1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Oxygen, Refrigerated Liquid
CHEMICAL NAME: Oxygen
CHEMICAL FAMILY: Oxidizer
SYNONYMS: Cryogenic Oxygen, Refrigerated Oxygen, LOX
CHEMICAL FORMULA: O_2
USE: Medical purposes, Welding/ Cutting Purposes.

NAME AND ADDRESS: **Refrigeration & Oxygen Co.**
Corporate Office
Area No 1, Block 21 C,
Central Slaughter House Street
Shuwaikh Industrial Area
Kuwait.

WEB ADDRESS: www.rockuwait.com; E-mail: info@rocq8.com
TELEPHONE: (+965) 844 844

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
WARNING! Extremely cold oxidizing liquid and gas under pressure,
Vigorously accelerates combustion,
Combustibles in contact with liquid oxygen may explode on ignition or impact.
Can cause severe frostbite.

POTENTIAL HEALTH EFFECTS INFORMATION:

ROUTES OF EXPOSURE:
INHALATION: Breathing 80% 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 oxygen at higher pressure increases the likelihood of adverse effects within a shorter time period. Breathing pure oxygen under pressure may cause lung damage and also central nervous system effects resulting in dizziness, poor coordination, tingling sensation, visual and hearing disturbances, muscular twitching, unconsciousness and convulsions. Breathing oxygen under pressure may cause prolonged adaptation to darkness and reduced peripheral vision.
EYE CONTACT: Tissue freezing and severe cryogenic burns of eyes,
SKIN CONTACT: Tissue freezing and severe cryogenic burns of skin
SKIN ABSORPTION: Not applicable.
INGESTION: Not applicable.
CHRONIC EFFECTS: None established
MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None
OTHER EFFECTS OF OVEREXPOSURE: See Section 11, Toxicological Information.
CARCINOGENICITY: Oxygen is not listed by NTP, OSHA, or IARC.
POTENTIAL ENVIRONMENTAL EFFECTS: No adverse ecological effects are expected.

3. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME OXYGEN

PERCENTAGE >99%
CAS NUMBER 7782-44-7

4. FIRST AID MEASURES

FIRST AID PROCEDURES:
INHALATION: Move victim to fresh air Call a physician. The physician should be advised that the victim has been exposed to a high concentration of oxygen.
Rescue personnel should be aware of the extreme fire hazards associated with oxygen-enriched atmospheres.
EYE CONTACT: In case of splash contamination, immediately flush eyes with water for at least 15 minutes. See a physician, preferably an ophthalmologist, immediately.
SKIN CONTACT: Remove any clothing that may restrict circulation to frozen area. Do not rub frozen parts as tissue damage may result. As soon as practical place the affected area in a warm water bath that has a temperature not to exceed 105 OF (40°C). Never use dry heat. Remove and thoroughly air out contaminated clothing. In case of massive exposure, remove clothing while showering with warm water. Call a physician as soon as possible.
Frozen tissue is painless and appears waxy with a possible yellow color. It will become swollen, painful, and prone to infection when thawed. If the frozen part of the body has been thawed by the time medical attention has been obtained, cover the area with dry sterile dressing with a large bulky protective covering
INGESTION: Not applicable
NOTES TO PHYSICIAN: Supportive treatment should include immediate sedation, anti-convulsive therapy if needed, and rest. More detailed information can be found in Section 11, Toxicological Information.

5. FIREFIGHTING MEASURES

FLAMMABLE PROPERTIES: Oxygen is nonflammable and will accelerate combustion.
EXTINGUISHING MEDIA: Use extinguishing media appropriate for surrounding fire.

PROTECTION OF FIREFIGHTERS:
SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Oxidizing agent, vigorously accelerates combustion. Some materials that are noncombustible in air will burn in the presence of an oxygen-enriched atmosphere (over 23.5%). Oxygen may form explosive compounds when exposed to combustible materials or oil, grease, and other hydrocarbon materials.
Liquid oxygen, when spilled, will vaporize rapidly, forming an oxygen-rich vapor cloud. Evacuate this vapor cloud area. Visibility may be obscured in its vapor cloud.
Pressure in a container can build up due to heat and it may rupture if pressure relief devices should fail to function. Contact with cold liquid or gaseous oxygen may cause frostbite.
PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS: Evacuate all personnel from the danger area. If possible, shut off flow of oxygen that is supporting the fire. Immediately cool containers with water spray from maximum distance. Do not direct water spray at the container vent. When cool, move containers from fire area, if without risk. Liquid oxygen when spilled will vaporize rapidly forming an oxygen enriched vapor cloud. Evacuate this vapor cloud area.
SENSITIVITY TO STATIC DISCHARGE: Not applicable
SENSITIVITY TO MECHANICAL IMPACT: None

PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS: Evacuate all personnel from the danger area. If possible, shut off flow of oxygen that is supporting the fire. Immediately try to cool containers with water spray from maximum distance. When cool, move containers from fire area, if without risk.

