

## Safety Data Sheet

### Oxygen, Refrigerated Liquid

Issue date: 16/01/2013  
Revision date: 26/05/2023


Version: 2.1

SDS reference: MY000525  
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#### SECTION 1: Identification of the hazardous chemical and of the supplier

- 1.1. Product identifier**
- |              |  |
|--------------|--|
| Product form | Substance  |
| Trade name   | i) Oxygen, Refrigerated Liquid<br>ii) PCC Oxygen, Refrigerated Liquid<br>iii) UHP O2 |
| CAS-No.      | 7782-44-7  |
| Formula      | O2   |
- 1.2. Relevant identified uses of the substance or mixture and uses advised against**
- |                     |       |
|---------------------|-------|
| Restrictions on use | None. |
|---------------------|-------|
- 1.3. Supplier's details**
- Linde Gas Products Malaysia Sdn Bhd (453560-K)  
P.O. Box 10633, GPO Kuala Lumpur, 50670 WPKL.  
No. 1, Jalan Graphite 3, Kawasan Perindustrian Bandar Mahkota Banting,  
42700 Banting, Kuala Langat, Selangor Darul Ehsan.  
Toll Free: 1800 883 888 / +603 5651 7000  
[csc.lg.my@linde.com](mailto:csc.lg.my@linde.com)
- 1.4. Emergency telephone number**
- Emergency phone number (24h): 1800 883 888  
Poison center : Unit HAZMAT Malaysia, tel: 999

#### SECTION 2: Hazards identification

- 2.1. Classification of the hazardous chemical**
- Classification according to Industry Code of Practice on chemicals classification and hazard communication (2014)
- |                        |      |
|------------------------|------|
| Ox. Gas 1              | H270 |
| Press. Gas (Ref. Liq.) | H281 |
- 2.2. Label elements**
- Labelling according to Industry Code of Practice on chemicals classification and hazard communication (2014)
- Hazard pictograms (GHS MY) :
- 

GHS03



GHS04
- Signal word (GHS MY) : Danger
- Hazard statements (GHS MY) :
- H270 - May cause or intensify fire; oxidizer
  - H281 - Contains refrigerated gas; may cause cryogenic burns or injury
- Precautionary statements (GHS MY)
- Prevention : P220 - Keep/Store away from clothing and others combustible materials.  
P244 - Keep reduction valves free from grease and oil.  
P282 - Wear cold insulating gloves/face shield/eye protection
  - Response : P315 - Get immediate medical advice/attention.  
P336 - Thaw frosted parts with lukewarm water. Do not rub affected area.  
P370+P376 - In case of fire: stop leak if safe to do so
  - Storage : P403 - Store in a well-ventilated place
- 2.3. Other hazards not contributing to the classification**
- Other hazards which do not result in classification : None.



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#### SECTION 3: Composition and information of the ingredients of the hazardous chemical

##### 3.1. Substances

Name	Product identifier	%
Oxygen, Refrigerated Liquid (Main constituent)	(CAS-No.) 7782-44-7	100

##### 3.2. Mixtures

Not applicable

#### SECTION 4: First aid measures

##### 4.1. Description of first aid measures

- First-aid measures after inhalation** : Remove person to fresh air and keep comfortable for breathing. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped. Remove victim to uncontaminated area.
- First-aid measures after skin contact** : In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance. Wash skin with plenty of water.
- First-aid measures after eye contact** : Immediately flush eyes thoroughly with water for at least 15 minutes. Rinse eyes with water as a precaution.
- First-aid measures after ingestion** : Ingestion is not considered a potential route of exposure. Call a poison center or a doctor if you feel unwell.

##### 4.2. Most important symptoms and effects, both acute and delayed

- Most important symptoms and effects, both acute and delayed** : Continuous inhalation of concentrations higher than 75% may cause nausea, dizziness, respiratory difficulty and convulsion. See section 11.

##### 4.3. Indication of any immediate medical attention and special treatment needed

- Other medical advice or treatment** : None.

#### SECTION 5: Fire-fighting measures

##### 5.1. Extinguishing media

- Suitable extinguishing media** : Water spray or fog. Water spray. Dry powder. Foam.
- Unsuitable extinguishing media** : Do not use water jet to extinguish.

##### 5.2. Special hazards arising from the substance or mixture

- Fire hazard** : May intensify fire; oxidiser.
- Reactivity** : No reactivity hazard other than the effects described in sub-sections below.
- Reactivity in case of fire** : No reactivity hazard other than the effects described in sub-sections below.
- Hazardous combustion products** : None.

