



Material Safety Data Sheet

Oxygen, Refrigerated Liquid

Section 1 : PRODUCT AND COMPANY IDENTIFICATION

Product name: Oxygen, Refrigerated Liquid

Synonyms: Liquid Oxygen, LOX, Oxygen USP, Oxygen (cryogenic liquid)

Supplier/ Manufacturer: Premier Medical Corporation
5055 East 48th Avenue
Denver, CO 80226

Business Phone: (303) 650-4400.

Emergency phone: Chem-Tel 1-800-255-3924.

Section 2 : COMPOSITION / INGREDIENT INFORMATION

Ingredient Name	C.A.S.	CONCENTRATION %
OXYGEN	7782-44-7	> 99%

Section 3 : HAZARD IDENTIFICATION

Emergency Overview: Liquid Oxygen is a pale blue, odorless cryogenic liquid.

The chief physical hazard associated from contact with this liquid is the extreme cold. The liquefied gas can cause freezing of tissue, or cryogenic burns, similar to frostbite to eyes or skin upon contact. The main hazard associated with releases of the gas is its oxidizing power which can greatly accelerate the burning rate for both common and exotic combustible materials. The cryogenic liquid will rapidly boil to the gas at standard temperatures and pressures. Emergency personnel must practice extreme caution when approaching oxygen releases because of the potential for intense fire.

Route of entry: Inhalation, skin and eye contact.

Effects of acute exposure

Eye contact: Contact of the liquid with the eyes can cause pain, redness, severe cryogenic burns, and prolonged exposure could cause blindness.

Skin contact: Contact of the liquid with the skin can lead to severe cryogenic burns or dermatitis (red, cracked, irritated skin), depending upon concentration and duration of exposure. Contact with the

undiluted liquid will cause frostbite, ulceration of the skin (which may be delayed in appearance for several hours), blistering, and pain. Contact with the rapidly expanding gas poses a frostbite hazard.

Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside.

Inhalation: Inhalation of the extremely cold vapors of this product will cause cryogenic burns to the respiratory system. Breathing gaseous oxygen at atmospheric pressure and high oxygen concentrations (80% or more) for prolonged periods (more than a few hours) may cause nasal stuffiness or respiratory system irritation. May cause cough, sore throat, chest pain, breathing difficulty, peripheral vasoconstriction, or seizures.

Ingestion: Not a likely route of exposure, but severe frostbite of the lips and mouth may result from contact with the liquid.

Effects of chronic exposure: None known.

Exposure Limits: No

Irritant: No

Sensitization: No

Teratogen: No

Reproductive Hazard: No

Mutagen: No

Synergistic Effects: None known

OSHA Regulatory Status This material is classified as hazardous under OSHA regulations.

Section 4 : FIRST AID MEASURES

Skin contact: Remove any clothing that may restrict circulation to any frozen area. As soon as practicable, place any affected area in warm water bath, which has a temperature that does not exceed 105° F (40° C). NEVER USE HOT WATER. NEVER USE DRY HEAT. If area of frostbite is extensive, and if possible, remove clothing while showering with warm water. If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area of the body in the armpit. Frozen tissue is painless and appears waxy, with a possible yellow color. Frozen tissue will become swollen, painful, and prone to infection when thawed. If the frozen part of the body has been thawed by the time medical

attention has been obtained, cover the area with a dry sterile dressing and a large bulky protective covering.

Eye contact: If liquid is splashed into eyes, or if irritation of the eye develops after exposure to liquid or gas, open victim's eyes while under gentle running water. Flush for a minimum of 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical attention immediately, preferably an ophthalmologist.

Inhalation: Remove victim(s) to fresh air, as quickly as possible. If not breathing qualified personnel should administer artificial respiration. Get medical attention.
Keep person warm and at rest.

Ingestion: Not considered a potential route of exposure.

Section 5 : FIRE FIGHTING MEASURES

Flammability: Oxidizer.

Conditions of flammability: Cryogenic liquids can be particularly dangerous during fires because of their potential to rapidly freeze water. Careless use of water may cause heavy icing. Contact with flammable materials may cause fire or explosion. Do not walk on or roll equipment over spill, any impact could cause an explosion. Heat of fire can build pressure in a closed container and cause it to rupture. No part of a container should be subject to temperatures of more than 125° F (52° C). Liquid oxygen containers are equipped with pressure relief devices. Venting vapors may obscure visibility. Liquid oxygen, when released, will vaporize rapidly, forming an oxygen-rich vapor cloud. Evacuate this vapor cloud area. Direct water onto vessels to keep the vessels cool. Shut-off the flow of Liquid Oxygen or move vessels from fire area if it can be done safely.
Vigorously accelerates combustion.

