



# OXYGEN, REFRIGERATED LIQUID

## Material Safety Data Sheet

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	OXYGEN, REFRIGERATED LIQUID
Product Code(s)	G-102
UN-No	UN1073
Recommended Use	Refrigerant.
Synonyms	Liquid Oxygen; LOX
Supplier Address*	<p>Linde Gas North America LLC - Linde Merchant Production Inc. - Linde LLC            575 Mountain Ave.            Murray Hill, NJ 07974            Phone: 908-464-8100            www.lindeus.com</p> <p>Linde Gas Puerto Rico, Inc.            Las Palmas Village            Road No. 869, Street No. 7            Catano, Puerto Rico 00962            Phone: 787-641-7445            www.pr.lindegas.com</p> <p>Linde Canada Limited            5860 Chedworth Way            Mississauga, Ontario L5R 0A2            Phone: 905-501-1700            www.lindecana.com</p>
	* May include subsidiaries or affiliate companies/divisions.
	For additional product information contact your local customer service.
Chemical Emergency Phone Number	Chemtrec: 1-800-424-9300 for US/ 703-527-3887 outside US

### 2. HAZARDS IDENTIFICATION

<b>WARNING!</b>		
<b>Emergency Overview</b>		
Oxidizer		
Contact with combustible material may cause fire		
Contact with liquid may cause frostbite.		
Contents under pressure		
Keep at temperatures below 52°C / 125°F		
Appearance Pale blue	Physical State Cryogenic Liquid.	Odor Odorless

#### OSHA Regulatory Status

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential Health Effects

Principle Routes of Exposure	Eye contact. Skin contact. Inhalation.
Acute Toxicity	
Inhalation	Oxygen is not acutely toxic under normal pressure. Oxygen is more toxic when inhaled at elevated pressures. Depending upon pressure and duration of exposure, pure oxygen at elevated pressures may cause cramps, dizziness, difficulty breathing, convulsions, edema and death.
Eyes	This product is a gas at room temperature. Contact with liquid may cause frostbite.
Skin	This product is a gas at room temperature. Contact with liquid may cause frostbite.
Skin Absorption Hazard	No known hazard in contact with skin.
Ingestion	None known.
Chronic Effects	Prolonged inhalation of high oxygen concentrations (>75%) may affect coordination, attention, and cause tiredness of respiratory irritation.
Aggravated Medical Conditions	Chronic obstructive pulmonary disease.
Environmental Hazard	See Section 12 for additional Ecological Information.

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Chemical Name	CAS-No	Volume %	Chemical Formula
Oxygen	7782-44-7	>99	O <sub>2</sub>

**4. FIRST AID MEASURES**

Eye Contact	None required for gas. If frostbite is suspected, flush eyes with cool water for 15 minutes and obtain immediate medical attention.
Skin Contact	None required for gas. For dermal contact or suspected frostbite, remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if contact with the product has resulted in blistering of the dermal surface or in deep tissue freezing.
Inhalation	Move victim to fresh air. Seek immediate medical attention/advice.
Ingestion	None under normal use. Get medical attention if symptoms occur.
Notes to Physician	Treat symptomatically.

**5. FIRE-FIGHTING MEASURES**

Flammable Properties	Oxidizer. May vigorously accelerate combustion.
Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Explosion Data

Sensitivity to Mechanical Impact	None
Sensitivity to Static Discharge	None
Specific Hazards Arising from the Chemical	May ignite combustibles (wood paper, oil, clothing, etc.). High oxygen concentrations vigorously accelerate combustion. Cylinders may rupture under extreme heat. Continue to cool fire exposed cylinders until flames are extinguished. Damaged cylinders should be handled only by specialists.
Protective Equipment and Precautions for Firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

## 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Ensure adequate ventilation. Monitor oxygen level.
Environmental Precautions	Prevent spreading of vapors through sewers, ventilation systems and confined areas.
Methods for Containment	Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. If leak is in container or container valve, contact the appropriate emergency telephone number in Section 1 or call your closest Linde location.
Methods for Cleaning Up	Return cylinder to Linde or an authorized distributor.