##### 5.3. Special protective equipment and precautions for fire-fighters

- Firefighting instructions** : In case of fire: stop leak if safe to do so.
- Protection during firefighting** : Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.
- Special protective equipment for fire fighters** : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.
- Specific methods** : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems. If possible, stop flow of product. Use water spray or fog to knock down fire fumes if possible. If leaking do not spray water onto container. Water surrounding area (from protected position) to contain fire. Move containers away from the fire area if this can be done without risk.

- EAC code** : 2P

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#### SECTION 6: Accidental release measures

##### 6.1. Personal precautions, protective equipment and emergency procedures

**General measures** : Try to stop release. Evacuate area. Monitor concentration of released product. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Eliminate ignition sources. Use protective clothing. Ensure adequate air ventilation. Act in accordance with local emergency plan. Stay upwind.

##### 6.1.1. For non-emergency personnel

**Emergency procedures** : Ventilate spillage area.

##### 6.1.2. For emergency responders

**Protective equipment** : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

##### 6.2. Environmental precautions

Avoid release to the environment. Try to stop release. Liquid spillages can cause embrittlement of structural materials.

##### 6.3. Methods and material for containment and cleaning up

**Methods for cleaning up** : Notify authorities if product enters sewers or public waters.

**Methods and material for containment and cleaning up** : Ventilate area.

#### SECTION 7: Handling and storage

##### 7.1. Precautions for safe handling

**Precautions for safe handling** : Ensure good ventilation of the work station. Wear personal protective equipment. Keep valves and fittings free from oil and grease.

**Hygiene measures** : Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

**Safe handling of the gas receptacle** : Refer to supplier's container handling instructions. Do not allow backfeed into the container. Protect containers from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminants particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one cylinder/container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the content of the container. Suck back of water into the container must be prevented. Open valve slowly to avoid pressure shock.

**Safe use of the product** : Do not breathe gas. The product must be handled in accordance with good industrial hygiene and safety procedures. Only experienced and properly instructed persons should handle gases under pressure. Consider pressure relief device(s) in gas installations. Ensure the complete gas system was (or is regularly) checked for leaks before use. Do not smoke while handling product. Keep equipment free from oil and grease. For more guidance, refer to the EIGA Doc. 33 - Cleaning of Equipment for Oxygen Service downloadable at <http://www.eiga.eu>. Use no oil or grease. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Use only oxygen approved lubricants and oxygen approved sealings. Use only with equipment cleaned for oxygen service and rated for container pressure. Avoid suck back of water, acid and alkalis.

##### 7.2. Conditions for safe storage, including any incompatibilities

**Storage conditions** : Store in a well-ventilated place. Keep cool.

**Incompatible materials** : combustible materials.

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**Conditions for safe storage, including any incompatibilities** : Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Container valve guards or caps should be in place. Containers should be stored in the vertical position and properly secured to prevent them from falling over. Stored containers should be periodically checked for general condition and leakage. Keep container below 50°C in a well ventilated place. Segregate from flammable gases and other flammable materials in store. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

No additional information available

### Exposure limit values for the other components

No additional information available

### 8.2. Monitoring

### 8.3. Appropriate engineering controls

**Appropriate engineering controls** : Ensure good ventilation of the work station. Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Avoid oxygen rich (>23,5%) atmospheres. Gas detectors should be used when oxidising gases may be released. Consider the use of a work permit system e.g. for maintenance activities.

### 8.4. Personal protective equipment

Wear safety shoes while handling containers.

Standard EN ISO 14116 - Limited flame spread materials. Wear safety shoes while handling containers. Standard EN ISO 20345 - Personal protective equipment - Safety footwear. Consider the use of flame resistant safety clothing.

#### Hand protection:

Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risk, performance level 1 or higher. Wear cold insulating gloves when transfilling or breaking transfer connections. Standard EN 511 - Cold insulating gloves.

#### Eye protection:

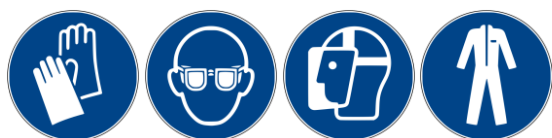
Safety glasses. Wear goggles and a face shield when transfilling or breaking transfer connections. Standard EN 166 - Personal eye-protection - specifications

#### Skin and body protection:

Wear suitable protective clothing

#### Respiratory protection:

None necessary.



**Thermal hazard protection** : None in addition to the above sections.

**Environmental exposure controls** : Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment. Avoid release to the environment.