Extinguishing media: Use appropriate extinguishing media for surrounding fire.

Special procedures: Structural firefighters must wear Self-contained breathing apparatus and full protective gear.
Other information for pre-planning can be found in the North American Emergency Response Guidebook, and the DOT Emergency Response Guidebook.
Cool fire exposed containers with water spray.
Personnel should be evacuated.
Remove containers from fire area if without risk.

Auto-ignition temperature: Not applicable.

Flash point (°C), method: Not applicable.

Lower flammability limit (% vol): Not applicable.

Upper flammability limit (% vol): Not applicable.

Explosion Data

Sensitivity to mechanical impact: Contact with flammable materials may cause fire or explosion. Do not walk on or roll equipment over spill, any impact could cause an explosion.

Explosive power: Closed containers may rupture or explode due to pressure build-up when exposed to extreme heat. Cylinders are equipped with temperature and pressure relief devices but may still rupture under fire conditions.

Section 6 : ACCIDENTAL RELEASE MEASURES

Leak/Spill: Evacuate all personnel and allow the liquid to evaporate and the gas to dissipate. To increase the rate of vaporization, spray large amounts of water on the leak from an upwind position. If the area must be entered by emergency personnel, leather or thermally protective gloves, and appropriate foot and leg protection must be worn.

Shut off flow and/or stop leak if without risk.

Remove all flammable materials from vicinity.

If possible, prevent liquid oxygen from contacting any grease, oil, asphalt, oily surface, petroleum based product, or other combustible materials. Avoid all contact with liquid oxygen or cold gas.

Ventilate area or move cylinder to a well ventilated area.

Section 7 : HANDLING AND STORAGE

Handling procedures and equipment: Protect cylinders and system components from damage.

Use adequate ventilation.

Never allow any unprotected body part to touch uninsulated pipes or vessels containing cryogenic fluids. Flesh will stick to the extremely cold metal and will tear when any attempt is made to pull free.

Do not get liquid in eyes, on skin, or on clothing. Persons exposed to high concentrations of liquid oxygen should stay in a well-ventilated or open area for 30 minutes before entering a confined space or going near any source of ignition. Immediately remove clothing exposed to oxygen and air it out to reduce the likelihood of an engulfing fire.

Oxygen is not to be used as a substitute for compressed air.

Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve

or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment. Use only piping and equipment cleaned for oxygen service.

Storage requirements: Cryogenic containers should be stored in cool, dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Store away from flammable materials and corrosive atmospheres. Do not store near elevators, corridors or loading docks. Do not allow area where cylinders are stored to exceed 52°C (125°F). Do not store in confined space. Cryogenic containers are equipped with a pressure relief device and a pressure controlling valve. Under normal conditions, these containers will periodically vent gaseous oxygen.

Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Store cylinders upright and firmly secured with a chain or in a rack or stand designed for that purpose.

Separate liquid oxygen containers from flammables by at least 20 feet or use a barricade of non-combustible material at least 5 feet high, having a fire resistance rating of at least ½ hour.

Refer to local fire codes for additional storage requirements.

Section 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

Precautionary Measures

Gloves/Type: Wear loose fitting, leather or thermally protective gloves when handling cryogenic cylinders, hoses or fittings. Gloves must be free of oil and grease. If necessary, select in accordance with OSHA 29 CFR 1910.132, 1910.133, and 1910.138.

Respirator/Type: None required under normal use. Maintain oxygen levels above 19.5% and below 23.5% in the workplace. DO NOT ENTER AN AREA IF THE OXYGEN CONTENT EXCEEDS 23.5%.

Eye/Type: Full face shield and safety glasses are recommended.

Footwear/Type: Safety shoes are recommended when handling cylinders.

Clothing/Type: Wear protective clothes appropriate for task. Cuff-less trousers should be worn outside the shoes to prevent any splashed or spilled cryogenic liquid from being trapped against the skin. A leather apron is recommended to protect clothing.

Ventilation requirements: Use with adequate ventilation. Mechanical ventilation is satisfactory. Ensure oxygen concentration remains above 19.5%

and below 23.5%.
Local exhaust at points of emission preferred.

Section 9 : PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Cryogenic liquid

Appearance & odor: Pale blue, odorless cryogenic liquid.

Odor threshold (PPM): N/A.