SENSITIVITY TO STATIC DISCHARGE: None
SENSITIVITY TO MECHANICAL IMPACT: None

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS: Use personal protection recommended in Section 8. Evacuate all unnecessary personnel from the affected area. Remove sources of heat, ignition and, if possible, separate combustibles from the leak. Ventilate area or remove leaking container to a well-ventilated area.
If possible, prevent liquid oxygen from contacting grease, oil, asphalt and other combustibles. To increase rate of vaporization, spray large amounts of water onto the spill from an upwind position. Avoid contact with liquid oxygen or cold gas.
ENVIRONMENTAL PRECAUTIONS: Not applicable.
METHODS FOR CONTAINMENT: Shut off source of oxygen, if possible.
METHODS FOR CLEAN-UP: Not applicable.
OTHER INFORMATION: None..

7. HANDLING AND STORAGE

HANDLING: Never allow any unprotected part of the body to touch uninsulated pipes or vessels that contain cryogenic fluids. The extremely cold metal will cause the flesh to stick fast and tear when one attempts to withdraw from it. Use a suitable four-wheel hand truck for container movement. Containers shall be handled and stored in an upright position. Do not drop, tip, or roll containers on their side. If user experiences any difficulty operating container valve discontinue use and contact supplier. Containers of liquid oxygen should be separated from flammable gas containers by a minimum distance of 20 ft, or by a barrier of noncombustible material at least 5 ft high having a fire resistance rating of 1/2 hour. For additional precautions in using liquid oxygen see Section 15 - Other Information.

STORAGE: Store and use with adequate ventilation. Compressed gas cylinders shall be separated from materials and conditions that present exposure hazards to or from each other. Do not store in a confined space. Post "No Smoking or Open Flames" signs in the storage area. Cryogenic containers are equipped with pressure relief devices to control internal pressure. Under normal conditions these containers will periodically vent product. Some metals such as carbon steel may become brittle at low temperatures and will easily fracture. Prevent entrapment of liquid in closed system or piping without pressure relief.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE GUIDELINES:
OSHA PEL-TWA: None NIOSH IDLH: None
ACGIH TLV: None

ENGINEERING CONTROLS:
VENTILATION: Natural or mechanical to prevent oxygen-enriched atmospheres above 23.5% oxygen.

PERSONAL PROTECTIVE EQUIPMENT:
EYE/FACE PROTECTION: Full face shield and safety glasses are recommended.
SKIN PROTECTION: Loose fitting thermal insulated or leather gloves. Gloves must be clean and free of oil and grease. Safety shoes when handling containers. Long sleeve shirts and trousers without cuffs.
RESPIRATORY PROTECTION (SPECIFY TYPE):
General Use: Not required
Emergency Use: Not required

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Pale blue ODOR: Odorless
ODOR THRESHOLD: Not applicable
PHYSICAL STATE: Cryogenic liquid
pH: Not applicable
FREEZING POINT: -361.1 °F (-218.4 °C) @ 1 atm
BOILING POINT (1 ATM): -297.3 °F (-183.0 °C)
FLASH POINT: Not applicable
EVAPORATION RATE (Butyl Acetate=1): Not applicable
FLAMMABILITY: Nonflammable

FLAMMABLE LIMITS IN AIR BY VOLUME:
LOWER: Not applicable UPPER: Not applicable
VAPOR PRESSURE (AT 20°C): Not applicable
GAS DENSITY: 0.083 lb/ft^3 (1.326 kg/m^3) @ 70 °F (21.1 °C) and 1 atm
SPECIFIC GRAVITY (Air =1): 1.14 @ 70 °F (21.1 °C) and 1 atm
SOLUBILITY IN WATER: Vol./ Vol. at 32 °F (0 °C): 0.0489
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
AUTOIGNITION: Not applicable
DECOMPOSITION TEMPERATURE: Not applicable
MOLECULAR WEIGHT: 32.00
EXPANSION RATIO: (for liquid to gas) 70 OF (21.1 °C): 1 to 860.5

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable
CONDITIONS TO AVOID: None
INCOMPATIBLE MATERIALS: Flammable materials, hydrocarbons such as oils and grease, asphalt, ethers, alcohols, acids and aldehydes. Compatibility to plastics/polymers should be confirmed prior to use. Oxygen reacts with many materials.
HAZARDOUS DECOMPOSITION PRODUCTS: None
POSSIBILITY OF HAZARDOUS REACTIONS: Will not occur

11. TOXICOLOGICAL INFORMATION

ACUTE DOSE EFFECTS:
LD_{50}: None; LC_{50}: None

REPEATED DOSE EFFECTS: At atmospheric concentration and pressure, oxygen poses no toxicity hazards.
Premature infants exposed to high oxygen concentrations may suffer delayed retinal damage, which 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.

