



PRODUCT NAME: **LIQUID OXYGEN**

### 1. Chemical Product and Company Identification

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PRODUCT NAME: **OXYGEN, REFRIGERATED LIQUID**

CHEMICAL NAME: Oxygen

COMMON NAMES/SYNONYMS: Liquid Oxygen, LOX

### 2. Composition, Information on Ingredients

| Ingredient                        | % Volume | TLV-ACGIH <sup>2</sup> |
|-----------------------------------|----------|------------------------|
| Oxygen<br>FORMULA: O <sub>2</sub> | 99.5%    | Not available          |

### 3. Hazards Identification

#### EMERGENCY OVERVIEW

Elevated oxygen levels may result in cough and other pulmonary changes. High concentrations of oxygen (greater than 75%) causes symptoms of hyperopia which included cramps, nausea, dizziness, hypothermia, amblyopia, respiration difficulties, bradycardia, fainting spells and convulsions capable of leading to death. Nonflammable. Oxidizer will accelerate combustion. Contact with liquid form may cause frostbite or freeze burns in exposed tissues.

#### ROUTE OF ENTRY:

|                            |                              |                           |                          |                         |
|----------------------------|------------------------------|---------------------------|--------------------------|-------------------------|
| Skin Contact<br><b>Yes</b> | Skin Absorption<br><b>No</b> | Eye Contact<br><b>Yes</b> | Inhalation<br><b>Yes</b> | Ingestion<br><b>Yes</b> |
|----------------------------|------------------------------|---------------------------|--------------------------|-------------------------|

#### HEALTH EFFECTS:

Exposure Limits: No  
Irritant: No  
Sensitization: No  
Teratogen: No  
Reproductive Hazard: No  
Mutagen: No  
Synergistic Effects: None Known

#### EYE EFFECTS:

Contact with liquid product may cause tissue freezing.

#### SKIN EFFECTS:

Contact with liquid product may cause tissue freezing.



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**INGESTION EFFECTS:**

Contact with liquid product may cause tissue freezing.

**INHALATION EFFECTS:**

High concentrations of oxygen (greater than 75%) causes symptoms of hyperopia which included cramps, nausea, dizziness, hypothermia, amblyopia, respiration difficulties, bradycardia, fainting spells and convulsions capable of leading to death. The property is that of hyperopia which leads to pneumonia. Concentrations between 25 and 75 % present a risk of inflammation of organic matter in the body.

**4. First Aid Measures**

**EYE:**

Never introduce ointment or oil into the eyes without medical advice! In case of freezing or cryogenic "burns" caused by rapidly evaporating liquid, **DO NOT WASH THE EYES WITH HOT OR EVEN TEPID WATER!**. Remove victim from the source of contamination. Open eyelids wide to allow liquid to evaporate. If pain is present, refer the victim to an ophthalmologist for treatment and follow up. If the victim cannot tolerate light, protect the eyes with a light bandage.

**SKIN:**

For dermal contact or frostbite: Remove contaminated clothing and flush affected areas with lukewarm water. **DO NOT USE HOT WATER**. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

**INGESTION:**

A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

**INHALATION:**

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO OXYGEN. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Further treatment should be symptomatic and supportive. Inform the treating physician that the patient could be experiencing hyperopia.

**5. Fire Fighting Measures**

| Conditions of Flammability    | Flash Point                     | Method                          |
|-------------------------------|---------------------------------|---------------------------------|
| Not flammable, Oxidizer       | None                            | Not applicable                  |
| Auto-ignition Temperature     | LEL %                           | UEL %                           |
| None                          | None                            | None                            |
| Hazardous combustion products | Sensitivity to mechanical shock | Sensitivity to static discharge |
| None                          | None                            | None                            |

**FIRE AND EXPLOSION HAZARDS:**

High oxygen concentrations vigorously accelerate combustion.

**EXTINGUISHING MEDIA:**

Extinguishing agent appropriate for the combustible material.

**FIRE FIGHTING INSTRUCTIONS:**

If possible, stop the flow of oxygen which is supporting the fire.



