristics and Safe Handling of Medical Gases
- P-12 Safe Handling of Cryogenic Liquids
- P-14 Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres
- SB-8 Use of Oxy-Fuel Gas Welding and Cutting Apparatus
- 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

Praxair asks users of this product to study this MSDS and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

PREPARATION INFORMATION:

DATE: October 15, 2016
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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