1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Oxygen (Refrigerated)
Chemical formula	:	O2
Synonyms	:	Oxygen (refrigerated), Oxygen USP, LOX, Cryogenic Liquid Oxygen
Product Use Description	:	General Industrial
Company	:	Air Products and Chemicals,Inc 7201 Hamilton Blvd. Allentown, PA 18195-1501
Telephone	:	800-345-3148
Emergency telephone number	:	800-523-9374 USA 01-610-481-7711 International

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Volume)
Oxygen	7782-44-7	100 %

Concentration is nominal. For the exact product composition, please refer to Air Products technical specifications.

3. HAZARDS IDENTIFICATION

Emergency Overview

Extremely cold liquid and gas under pressure.
Direct contact with liquid can cause frostbite.
May react violently with combustible materials.
Keep oil, grease, and combustibles away.

Potential Health Effects

Inhalation	:	Breathing 75% 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 pure oxygen under pressure may cause lung damage and also central nervous system effects. Breathing 75% 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 pure oxygen under pressure may cause lung damage and also central nervous system effects.
Eye contact	:	Contact with liquid may cause cold burns/frost bite.
Skin contact	:	Contact with liquid may cause cold burns/frost bite. May cause severe frostbite.

Ingestion	:	Ingestion is not considered a potential route of exposure.

Exposure Guidelines

Primary Routes of Entry	:	Inhalation Eye and skin contact.
Target Organs	:	None.

Aggravated Medical Condition

If oxygen is administered to persons with chronic obstructive pulmonary disease, raising the oxygen concentration in the blood depresses their breathing and raises their retained carbon dioxide to a dangerous level. None.

4. FIRST AID MEASURES

Eye contact	:	In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Skin contact	:	In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash frost-bitten areas with plenty of water. Do not remove clothing. As soon as practical, place the affected area in a warm water bath- which has a temperature not to exceed 40 °C (105 °F). Cover wound with sterile dressing.
Ingestion	:	Ingestion is not considered a potential route of exposure.
Inhalation	:	Consult a physician after significant exposure. Move to fresh air.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	All known extinguishing media can be used. Use extinguishing media appropriate for surrounding fire.
Specific hazards	:	Combustibles in contact with liquid oxygen may explode on ignition or impact. Some materials which are noncombustible in air may burn in the presence of an oxidizer. Contact with organic and most inorganic materials may cause fire. Vapor cloud may obscure visibility. Keep area evacuated and free from ignition sources until any spilled liquid has evaporated. (Ground free from frost). Move away from container and cool with water from a protected position. Do not direct water spray at container vent. If possible, stop flow of product.
Special protective equipment for fire-fighters	:	Wear self contained breathing apparatus for fire fighting if necessary. Fire resistant clothing may burn and offer no protection in oxygen rich atmospheres.
Further information	:	Some materials that are noncombustible in air will burn in the presence of an oxygen enriched atmosphere (greater than 23%). Fire resistant clothing may burn and offer no protection in oxygen rich atmospheres.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Clothing exposed to high concentrations may retain oxygen 30 minutes or longer and become a potential fire hazard. Stay away from ignition sources. Evacuate personnel to safe areas. Ventilate the area. Monitor oxygen level. Spill will rapidly vaporize forming an oxygen rich vapor cloud. Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level. Personnel who have been exposed to high concentrations of oxygen should stay in a well-ventilated or open area for 30 minutes before going into a confined space or near an ignition source.
Methods for cleaning up	:	Ventilate the area. Keep area evacuated and free from ignition sources until any spilled liquid has evaporated. (Ground free from frost).
Additional advice	:	Increase ventilation to the release area and monitor oxygen level.

7. HANDLING AND STORAGE

Handling

All gauges, valves, regulators, piping and equipment to be used in oxygen service must be cleaned for oxygen service. Oxygen is not to be used as a substitute for compressed air. Never use an oxygen jet for cleaning purposes of any sort, especially clothing, as it increases the likelihood of an engulfing fire. Know and understand the properties and hazards of the product before use. Only experienced and properly instructed persons should handle compressed gases. Before using the product, determine its identity by reading the label. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Do not remove or interchange connections. Prevent entrapment of cryogenic liquid in closed systems not protected with relief device. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Do not subject containers to abnormal mechanical shocks which may cause damage to their valve or safety devices. Only transfer lines designed for cryogenic liquids shall be used. Use only with equipment cleaned for oxygen service and rated for cylinder pressure. Never permit oil, grease, or other readily combustible substances to come into contact with valves or containers containing oxygen or other oxidants. All vents should be piped to the exterior of the building.