## SECTION 9: Physical and chemical properties

**Physical state** : Gas  
**Appearance** : No data available  
**Colour** : Bluish liquid.

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Odour	: Odourless. No odour warning properties.
Odour threshold	: Odour threshold is subjective and inadequate to warn of overexposure.
pH	: Not applicable for gases and gas mixtures.
Melting point, Freezing point	: Melting point: -219 °C Freezing point: -219 °C
Boiling point	: -183 °C
Flash point	: Not applicable for gases and gas mixtures.
Critical temperature	: -118 °C
Auto-ignition temperature	: Non flammable.
Decomposition temperature	: Not applicable.
Flammability	: Non flammable.
Vapour pressure	: Vapour pressure: Not applicable. Vapour pressure at 50°C: Not applicable.
Evaporation rate	: Relative evaporation rate (ether=1): Not applicable for gases and gas mixtures.
Explosive limits	: Non flammable.
Lower explosion limit	: No data available
Upper explosion limit	: No data available
Explosive properties	: Not applicable.
Minimum ignition energy	: No data available
Solubility	: Water: 39 mg/l
Density	: Relative density: 1.1
Relative density	: Relative vapour density at 20°C: Not applicable. Relative gas density: 1.1
Viscosity	: Viscosity, dynamic: No reliable data available. Viscosity, kinematic: 1.1No reliable data available.
Critical pressure	: 5043 kPa
Gas group	: Press. Gas (Ref. Liq.)
Partition coefficient n-octanol/water (Log Pow)	: Not applicable for inorganic products.
Molecular mass	: 32 g/mol
Oxidising properties	: Oxidiser.
Ci	: 1

#### SECTION 10: Stability and reactivity

Chemical stability	: Stable under normal conditions.
Conditions to avoid	: Avoid moisture in installation systems.
Hazardous decomposition products	: None.
Incompatible materials	: Combustible materials. Consider the potential toxicity hazard due to the presence of chlorinated or fluorinated polymers in high pressure (> 30 bar) oxygen lines in case of combustion. May react violently with combustible materials. May react violently with reducing agents. Keep equipment free from oil and grease. For more guidance, refer to the EIGA Doc. 33 - Cleaning of Equipment for Oxygen Service downloadable at <a href="http://www.eiga.eu">http://www.eiga.eu</a> . For additional information on compatibility refer to ISO 11114. Materials such as carbon steel, low alloy carbon steel and plastic become brittle at low temperatures and are subject to failure. Use appropriate materials compatible with the cryogenic conditions present in refrigerated liquefied gas systems. Consult supplier for specific recommendations.
Possibility of hazardous reactions	: Violently oxidises organic material, Risk of explosion if spilt on organic structural materials (e.g. wood or asphalt).
Reactivity	: No reactivity hazard other than the effects described in sub-sections below.

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#### SECTION 11: Toxicological information

##### 11.1. Information on toxicological effects

Acute toxicity (oral)	: Not classified
Acute toxicity (dermal)	: Not classified
Acute toxicity (inhalation)	: Not classified
Skin corrosion or irritation	: Not classified pH: Not applicable for gases and gas mixtures.
Serious eye damage or eye irritation	: Not classified
Respiratory or skin sensitisation	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity (STOT) – single exposure	: Not classified
Specific target organ toxicity (STOT) – repeated exposure	: Not classified
Aspiration hazard	: Not classified

i) Oxygen, Refrigerated Liquid  
ii) PCC Oxygen, Refrigerated Liquid  
iii) UHP O2 (7782-44-7)

Viscosity, kinematic (calculated value) (40 °C)	No reliable data available.
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#### SECTION 12: Ecological information

##### 12.1. Toxicity

Ecology - general	: No data available.
Hazardous to the aquatic environment, short-term (acute)	: Not classified
Hazardous to the aquatic environment, long-term (chronic)	: Not classified

i) Oxygen, Refrigerated Liquid  
ii) PCC Oxygen, Refrigerated Liquid  
iii) UHP O2 (7782-44-7)

Partition coefficient n-octanol/water (Log Kow)	Not applicable for gas mixtures.
Partition coefficient n-octanol/water (Log Pow)	Not applicable for inorganic products.

##### 12.2. Persistence and degradability

i) Oxygen, Refrigerated Liquid  
ii) PCC Oxygen, Refrigerated Liquid  
iii) UHP O2 (7782-44-7)

Persistence and degradability	No data available.
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##### 12.3. Bioaccumulative potential

i) Oxygen, Refrigerated Liquid  
ii) PCC Oxygen, Refrigerated Liquid  
iii) UHP O2 (7782-44-7)

Partition coefficient n-octanol/water (Log Pow)	See section 12.1 on ecotoxicology
Partition coefficient n-octanol/water (Log Kow)	See section 12.1 on ecotoxicology
Bioaccumulative potential	No data available.

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#### 12.4. Mobility in soil

i) Oxygen, Refrigerated Liquid ii) PCC Oxygen, Refrigerated Liquid iii) UHP O2 (7782-44-7)	
Mobility in soil	No additional information available
Partition coefficient n-octanol/water (Log Pow)	See section 12.1 on ecotoxicology
Partition coefficient n-octanol/water (Log Kow)	See section 12.1 on ecotoxicology
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.