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**6. Accidental Release Measures**

Be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate person in **Linde Gas Middle East LLC**.

**7. Handling and Storage**

**Electrical classification:**

Nonhazardous.

Liquid oxygen cannot be handled in carbon or low alloy steel. 18-8 and 18-10 stainless steel are acceptable as -metallic gasket materials.

Check with supplier to verify oxygen compatibility for the service conditions.

Do not attempt to repair, adjust or in any other way modify the operation of these vessels. If there is a malfunction or other type of operations problem with the vessel, contact the **Linde Gas Middle East LLC** immediately.

Oxygen liquid is delivered to a customer into stationary, vacuum-jacketed vessels at the customer's location or in portable vacuum-jacketed "liquid" cylinders.

Due to the extremely cold liquid, un-insulated transfer lines may condense air. The liquefied air may flash of nitrogen, leaving an oxygen enriched liquid. Do not allow the liquefied air to contact oils, greases or other combustible materials such as asphalt and motor oil.

No smoking or open flames should be allowed near these vessels.

Liquid oxygen vessels should be used only in well ventilated areas in accordance with manufacture and

Movement. Full and empty cylinders should be stored away from flammable products.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

**8. Exposure Controls, Personal Protection**

**EXPOSURE LIMITS<sup>1</sup>:**

| Ingredient            | % Volume | TLV-ACGIH <sup>2</sup> |
|-----------------------|----------|------------------------|
| Oxygen<br>FORMULA: O2 | 99.5%    | Not available          |

**ENGINEERING CONTROLS:**

Use local exhaust to prevent accumulation of high concentrations that increase the oxygen level in air to more than 25%.

**EYE/FACE PROTECTION:**

Safety goggles or glasses as appropriate for the job. Face shield is recommended for cryogenic liquids.



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**SKIN PROTECTION:**

Protective gloves made of any suitable material appropriate for the job. Insulated gloves recommended for cryogenic liquids.

**OTHER/GENERAL PROTECTION:**

Safety shoes, safety shower.

**9. Physical and Chemical Properties**

| PARAMETER                           | VALUE                                | UNITS |
|-------------------------------------|--------------------------------------|-------|
| Physical state (gas, liquid, solid) | : Cryogenic liquid                   |       |
| Vapor pressure                      | : Above critical temp.               |       |
| Vapor density (Air = 1)             | : 1.11                               |       |
| Evaporation point                   | : Not Available                      |       |
| Boiling point                       | : -297.3                             |       |
|                                     | : -182.9                             |       |
| Freezing point                      | : -361.8                             |       |
|                                     | : -218.8                             |       |
| pH                                  | : Not Applicable                     |       |
| Specific gravity                    | : 1.105                              |       |
| Oil/water partition coefficient     | : Not Available                      |       |
| Solubility (H <sub>2</sub> O)       | : Slightly soluble                   |       |
| Odor threshold                      | : Not Applicable                     |       |
| Odor and appearance                 | : Clear, odorless, pale blue liquid. |       |

**10. Stability and Reactivity**

**STABILITY:**

Stable

**INCOMPATIBLE MATERIALS:**

All flammable materials

**HAZARDOUS DECOMPOSITION PRODUCTS:**

None

**HAZARDOUS POLYMERIZATION:**

Will not occur.

**11. Toxicological Information**

**MUTAGENIC:**

Oxygen concentrations between 20 to 95% have produced genetic changes in mammalian cell assay test systems.

**12. Disposal Considerations**

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to **Linde Gas Middle East LLC** or authorized distributor for proper disposal.



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**13. Transport Information**

| <b>Parameter</b>      | <b>United States DOT</b>    |
|-----------------------|-----------------------------|
| Proper Shipping Name  | Oxygen, liquid              |
| Hazard Class          | 2.2                         |
| Identification Number | UN 1073                     |
| Shipping Label        | Non Flammable Gas, Oxidizer |

**14. Hazard Classes**

Fire Hazard

Sudden Release of Pressure Hazard

**15. Other Information**

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

**DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:**

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