Vapor pressure : N/A

Specific gravity (air=1): 1.105 @ 70°F (21°C) and 1 atmosphere

Volatiles (% by volume) 100%

Boiling point : -183°C (760 mmHg)
-297.4°F

Freezing point : -218.8°C
-361.8°F

Solubility in water (%): 0.0489 (vol/vol at 0°C and 1 atm.).

Molecular Weight: 32.00

Section 10 : STABILITY AND REACTIVITY

Chemical stability: Normally stable.

Conditions of reactivity: Heat

Hazardous polymerization: Will not occur.

Incompatible substances: Combustible and flammable materials.
Hydrocarbons such as oils and grease, asphalt, ethers, alcohols, acids, and aldehydes. Refer to NFPA 491M Manual of Hazardous Chemical Reactions.

Hazardous decomposition products: None.

Section 11 : TOXICOLOGICAL INFORMATION

Acute Dose Effects: Oxygen poses no toxicity hazards at atmospheric concentration and pressure. 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 hours or more) or at pressures exceeding atmospheric pressure. All individuals exposed for long periods to oxygen at high pressure and all who exhibit overt oxygen toxicity should be examined by a physician.

At two or more atmospheres, central nervous system (CNS) toxicity 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, and at six atmospheres in only a few minutes.

Patients with chronic obstructive pulmonary disease (COPD) may retain carbon dioxide abnormally. If oxygen is administered, raising their blood oxygen concentration, in rare cases their breathing may become depressed.

Section 13 : DISPOSAL CONSIDERATIONS

Waste disposal: Waste disposal must be conducted in accordance with federal, state, and local regulations.
Gas will dissipate in air. Cryogenic containers should be returned in the original shipping container, properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place. For emergency disposal, secure the cylinder and slowly discharge the gas to the atmosphere in a well-ventilated area or outdoors, away from all sources of ignition.

Section 14 : TRANSPORT INFORMATION

DOT/ TDG classification: Oxygen, refrigerated liquid
UN1073
Class 2.2 (Non-Flammable Gas)
with subsidiary risk 5.1 (Oxidizer)



**North American
Emergency Response
Guidebook 2008 Number:** 122

Section 15 : REGULATORY INFORMATION

Disclaimer:	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, state, and local regulations.
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**U.S. CERCLA Reportable
Quantity (RQ):** Not applicable.

**U.S. SARA Reporting
Requirements:** 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act. Oxygen is subject to the reporting

requirements of sections 311 and 312 of Title III of the Superfund Amendments and Reauthorization Act (40CFR 370.21).

U.S. SARA Threshold

Planning Quantity Not applicable.

Requirements:

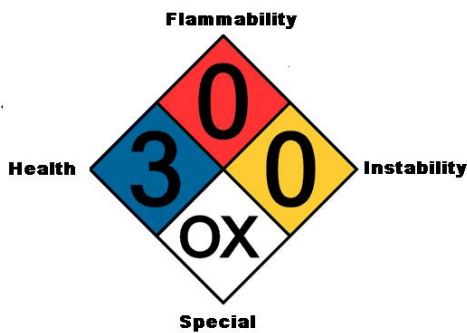
U.S. TSCA Inventory

Status: Oxygen is listed on the TSCA inventory.

FDA: Oxygen USP is regulated by the FDA as a prescription drug.

Section 16 : OTHER INFORMATION

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) CLASSIFICATION:



NFPA Rating Explanation Guide					
RATING NUMBER	HEALTH HAZARD	FLAMMABILITY HAZARD	INSTABILITY HAZARD	RATING SYMBOL	SPECIAL HAZARD
4	Can be lethal	Will vaporize and readily burn at normal temperatures	May explode at normal temperatures and pressures	ALK	Alkaline
3	Can cause serious or permanent injury	Can be ignited under almost all ambient temperatures	May explode at high temperature or shock	ACID	Acidic
2	Can cause temporary incapacitation or residual injury	Must be heated or high ambient temperature to burn	Violent chemical change at high temperatures or pressures	COR	Corrosive
1	Can cause significant irritation	Must be preheated before ignition can occur	Normally stable. High temperatures make unstable	OX	Oxidizing
0	No hazard	Will not burn	Stable	☸	Radioactive
				☹	Reacts violently or explosively with water
				☹OX	Reacts violently or explosively with water and oxidizing

This chart for reference only - For complete specifications consult the NFPA 704 Standard

HAZARDOUS MATERIAL INFORMATION SYSTEM (HMIS) CLASSIFICATION:

3	HEALTH
0	FLAMMABILITY
0	REACTIVITY
X	PPE
SEE SECTION 8	

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