ADDITIONAL NOTES TO PHYSICIAN: Animal studies suggest that the administration of certain drugs, including phenothiazine drugs and chloroquine, increase the susceptibility to toxicity from oxygen at high pressures. Animal studies also indicate that vitamin "E" deficiency may increase susceptibility to oxygen toxicity.
Patients with chronic obstructive pulmonary disease retain carbon dioxide abnormally. If oxygen is administered to them, raising the oxygen concentration in the blood depresses their breathing and raises their retained carbon dioxide to a dangerous level.
Airway obstruction during high oxygen tension may cause alveolar collapse following absorption of the oxygen. Similarly, occlusion of the Eustachian tubes may cause retraction of the eardrum and obstruction of the paranasal sinuses may produce "vacuum-type" headache.
All individuals exposed for long periods to oxygen at high pressure and who exhibit overt oxygen toxicity should have ophthalmologic examinations.

IRRITATION: None
GENETIC EFFECTS: None
DEVELOPMENTAL EFFECTS: None
TERATOGENICITY: None
SYNERGISTIC MATERIALS: None

SENSITIZATION: None
REPRODUCTIVE EFFECTS: None
TARGET ORGAN EFFECTS: None
MUTAGENICITY: None

12. ECOLOGICAL INFORMATION

ECOTOXICITY: The atmosphere contains approximately 21 % oxygen. No adverse ecological effects are expected. Oxygen does not contain any Class I or Class II ozone depleting chemicals. Oxygen is not listed as a marine pollutant by DOT.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities. Contact your supplier.
For emergency disposal, slowly discharge to the atmosphere in a well-ventilated area or outdoors away from all sources of ignition.

14. TRANSPORT INFORMATION

BASIC SHIPPING DESCRIPTION:
PROPER SHIPPING NAME: Oxygen, Refrigerated Liquid
HAZARD CLASS: 2.2 (5.1)
IDENTIFICATION NUMBER: UN 1073
ADDITIONAL INFORMATION:
PRODUCT RQ: Not applicable
SHIPPING LABEL(s): Oxygen.
PLACARD (when required): Nonflammable gas or oxygen
SPECIAL SHIPPING INFORMATION: Containers should be transported in a secure position, in a wellventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards and should be discouraged. For air shipments, the "Cryogenic Liquid" handling label must be used in addition to the nonflammable gas (Division 2.2) hazard label on packages and overpacks containing cryogenic liquids.

15. REGULATORY INFORMATION & OTHER INFORMATION

SPECIAL PRECAUTIONS: All gauges, valves, regulators, piping and equipment to be used in oxygen service must be cleaned for oxygen service in accordance with CGA G-4.1. Use piping and equipment adequately designed to withstand pressures to be encountered. 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. Use a check valve or other protective apparatus in any line or piping from the cylinder to prevent reverse flow. Cross contamination of gases, liquids, or both can also create a hazardous condition inside a cylinder, dewar, or vessel (e.g., flammable and oxidizing gases can create an explosive mixture), which may result in rupture. To present cryogenic liquids or cold gas from being trapped in piping between valves, the piping shall be equipped into pressure relief devices. Only transfer lines designated for cryogenic liquids shall be used. It is recommended that all vents be piped to the exterior of the building.
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.

HAZARD RATINGS AND RATING SYSTEMS:

NFPA RATINGS:

HEALTH: =3; FLAMMABILITY: =0; INSTABILITY: =0; SPECIAL: OX

STANDARD VALVE CONNECTIONS:

THREADED: CGA 440

PIN-INDEXED YOKE: Non Applicable
ULTRA HIGH INTEGRITY:Non Applicable

Use the proper connections; DO NOT USE ADAPTERS. DONOT FORCE FIT CONNECTIONS. DONOT OIL/ GREASE THE CONNECTIONS.

The information and recommendations in this Material Safety Data Sheet relate only to the specific material mentioned herein and do not relate to use otherwise ie., in combination with any other material or in any process.

The information and recommendations herein are taken from our extensive experiences and the data contained in recognized references and believed by us to be accurate. Refrigeration group of companies make no warranties either expressed or implied with respect there to and assume no liability in connection with the use of such information and recommendation.