MATERIAL SAFETY DATA SHEET

LIQUID OXYGEN

DATE: April 2001

1 PRODUCT AND COMPANY IDENTIFICATION

1 PRODUCT IDENTIFICATION

Product Name: Liquid Oxygen
Chemical Formula: O₂
Trade Names: Liquid 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: Allow injured areas to warm gently. Seek medical attention.
Ingestion: In case of ingestion and rich atmospheres coming into contact of the extreme cold of the liquid, damage 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.

Environmental precautions: If possible, ventilate the affected area.

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 workshops. 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.

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 atmospheres, as this could result in clothing becoming saturated by oxygen. On ignition the clothing could burn fiercely resulting in serious burns.

ENGINEERING CONTROL
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.

9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DATA
Chemical Symbol: O₂
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/m³
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

15 REGULATORY INFORMATION

ECOCHEM WARNING

1073

16 OTHER INFORMATION

BIBLIOGRAPHY
Compressed Gas Association, Arlington, Virginia
Handbook of Compressed Gases - 3rd Edition
SABS 0265 - Labelling of Dangerous Substances

17 EXCLUSION OF LIABILITY

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