Storage

WARNING! Do not change or force fit connections. Always keep container in upright position. Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. Do not allow storage temperature to exceed 50°C (122°F). Full containers should be stored so that oldest stock is used first. Do not store in a confined space. Full and empty cylinders should be segregated. Store containers in location free from fire risk and away from sources of heat and ignition. Return empty containers in a timely manner. Stored containers should be periodically checked for general condition and leakage. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Cryogenic containers are equipped with pressure relief devices to control internal pressure. Under normal conditions these containers will periodically vent product. Where necessary containers containing oxygen and oxidants should be separated from flammable gases by a fire resistant partition.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Natural or mechanical to prevent oxygen-enriched atmospheres above 23% oxygen.

Personal protective equipment

Respiratory protection	:	Not required for properly ventilated areas.
Hand protection	:	Loose fitting thermal insulated or leather gloves. Work gloves are recommended when handling cylinders. Gloves must be clean and free of oil and grease. The breakthrough time of the selected glove(s) must be greater than the intended use period.
Eye protection	:	Protect eyes, face and skin from liquid splashes. Safety glasses recommended when handling cylinders.
Skin and body protection	:	Personnel who have been exposed to high concentrations of oxygen should stay in a well-ventilated or open area for 30 minutes before going into a confined space or near an ignition source. Never allow any unprotected part of the body to touch uninsulated pipes or vessels which contain cryogenic fluids. The extremely cold metal will cause the flesh to stick fast and tear when one attempts to withdraw from it. Safety shoes are recommended when handling cylinders.
Special instructions for protection and hygiene	:	Ensure adequate ventilation, especially in confined areas.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquefied gas.
Color	:	Blue.
Odor	:	No odor warning properties.
Molecular Weight	:	32 g/mol
Relative vapor density	:	1.1 (air = 1)
Relative density	:	1.1 (water = 1)
Boiling point/range	:	-297 °F (-183 °C)
Critical temperature	:	-180 °F (-118 °C)
Melting point/range	:	-362 °F (-219 °C)
Water solubility	:	0.039 g/l

10. STABILITY AND REACTIVITY

Stability	:	Stable under normal conditions.
Materials to avoid	:	Avoid oil, grease and all other combustible materials. Flammable materials. Organic materials. Finely divided aluminium. Carbon steel. Reducing agents.

11. TOXICOLOGICAL INFORMATION

Acute Health Hazard

Ingestion	:	No data is available on the product itself.
Inhalation	:	No data is available on the product itself.
Skin.	:	No data is available on the product itself.

Chronic Health Hazard

Premature infants exposed to high oxygen concentrations may suffer delayed retinal damage 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 hr). 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.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity	:	No data is available on the product itself.
Toxicity to other organisms	:	No data available.

Persistence and degradability

Mobility	:	No data available.
Bioaccumulation	:	No data is available on the product itself.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products	:	Return unused product in orginal cylinder to supplier. Contact supplier if guidance is required.
Contaminated packaging	:	Return cylinder to supplier.

14. TRANSPORT INFORMATION

CFR

Proper shipping name : Oxygen, refrigerated liquid
Class : 2.2 (5.1)
UN/ID No. : UN1073

IATA

Proper shipping name : Oxygen, refrigerated liquid
UN/ID No. : UN1073

IMDG

Proper shipping name : OXYGEN, REFRIGERATED LIQUID
Class 2.2 (5.1)
UN/ID No. : UN1073

CTC

Proper shipping name : OXYGEN, REFRIGERATED LIQUID
Class : 2.2 (5.1)
UN/ID No. : UN1073

Further Information
Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

15. REGULATORY INFORMATION

OSHA Hazard Communication Standard (29 CFR 1910.1200) Hazard Class(es)
Oxidizer. Cryogenic (refrigerated) Liquid

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
EU	EINECS	Included on Inventory.
Canada	DSL	Included on Inventory.
Australia	AICS	Included on Inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Included on Inventory.
Philippines	PICCS	Included on Inventory.
Japan	ENCS	Included on Inventory.

EPA SARA Title III Section 312 (40 CFR 370) Hazard Classification:
Acute Health Hazard. Fire Hazard.

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)
This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other harm.

16. OTHER INFORMATION

NFPA Rating

Health	:	3
Fire	:	0
Instability	:	0
Special	:	OX

HMIS Rating

Health	:	3
Flammability	:	0
Physical hazard	:	2

Prepared by : Air Products and Chemicals, Inc. Global EH&S Product Safety Department

For additional information, please visit our Product Stewardship web site at
http//www.airproducts.com/productstewardship/