OXYGEN (LIQUID / REFRIGERATED)

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier : OXYGEN (Liquid / Refrigerated)

CAS No. : 7782-44-7

Chemical formula : O2

Synonyms : Oxygen (refrigerated), LOX, Cryogenic Liquid Oxygen

REACH Registration Number : Listed in Annex IV/V REACH, exempted from registration.

Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : General Industrial and Professional use. Perform risk assessment prior to use.

Restrictions on use : Not for consumer use

Details of the supplier of the safety Data sheet

Physical address : Air Products South Africa (Pty) Ltd.
Silver Stream Business Park, 1st Floor, Building 3,
10 Muswell Road South,
Bryanston, 2191

Telephone : +27 (0)11 570 5000 (Head Office)
+27 (0)11 977 6444 (Customer Care Cylinders)
0800 023 298 (Engineering / Bulk Services)

Emergency telephone number (24h) : 0800 650 315

SECTION 2: HAZARDS IDENTIFICATION

Classification of the substance/mixture

Oxidizing gases. -Category 1 H270: May cause or intensify fire; oxidiser

Gases under pressure – Refrigerated liquefied gas H281: Contains refrigerated gas; may cause cryogenic burns or injury

Label elements

Hazard pictograms/symbols

Signal word : Danger

Hazard statements:

H270: May cause or intensify fire; oxidiser

H281: Contains refrigerated gas; may cause cryogenic burns or injury.

Precautionary statement

Prevention : P220: Keep away from clothing and other combustible materials
P244: Keep valves and fittings free from oil and grease.
P282: Wear cold insulating gloves/face shield/eye protection.

Response : P370+P376: In case of fire: Stop leak if safe to do so.
P336: Thaw frosted parts with lukewarm water. Do not rub affected area
P315: Get immediate medical attention.

Storage : P403: Store in a well-ventilated place.

Other hazards

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.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

Substances

Components	EINECS/ELINCS Number	CAS Number	Concentration (volume)
Oxygen	231-956-9	7782-44-7	100%

Components	Classification (CLP)	REACH Reg. #
Oxygen	Ox. Gas 1; H270 Press. Gas (Ref.liq.) H281	*1

*1: Listed in Annex IV/V REACH, exempted from registration

*2: Registration not required: Substance manufactured or imported< 1 t/y.

*3: Registration not required: substance manufactured or imported < 1 t/y for non-intermediate uses.

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

Mixtures : Not applicable

SECTION 4: FIRST AID MEASURES

Description of 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 frostbitten 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. 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.

Most important symptoms and effects, both acute and delayed

Symptoms : No data available

Indication of any immediate medical attention and special treatment needed

Treatment : If exposed or concern: Get medical attention/advice.

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media : The product itself does not burn. Use extinguishing media appropriate for surrounding fire.

Extinguishing media which must not be used for safety reasons : Do not use water jet to extinguish.

Specific hazards arising from the substance or mixture

Combustibles in contact with liquid oxygen may explode on ignition or impact. Some materials which are non-combustible in air may burn in the presence of an oxidizer. Contact with organic and most inorganic materials may cause fire. 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. Gas is heavier than air and may collect in low areas or travel along the ground where there may be an ignition source present. Vapour cloud may obscure visibility. Keep area evacuated and free from ignition sources until any spilled liquid has evaporated. (Ground free from frost).

Advice for fire-fighters : Fire resistant clothing may burn and offer no protection in oxygen rich atmospheres. Wear self-contained breathing apparatus for fire-fighting if necessary. Standard protective clothing and equipment (self-contained breathing apparatus) for fire fighters. Standard EN 137-Self-contained open circuit compressed air breathing apparatus with full face mask. Standard EN 469-Protective clothing for fire-fighters. Standard EN 659-Protective gloves for fire-fighters.

Further information : Some materials that are non-combustible in air will burn in the presence of an oxygen enriched atmosphere (greater than 23.5%). Fire resistant clothing may burn and offer no protection in oxygen rich atmospheres.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

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 vapour cloud. Gas / vapour 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.

Environmental precautions : No data available

Methods and materials for containment and 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.

Reference to other sections : For more information refer to Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

Precautions for safe handling

Cylinders should be stored up right with valve protection guard in place and firmly secured to prevent falling or being knocked over. Use equipment rated for cylinder pressure. 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/cryogenic liquid. 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.