## 7. HANDLING AND STORAGE

Handling	<p>Liquid oxygen cannot be handled in carbon or low alloy steel, 18-8 and 18-10 stainless steel are acceptable as are copper and its alloys, brass bronze, silicon alloys, Monel®, Inconel®, and beryllium. Teflon®, Teflon® composites, or Kel-F® are preferred non-metallic gasket materials.</p> <p>Oxygen should not be used as a substitute for compressed air in pneumatic equipment since they generally contain flammable lubricants. Equipment able to use oxygen must be "cleaned for oxygen service". Check with the equipment supplier to verify oxygen compatibility for the service conditions.</p> <p>Stationary customer site vessels should be operated in accordance with the manufacturer's and Linde's instruction. Do not attempt to repair, adjust or in any other way modify the operation of these vessels. If there is a malfunction or other type of operations problem with the vessel, contact the closest Linde location immediately for assistance. "NO SMOKING" signs should be posted in storage and use areas. Containers of liquid oxygen should be separated from flammable gas containers by a minimum distance of 20 ft., or by a barrier of non-combustible material at least 5 ft. high having a fire resistance rating of 1/2 hour.</p> <p>Use only in ventilated areas. Never attempt to lift a cylinder by its valve protection cap. Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distance, use a cart designed to transport cylinders. Use equipment rated for cylinder pressure. Use backflow preventive device in piping. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing leak to occur.</p> <p>Use an adjustable strap wrench to remove over-tight or rusted caps. Close valve after each use and when empty. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.</p> <p>Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.</p> <p>For additional recommendations, consult Compressed Gas Association's Pamphlets SB-7, G-4.3, G-4.1, G-4.4, P-2.5, G-4.9, P-14, and SB-2.</p>
----------	--

**Storage** Protect from physical damage. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Exposure Guidelines** This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

**Engineering Measures** Showers. Eyewash stations. Ventilation systems.

**Ventilation** Use local exhaust in combination with general ventilation as necessary to keep oxygen concentrations below 23.5%.

**Personal Protective Equipment**

**Eye/Face Protection** Wear protective eyewear (safety glasses).

**Skin and Body Protection** Work gloves and safety shoes are recommended when handling cylinders. Wear cold insulating gloves when handling liquid. Gloves must be clean and free from grease or oil.

**Respiratory Protection**

**General Use** No special protective equipment required.

**Hygiene Measures** Handle in accordance with good industrial hygiene and safety practice.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance</b>	Pale blue.	<b>Odor</b>	Odorless.
<b>Odor Threshold</b>	No information available.	<b>Physical State</b>	Cryogenic Liquid
<b>Flash Point</b>	No information available.	<b>Autoignition Temperature</b>	No information available.
<b>Decomposition Temperature</b>	No information available.	<b>Boiling Point/Range</b>	-182.9°C / -297.3°F
<b>Freezing Point</b>	-218.8°C / -361.8°F	<b>Molecular Weight</b>	32.00
<b>Water Solubility</b>	Slightly soluble	<b>Evaporation Rate</b>	No information available
<b>Vapor Pressure</b>	760 mmHg @ -183°C	<b>Vapor Density</b>	1.14 (air = 1)
<b>VOC Content (%)</b>	Not applicable.	<b>Flammability Limits in Air</b>	
		<b>Upper</b>	Not applicable
		<b>Lower</b>	Not applicable

## 10. STABILITY AND REACTIVITY

**Stability** Stable.

**Incompatible Products** Combustible materials. Organic material. Reducing agents.

**Conditions to Avoid** Keep away from open flames, hot surfaces and sources of ignition.

Hazardous Decomposition Products	None known.
Hazardous Polymerization	Hazardous polymerization does not occur.

## 11. TOXICOLOGICAL INFORMATION

### Acute Toxicity

LD50 Oral: No information available.

LD50 Dermal: No information available.

LC50 Inhalation: No information available.

**Inhalation**  
Human volunteers which inhaled 90-95% oxygen through a face mask for 6 hours showed signs of tracheal irritation and fatigue. Other symptoms (which may have been caused by placing a tube into the trachea during the experiment) included: sinusitis, conjunctivitis, fever, and symptoms of acute bronchitis.

Poisoning began in dogs 36 hours after inhalation of pure oxygen at atmospheric pressure. Distress was seen within 48 hours and death within 60 hours.

**Eye Contact**  
The incompletely developed retinal circulation is more susceptible to toxic levels of oxygen. In premature infants, arterial oxygen tension above 150 mm Hg may cause retrolental fibroplasia. Permanent blindness may occur several months later. One case of severe retinal damage in an adult was reported. An individual suffering from myasthenia gravis developed irreversible retinal atrophy after breathing 80% oxygen for 150 days.

