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MSDS V1.1	Liquid Oxygen	DG001L



Label 2.2: Non flammable, non toxic gas.



Label 5.1: Oxidizing Substance.



NFPA RATING



O: Oxidizing

1 IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

Trade Name	: Liquid Oxygen
Chemical Formula	: O ₂
MSDS No	: DG001L
Company Identification	: Aldakheel Industrial Gases Plant (DIGAS)
Emergency Phone Number	: 04-8455-101


2 COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS NUMBER	CONCENTRATION
Oxygen (Liquid)	7782-44-7	>99%*

*The symbol > means "greater than"

3 HAZARDS IDENTIFICATION

Emergency Overview	: WARNING! Extremely cold, oxidizing liquid and gas under pressure. Vigorously accelerates combustion. Combustibles in contact with liquid may explode on ignition or impact. May cause dizziness and drowsiness. Self-contained breathing apparatus and protective clothing may be required by rescue workers. Can cause sever frostbite.
Effects of a Single (Acute) Overexposure	
-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 of oxygen under pressure may cause prolongation of adaptation to darkness and reduced peripheral vision.
Skin Contact	: No harm expected from vapour. Liquid may cause frostbite.
Skin Absorption	: No harm expected from vapour. Liquid may cause frostbite.
Swallowing	: This product is a gas at normal temperature and pressure. An unlikely route of exposure, but frostbite of the lips and mouth may result from contact with the liquid.
Eye Contact	: No harm expected from vapour. Liquid may cause frostbite.
Effects of Repeated (Chronic) Overexposure	: No evidence of adverse effects from available information.
Other Effects of Overexposure	: See "Notes to Physician", in the "First Aid" section.
Medical Conditions Aggravated by Overexposure	: See "Notes to Physician".

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3 HAZARDS IDENTIFICATION (Continued)

Significant Laboratory Data With Possible Relevance to Human Health Hazard Evaluation : None currently known.

4 FIRST AID MEASURES

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. Get medical attention. Keep patient warm and at rest.

Skin contact : Immediately warm frostbite area with warm water (not to exceed 40°C). In case of massive exposure, remove clothing and shoes while showering with warm water. Get medical attention immediately.

Swallowing : This product is a gas at normal temperature and pressure.

Eye Contact : See a physician, preferably an ophthalmologist, immediately.

Notes to Physician : Supportive treatment should include immediate sedation, anti-convulsive therapy if needed, and rest. Animal studies suggest that the Administration of certain drugs, including phenothiazine drugs and chloroquine, increase the susceptibility to toxicity from oxygen at high concentrations or pressures. Animal studies also indicate that vitamin E deficiency may increase susceptibility to oxygen toxicity. 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. Newborn premature infants exposed to high oxygen concentrations may suffer delayed retinal damage, which can progress, to retinal detachment and blindness (retrolental fibroplasia). Retinal damage can also occur in adults exposed to 100% oxygen under greater than atmospheric pressure, particularly in individuals whose retinal circulation has been previously compromised.

5 FIRE-FIGHTING MEASURES

Flammable class : Non flammable.

Extinguishing media

Suitable extinguishing media : All known extinguishants can be used.

Hazardous combustion products : None.


Specific physical and chemical hazards : Oxidizing agent, vigorously accelerates combustion. Contact with flammable materials may cause fire or explosion. Closed container may rupture due to heat of fire. Liquid will freeze water rapidly. Containers are provided with pressure relief devices that are designed to vent the contents when they are exposed to elevated temperatures. Do not walk on or roll equipment over spill as this could cause explosion. Liquid causes cryogenic "burns" (frostbite-like injury). Smoking, flames, and electric sparks in the presence of enriched oxygen atmospheres are potential explosion hazards.

Specific methods : If possible, stop flow of product. Move away from the container and cool with water from a protected position. If leaking do not spray water onto container. Water surrounding area (from protected position) to contain fire.

Sensitivity to Impact : Avoid impact against container.

Sensitivity to Static Discharge : Not applicable.

Protective equipment and precautions for firefighters : Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

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6 ACCIDENTAL RELEASE MEASURES

Personal precautions	: Evacuate area. Ensure adequate air ventilation. Eliminate ignition sources. Use protective clothing.
Environmental precautions	: Try to stop release. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
Clean up methods	: Ventilate area. Keep area evacuated and free from ignition sources until any spilled liquid has evaporated. (Ground free from frost).