Conditions for safe storage, including any incompatibilities

Containers should be stored in a purpose-built compound which should be well ventilated, preferably in the open air. Do not allow storage temperature to exceed 50°C. 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.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure controls

Engineering measures

Natural or mechanical to prevent oxygen-enriched atmospheres above 23.5% oxygen.

Personal protective equipment

Respiratory protection : None necessary

Hand protection : Wear study work gloves when gas handling cylinders/containers. 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. If the operation involves possible exposure to a cryogenic liquid wear loose fitting thermal insulated or leather gloves. Standard EN 388- Protective gloves against mechanical risk. Standard EN 511 – Cold insulating gloves

Eye/face protection : Protect eyes, face and skin from liquid splashes. Safety glasses recommended when handling cylinders. Wear goggles and a face shield when transfilling or breaking transfer connections. Standard EN 166- Personal eye protection

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 un-insulated 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. Standard EN ISO 20345 – Personal protective equipment- safety footwear. Encapsulated chemical protective suit in emergency situations.

Special instructions for protection and hygiene : Ensure adequate ventilation, especially in confined areas.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Form	:	Liquefied gas.
Colour	:	Blue
Odour	:	No odour warning properties.
Density	:	0.0013g/cm^3 at 21 °C Note: (as vapour)
Molecular Weight	:	32 g/mol
Relative vapour density	:	1.1 (air = 1) heavier than air
Relative density	:	1.1 (water = 1)
Vapour pressure	:	Not applicable.
Specific Volume	:	0.7540 m^3/kg at 21 °C
Boiling point/range	:	-183 °C
Critical temperature	:	-118 °C
Melting point/range	:	-219 °C
Auto ignition temperature	:	Non flammable
Water solubility	:	0.039 g/l
Partition coefficient n-octanol/water [log kow]	:	Not applicable
pH	:	Not applicable
Viscosity	:	No applicable
Particle characteristics	:	No data available
Upper and lower explosion/flammability limits	:	No data available
Flash point	:	Not applicable
Decomposition temperature	:	No data available

Other information

Explosive properties	:	No data available
Oxidizing properties	:	Ci=1
Odour threshold	:	Odour threshold is subjective and inadequate to warn of over exposure
Evaporation rate	:	Not applicable
Flammability (solid, gas)	:	Refer to product classification in section 2

SECTION 10: STABILITY AND REACTIVITY

Reactivity : No reactivity hazard other than the effects described in the sub-section below

Chemical Stability : Stable under normal conditions.

Possibility of hazardous reactions : Violently oxidises organic material.

Conditions to avoid : None under recommended storage and handling conditions (see section 7)

Incompatible Materials : Avoid oil, grease and all other combustible materials.
Flammable materials.
Organic materials.
Finely divided aluminium
Carbon steel.
Reducing agents

Hazardous decomposition products : No data available

SECTION 11: TOXICOLOGICAL INFORMATION

Information on toxicological effects

Likely routes of exposure

Effects on eye	:	Contact with liquid may cause cold burns/frostbite
Effects on Skin	:	Contact the liquid may cause cold burns/frostbite
Inhalation 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.
Ingestion Effects	:	Ingestion is not considered a potential route of exposure
Symptoms	:	No data available

Acute toxicity

Acute oral toxicity	:	No data available on the product itself
Acute inhalation toxicity	:	No data available on the product itself
Acute dermal toxicity	:	No data available on the product itself
Skin corrosion/irritation	:	No data available
Serious eye damage/eye irritation	:	No data available
Sensitization	:	No data available

Chronic toxicity or effects from long term exposure

Carcinogenicity	:	No data available
Reproductive toxicity	:	No data available on the product itself
Germ cell mutagenicity	:	No data available on the product itself
Specific target organ systemic toxicity (single exposure)	:	No data available
Specific target organ systemic toxicity (repeated exposure)	:	No data available
Aspiration hazard	:	No data available

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

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

Persistence and degradability

No data available

Bioaccumulative potential	:	Refer to section 9 “partition coefficient (n-octanol/water)”.
Mobility in soil	:	Because of its high volatility, the product is unlikely to cause ground pollution.

Other adverse effects

This product has no known eco-toxicological effects.