Repeated Dose Toxicity No information available.

### Chronic Toxicity

Chronic Toxicity Prolonged inhalation of high oxygen concentrations (>75%) may affect coordination, attention, and cause tiredness of respiratory irritation.

Carcinogenicity Contains no ingredient listed as a carcinogen.

Irritation No information available.

Sensitization No information available.

Reproductive Toxicity No information available.

Developmental Toxicity No information available.

Synergistic Materials None known.

Target Organ Effects None known.

## 12. ECOLOGICAL INFORMATION

### Ecotoxicity

Will not bioconcentrate.

Ozone depletion potential; ODP; (R-11 = 1): Does not contain ozone depleting chemical (40 CFR Part 82).

### 13. DISPOSAL CONSIDERATIONS

**Waste Disposal Methods** Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde for proper disposal.

### 14. TRANSPORT INFORMATION

#### DOT

Proper Shipping Name	Oxygen, refrigerated liquid
Hazard Class	2.2
Subsidiary Class	5.1
UN-No	UN1073
Description	UN1073,Oxygen, refrigerated liquid,2.2,(5.1)
Emergency Response Guide Number	122

#### TDG

Proper Shipping Name	Oxygen, refrigerated liquid
Hazard Class	2.2
Subsidiary Class	(5.1)
UN-No	UN1073
Description	UN1073,OXYGEN, REFRIGERATED LIQUID,2.2(5.1)

#### MEX

Proper Shipping Name	Oxygen, refrigerated liquid
Hazard Class	2.2
Subsidiary Class	5.1
UN-No	UN1073
Description	UN1073 Oxygen, refrigerated liquid,2.2

#### IATA

UN-No	UN1073
Proper Shipping Name	Oxygen, refrigerated liquid
Hazard Class	2.2
Subsidiary Class	5.1
ERG Code	2X
Description	UN1073,Oxygen, refrigerated liquid,2.2(5.1)
Maximum Quantity for Passenger	Forbidden
Maximum Quantity for Cargo Only	Forbidden
Limited Quantity	No information available.

#### IMDG/IMO

Proper Shipping Name	Oxygen, refrigerated liquid
Hazard Class	2.2
Subsidiary Class	5.1
UN-No	UN1073
EmS No.	F-C, S-W
Description	UN1073, Oxygen, refrigerated liquid,2.2(5.1)

ADR

Proper Shipping Name	Oxygen, refrigerated liquid
Hazard Class	2.2
UN-No	UN1073
Classification Code	30
Description	UN1073 Oxygen, refrigerated liquid,2.2,
ADR/RID-Labels	5.1

**15. REGULATORY INFORMATION**International Inventories

TSCA	Complies
DSL	Complies
EINECS/ELINCS	Complies

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

U.S. Federal RegulationsSARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	Yes
Reactive Hazard	No

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Risk and Process Safety Management Programs

This material, as supplied, does not contain any regulated substances with specified thresholds under 40 CFR Part 68.

This product does not contain any substances regulated as Highly Hazardous Chemicals pursuant to the 29 CFR Part 1910.110.

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

CERCLA/SARA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

U.S. State Regulations

**California Proposition 65**

This product does not contain any Proposition 65 chemicals.

**U.S. State Right-to-Know Regulations**

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Oxygen	X	X	X	-	X

**International Regulations**

**Canada**

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

**WHMIS Hazard Class**

- A Compressed gases
- C Oxidizing materials



**16. OTHER INFORMATION**

Prepared By Product Stewardship  
23 British American Blvd.  
Latham, NY 12110  
1-800-572-6501

Issuing Date 05-Mar-2010

Revision Date 02-Sep-2010

Revision Number 1

Revision Note (M)SDS sections updated. 1.

<u>NFPA</u>	Health Hazard 3	Flammability 0	Stability 0	Physical and Chemical Hazards 0X
<u>HMIS</u>	Health Hazard 3	Flammability 0	Physical Hazard 2	Personal Protection -

**Note:** Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

**General Disclaimer**

For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between Linde LLC, Linde Merchant Production, Inc. or Linde Gas North America LLC (or any of their affiliates and subsidiaries) and the purchaser.



DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

End of Safety Data Sheet