



MATERIAL SAFETY DATA SHEET

LIQUID OXYGEN

DATE: April 2001

1 PRODUCT AND COMPANY IDENTIFICATION

1 PRODUCT IDENTIFICATION

Product Name	Liquid Oxygen
Chemical Formula	O ₂
Trade Names	Liquid Oxygen Cryogenic Oxygen
Visual Identification	The Portable Cryogenic Container (PCC) is made of polished stainless steel, and has the relevant decal affixed to the body of the PCC to clearly identify the contents. There is also a permanent tag fitted to the PCC for traffic ID purposes.
Valve	The vapour outlet valve is Brass 5/8 inch BSP right hand female
Company Identification	Gaz Industriels Madagascar S.A 7 Avenue de l'Indépendance Soarano Analamanga 101 Antananarivo Renivohitra Madagascar

2 COMPOSITION INFORMATION ON INGREDIENTS

Chemical Name	Oxygen
Chemical family	Oxidant
Synonyms	LOX
CAS No.	7782-44-7
UN No.	1073
ERG No.	122
Hazchem Warning	5 A Non-flammable gas

3 HAZARDS IDENTIFICATION

Main Hazards All Portable Cryogenic Containers (PCC's) containing cryogenic liquids must be regarded as pressure vessels at all times. Excessive exposure to heat could cause the internal pressure to increase significantly with the consequent violent rupturing of the vessel. Due to its extremely low boiling point, -183°C, extreme care must be taken when handling liquid oxygen, otherwise frostbite can occur. Evaporated liquid, i.e. gaseous oxygen, is non-flammable, but readily supports combustion. Never allow liquid oxygen to come into contact with combustible materials, such as oil or grease, as they could react with explosive violence.

Adverse Health Effects. Central nervous systems toxicity including dizziness, convulsions and loss of consciousness after only 2-3 hours of exposure to pure oxygen can occur.

Chemical Hazards At the temperature of liquid oxygen, ordinary carbon steels, and most alloy steels, lose their ductility, and are therefore considered to be unsatisfactory. Metals and alloys that have satisfactory ductility include austenitic stainless steel and nickel-chromium alloys,

Biological Hazards Contact between the skin and liquid oxygen, or uninsulated piping, or vessels containing it, can cause severe cold burn injuries.

Vapour Inhalation Inhalation of the cold vapour from liquid oxygen can cause severe damage to mucous membranes.

Eye Contact Can cause severe burn-like injuries.

Skin Contact Frostbite can occur from contact with liquid oxygen

4 FIRST AID MEASURES

Prompt medical attention is mandatory in all cases of overexposure to oxygen. In case of frostbite from contact with liquid oxygen, place the frost-bitten part in warm water, about 40-42°C. If warm water is not available, or is impractical to use, wrap the affected part gently in blankets. Encourage the patient to exercise the affected part whilst it is being warmed. Do not remove clothing whilst frosted.

Eye Contact Immediately flush with large quantities of tepid water, or with sterile saline solution. Seek medical attention.

Skin Contact See above for handling of frostbite.

Ingestion Allow injured areas to warm gently. Seek medical attention. Rescue personnel should be cognisant of extreme fire hazard associated with oxygen-rich atmospheres. The physician should be informed that the patient has experienced hyperoxia.

5 FIRE FIGHTING MEASURES

Extinguishing media As oxygen is non-flammable but strongly supports combustion, the correct type of extinguishant should be used depending on the combustible material involved.

Specific Hazards Oxygen vigorously accelerates combustion. Materials that would not normally burn in air could combust vigorously in atmospheres having high concentrations of oxygen.

Emergency Actions If possible, shut off the source of escaping oxygen. Evacuate area. Prevent liquid oxygen from entering sewers, basements and workpits. FIRE HAZARD. Do not absorb in sawdust or any other combustible material. Keep the bulk tank, PCC, or tanker cool by spraying with water if exposed to a fire. If tanker has overturned, do not attempt to right or move it CONTACT THE NEAREST AFROX BRANCH.

Protective Clothing Safety goggles, or glasses, plus faceshield, loose-fitting insulated gloves, and safety shoes, or boots.

Environmental precautions If possible, ventilate the affected area.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions Clothing saturated by cold gas should be removed immediately. Clothes and other materials, will burn fiercely in presence of high concentrations of oxygen.

Environmental Precautions. Oxygen itself does not pose a hazard to the to the environment. However, because of the extreme cold of the liquid, damage to the ecology can occur in the immediate environs of the spill. Beware of oxygen-enriched atmospheres coming into contact with readily combustible materials.