Effect on the ozone layer	:	No known effects from this product
Ozone Depleting Potential	:	None
Effect on the ozone layer	:	No known effects from this product
Global Warming Potential	:	None

SECTION 13: DISPOSAL CONSIDERATIONS

Waste treatment methods	:	Return unused product in original cylinder to supplier. Contact supplier if guidance is required.
Contaminated packaging	:	Return cylinder to supplier.

SECTION 14: TRANSPORT INFORMATION

ADR

UN/ID No.	:	UN1073
Proper shipping name	:	OXYGEN, REFRIGERATED LIQUID
Class/Division	:	2
Tunnel Code	:	(C/E)
Label(s)	:	2.2 (5.1)
ADR/RID Hazard ID no.	:	225
Marine Pollutant	:	No

IATA

Transport forbidden

IMDG

UN/ID No.	:	UN1073
Proper shipping name	:	OXYGEN REFRIGERATED LIQUID
Class or Division	:	2.2
Label(s)	:	2.2 (5.1)
Marine Pollutant	:	No

RID

UN/ID No.	:	UN1073
Proper shipping name	:	OXYGEN REFRIGERATED LIQUID
Class or Division	:	2.
Label(s)	:	2.2 (5.1)
Marine Pollutant	:	No

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. Ensure compliance with applicable regulations.

Before transporting product containers ensure that they are firmly secured, and cylinder valve is closed and not leaking, valve outlet cap nut or plug (where provided) is correctly fitted and valve protection device (where provided) is correctly fitted.

The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact an Air Products customer service representative.

SECTION 15: REGULATORY INFORMATION

OHS Act	:	Occupational Health and Safety Act 85 of 1993 (and Regulations)
SANS 11014	:	Safety data sheet for chemical products- Content and order of sections
SANS 10234	:	Globally Harmonized System of classification and labelling of chemicals (GHS)
SANS 10265	:	The classification and labelling of dangerous substances and preparations for sale and handling
SANS 10019	:	Transportable containers for compressed, dissolved and liquefied gases – Basic design, manufacture, use and maintenance
SANS 1518	:	Transport of dangerous goods – Design, construction, testing, approval and maintenance of road vehicles and portable tanks
SANS 10228	:	The identification and classification of dangerous goods for transport
SANS 10229-1&2	:	Transport of dangerous goods – Packaging and large packaging for road and rail transport Part 1: Packaging / Part 2: Large Packaging
SANS 10263-2	:	The warehousing of dangerous goods Part 2: The storage and handling of gas cylinders

NB: Refer to latest edition

SECTION 16: OTHER INFORMATION

Ensure all national/local regulations are observed.

Hazard Statements

H270: May cause or intensify fire; oxidiser
H281: Contains refrigerated gas; may cause cryogenic burns or injury

Indication of Method

Oxidizing gases Category 1. May cause or intensify fire, oxidiser.

Gases under pressure. Refrigerated liquefied gas. Contains refrigerated gas; may cause cryogenic burns or injury.

Abbreviations and acronyms

ATE – Acute Toxicity Estimate
CLP – Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
REACH – Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
EINECS – European Inventory of Existing Commercial Chemical Substances
ELINCS – European List of Notified Chemical Substances
CAS# - Chemical Abstract Service number
PPE – Personal Protective Clothing
Kow – octanol-water partition coefficient
LC50- Lethal Concentration to 50% of a test population
LD50 – Lethal Dose to 50% of a test population (Median Lethal Dose)
OEL – Occupational Exposure Limit
PBT – Persistent Bioaccummulative and Toxic
vPvB - Very Persistent and Very Bioaccummulative
STOT – Specific Target Organ Toxicity
EN – European Standard
UN – United Nations
ADR – European Agreement concerning the International Carriage of Dangerous Goods by Road
IATA – International Air Transport Association
IMDG – International Maritime Dangerous Goods
RID – Regulations concerning the International Carriage of Dangerous Goods by Rail

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

(Reference www.airproducts.com:- Air Products PLC OXYGEN REFRIGERATED MSDS Number 300000000111 / Version 1.15 / Revision Date 24.03.2020)

For further information on storage, handling, and use, consult Air Products Safetygrams available on our web site at http//www.airproducts.com/safetygrams.