7 HANDLING AND STORAGE


Precautions to be taken in handling	: Use piping and equipment adequately designed to withstand pressures to be encountered. Ground all equipment. Store and use with adequate ventilation at all times. Use only in a closed system.
Precautions to be taken in storage	: Extremely cold oxidizing liquid and gas. Vigorously accelerates combustion. Contact with liquid or cold gas causes severe frostbite. Combustibles with liquid air may explode on ignition or contact. Keep oil, grease, and combustibles away. Use only with equipment conditioned for oxygen service. Use piping and equipment adequately designed to withstand the pressures and temperatures to be encountered. Do not get liquid in eyes, on skin or clothing. Store and use with adequate ventilation. Close valve when not in use and when empty. Clothing exposed to liquid air should be removed immediately and aired out to reduce the likelihood of an engulfing fire. Ignition sources, such as static electricity generated in clothing by walking, etc., should be prevented. Protect container against physical damage. Isolate from combustible gas installations and combustible materials by adequate distance or by gas-tight, fire resistive barriers.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls	: Use a local exhaust system, if necessary, to prevent increased oxygen concentration in the worker's breathing zone.
Local exhaust	
Mechanical (General)	: Use a local exhaust system, if necessary, to prevent increased oxygen concentration in the worker's breathing zone.
Special	: Not applicable.
Other	: Not applicable.
Personal protection	
Respiratory Protection	: None required under normal use. However, air-supplied respirators are required while working in confined spaces with this product.
Skin Protection	: Loose-fitting cryogenic gloves.
Eye Protection	: Wear safety glasses when handling cylinders.
Other Protective Equipment	: Metatarsal shoes for cylinder handling. Protective clothing where needed. Cuffless trousers should be worn outside the shoes.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Light blue cryogenic liquid.
Odor	: Odorless.
Odor	: Odourless.
Physical State	: Liquid.
pH	: Not applicable.
Boiling Point	: -182.96°C(-297.3°F)

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9 PHYSICAL AND CHEMICAL PROPERTIES (Continued)

Freezing Point	: -218.78°C (-361.8°F)
Evaporation Rate	: High.
Vapor Pressure	: Not applicable.
Vapor Density	: 0.0013 g/ml @ 21.1°C
Specific Gravity Liquid (Water =1)	: 1.14 @ -183°C
Specific Gravity Vapor (Air = 1)	: 1.105 g/ml @ 21.1°C
Solubility In Water	: Negligible.
Coefficient of water/oil distribution	: Not applicable.
% Volatiles by Volume	: 100% (v/v)
Molecular Weight	: 31.9988 g/mole
Molecular Formula	: O ₂

10 STABILITY AND REACTIVITY


Stability	: The product is stable.
Conditions of Chemical Instability	: Elevated temperatures. Oxygen reacts with many materials.
Incompatibility (materials to avoid)	: Flammable materials, hydrocarbons such as oils and grease, asphalt, ethers, alcohols, acids and aldehydes.
Hazardous Decomposition Products	: None.
Hazardous Polymerization	: will not occur.
Conditions to Avoid	: None known.
Conditions of Reactivity	: None.

11 TOXICOLOGICAL INFORMATION

Study Results	: At atmospheric concentration and pressure, oxygen poses no toxicity hazards. At high concentrations, newborn premature infants may suffer delayed retinal damage (retrolental fibroplasia) 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 hours) or at greater than atmospheric pressure, particularly in individuals whose retinal circulation has been previously compromised. All individuals exposed for long periods to oxygen at high pressure and all who exhibit overt oxygen toxicity should have ophthalmologic examinations. At two or more atmospheres, toxicity to the Central Nervous System (CNS) occurs. Symptoms include nausea, vomiting, dizziness or vertigo, muscle twitching, vision dizziness or vertigo, muscle twitching, vision changes, and loss consciousness and generalized seizures. At three atmospheres, CNS toxicity occurs in less than two hours; at six atmospheres, in only a few minutes. Patients with chronic obstructive pulmonary disease retain carbon dioxide abnormally. If oxygen is administered, raising their blood oxygen concentration, their breathing becomes depressed and retained carbon dioxide rises to a dangerous level. Animal studies suggest that the administration of certain drugs, including phenothiazine drugs and chloroquine, increases the susceptibility to toxicity from oxygen at high concentrations or pressures. Animal studies also indicate that vitamin E deficiency may increase susceptibility to oxygen toxicity. 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.
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12 ECOLOGICAL INFORMATION

Ecological Effects Information	: No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals.
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13 DISPOSAL CONSIDERATION

Waste Disposal Method : Do not attempt to dispose of residual or unused quantities. Return cylinder to DIGAS.

14 TRANSPORT INFORMATION

Transport 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.
- : Before transporting product containers :
 - Ensure that containers are firmly secured.
 - Ensure cylinder valve is closed and not leaking.
 - Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
 - Ensure valve protection device (where provided) is correctly fitted.
 - Ensure there is adequate ventilation.
 - Compliance with applicable regulations.

15 OTHER INFORMATION

May cause frostbite.

Ensure all national/local regulations are observed.

Ensure operators understand the hazard of oxygen enrichment.

Mixtures. When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the product. Remember, gases and liquids have properties which can cause serious injury or death.

Hazard Rating Systems

NFPA Ratings

Health = 3
 Flammability = 0
 Instability = 0
 SPECIAL = OX

HMIS Ratings

Health = 3
 Flammability = 0
 Physical Hazard = 2

Standard Valve Connections

Threaded : CGA-440 (cryogenic liquid withdrawal)

Pin-indexed yoke : Not applicable

Use the proper CGA connections. **DO NOT USE ADAPTERS.**

This Material Safety Data Sheet has been established for the best knowledge of DIGAS.

Details given in this document are believed to be correct at the best of DIGAS knowledge. 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.

End of Documents.