Small spills Shut off the source of escaping oxygen. Ventilate the area.

Large spills Evacuate the area. Shut off the source of the spill if this can be done without risk. Restrict access to the area until completion of the clean-up procedure. Ventilate the area using forced draught if necessary.

7 HANDLING AND STORAGE

When liquid oxygen is held in any closed vessel or space, there must be an appropriate pressure relief device because of the very large pressure increases that can occur as the liquid oxygen is vapourised. Liquid oxygen must also be handled with all the precautions required for safety with any cryogenic fluid. Keep out of reach of children.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational	Avoid exposure to oxygen-enriched
Exposure	atmospheres, as this could result in
Hazards	clothing becoming saturated by oxygen. On ignition the clothing could burn fiercely resulting in serious burns.
Engineering control measures	Engineering control measures are preferred to reduce exposure to oxygen-enriched atmospheres. General methods include forced-draught ventilation, separate from other exhaust ventilation systems.
Personal protection	Safety goggles or glasses, plus face shield, loose-fitting insulated gloves and safety shoes, or boots.
Skin	Wear loose-fitting overalls preferably without pockets

9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DATA

Chemical Symbol	O ₂
Molecular Weight	32,00
Specific Volume @ 20°C & 101,325 kPa	755ml/g
Boiling point @ 101,325 kPa	-183°C
Density, gas @ 101,325 kPa & 20°C	1,33 kg/m ³
Relative density (Air = 1) @ 101,325 kPa	1,053
Latent heat of vapourisation @ boiling point	213 kJ/kg
Colour	None
Taste	None
Odour	None

10 STABILITY AND REACTIVITY

Conditions to avoid Oxygen-enriched atmospheres will react with all of the elements, excepting the rare gases, especially at elevated temperatures. These reactions could sometimes be violent, as those when high concentrations of oxygen come into contact with highly combustible materials such as oil and grease.

Incompatible Materials At the temperature of liquid oxygen, ordinary carbon steels, and most alloy steels, lose their ductility, and are therefore considered to be unsatisfactory. Metals and alloys that have satisfactory ductility include austenitic stainless steel (i.e. types 204 and 216), and nickel-chromium alloys, nickel, Monel 400, copper, brasses, bronze and aluminium alloys.

Hazardous Decomposition Products. None

11 TOXICOLOGICAL INFORMATION

Acute Toxicity	No known effect
Skin & eye contact	No known effect
Chronic Toxicity	No known effect
Carcinogenicity	Severe cold burns could result in carcinoma
Mutagenicity	No known effect
Reproductive Hazards	No known effect

(For further information see Section 3. Adverse Health Effects).

12 ECOLOGICAL INFORMATION

Cold spills will cause temporary damage. It does not pose a hazard to the ecology.

13 DISPOSAL CONSIDERATIONS

Disposal Methods	Small amounts may be allowed to evaporate into the atmosphere. In case of large spills consult an expert and allow to evaporate.
Disposal of packaging	The disposal of containers must only be handled by the gas supplier.

14 TRANSPORT INFORMATION

ROAD TRANSPORTATION

UN No.	1073
ERG No	122
Hazchem warning	5A - Non-flammable gas

SEA TRANSPORTATION

IMDG	1073
Class	
Packaging group	
Label	Non-flammable gas

AIR TRANSPORTATION

ICAO/IATA Code	1073
Class	
Packaging group	
Packaging instructions	
- Cargo	Forbidden
- Passenger	Forbidden
Maximum quantity allowed	
- Cargo	Forbidden
- Passenger	Forbidden

15 REGULATORY INFORMATION

EEC Hazard class	Non-flammable
Risk phrases	R9 Explosive when mixed with combustible material R35 Causes severe burns R41 Risk of serious damage to eyes R44 Risk of explosion if heated under confinement
Safety phrases	S2 Keep out of reach of children S9 Keep container in a well-ventilated place S12 Do not keep the container sealed S17 Keep away from combustible material S21 When using do not smoke S24 Avoid contact with skin S25 Avoid contact with eyes S27 Take off immediately all contaminated clothing S36 Wear suitable protective clothing

National Legislation: None

Refer to SABS 0265 for explanation of the above.

16 OTHER INFORMATION

Bibliography

Compressed Gas Association, Arlington, Virginia
Handbook of Compressed Gases - 3rd Edition
Matheson. Matheson Gas Data Book - 6th Edition
SABS 0265 - Labelling of Dangerous Substances

17 EXCLUSION OF LIABILITY

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