#### 12.5. Other adverse effects

Ozone	: Not classified
Effect on global warming	: None.
Effect on the ozone layer	: None.
Other adverse effects	: Can cause frost damage to vegetation.

### SECTION 13: Disposal information

#### 13.1. Disposal methods

Waste treatment methods	: Dispose of contents/container in accordance with licensed collector's sorting instructions. Contact supplier if guidance is required. Do not discharge into any place where its accumulation could be dangerous. Ensure that the emission levels from local regulations or operating permits are not exceeded. Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at <a href="http://www.eiga.eu">http://www.eiga.eu</a> for more guidance on suitable disposal methods. May be vented to atmosphere in a well ventilated place. Return unused product in original container to supplier.
Additional information	: External treatment and disposal of waste should comply with applicable local and/or national regulations. { Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at <a href="http://www.eiga.org">http://www.eiga.org</a> ) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.

### SECTION 14: Transportation information

#### 14.1. UN number

UN-No.(UN RTDG)	: 1073
UN-No. (IMDG)	: 1073
UN-No. (IATA)	: 1073

#### 14.2. Proper Shipping Name

Proper Shipping Name (UN RTDG)	: OXYGEN, REFRIGERATED LIQUID
Proper Shipping Name (IMDG)	: OXYGEN, REFRIGERATED LIQUID
Proper Shipping Name (IATA)	: Oxygen, refrigerated liquid

#### 14.3. Transport hazard class(es)

UN RTDG	
Transport hazard class(es) (UN RTDG)	: 2.2 (5.1)
Danger labels (UN RTDG)	: 2.2, 5.1



IMDG

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Transport hazard class(es) (IMDG) : 2.2 (5.1)  
Danger labels (IMDG) : 2.2, 5.1



IATA  
Transport hazard class(es) (IATA) : 2.2 (5.1)

#### 14.4. Packing group

Packing group (UN RTDG) : Not applicable  
Packing group (IMDG) : Not applicable  
Packing group (IATA) : Not applicable

#### 14.5. Environmental hazards

Dangerous for the environment : No  
Marine pollutant : No  
Other information : No supplementary information available

#### 14.6. Special precautions for user

Special transport precautions : 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 there is adequate ventilation, - Ensure that containers are firmly secured, - Ensure 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.

- UN RTDG

Special provisions (UN RTDG) : 274  
Limited quantities (UN RTDG) : 0

Excepted quantities (UN RTDG) : E0  
Packing instruction (UN RTDG) : P203  
Portable tank and bulk container special instructions (UN RTDG) : T75  
Portable tank and bulk container special provisions (UN RTDG) : TP5, TP22

- IMDG

Special provisions (IMDG) : 274  
Limited quantities (IMDG) : 0  
Excepted quantities (IMDG) : E0  
Packing instructions (IMDG) : P203  
Tank instructions (IMDG) : T75  
Tank special provisions (IMDG) : TP5, TP22  
EmS-No. (Fire) : F-C - FIRE SCHEDULE Charlie - NON-FLAMMABLE GASES  
EmS-No. (Spillage) : S-W - SPILLAGE SCHEDULE Whisky - OXIDIZING GASES  
Stowage category (IMDG) : D





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**Properties and observations (IMDG)** : Liquefied, non-flammable gas. Strong oxidizing agent. Mixtures of liquid oxygen with acetylene or oils may explode.

**MFAG-No** : 122

**- IATA**

**PCA Limited quantities (IATA)** : Forbidden

**PCA limited quantity max net quantity (IATA)** : Forbidden

**PCA packing instructions (IATA)** : Forbidden

**PCA max net quantity (IATA)** : Forbidden

**CAO packing instructions (IATA)** : Forbidden

**CAO max net quantity (IATA)** : Forbidden

**Special provisions (IATA)** : A2

**ERG code (IATA)** : 2X

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

14.8. 14.8. Hazchem or Emergency Action Code

EAC code : 2P.

#### SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Occupational Safety and Health Act 1994 and relevant regulations:

Occupational Safety and Health (Classification, Labeling and Safety Data Sheet of Hazardous Chemicals) Regulations 2013.  
Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000.

Environment Quality Act 1974 & regulations:

Environment Quality (Clean Air) Regulations 2014.  
Environmental Quality (Scheduled Wastes) Regulations 2005.

15.2. 15.2. Chemical safety assessment

#### SECTION 16: Other information

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#### Abbreviations and acronyms

: ATE - Acute Toxicity Estimate  
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008  
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006  
EINECS - European Inventory of Existing Commercial Chemical Substances  
CAS# - Chemical Abstract Service number  
PPE - Personal Protection Equipment  
LC50 - Lethal Concentration to 50 % of a test population  
RMM - Risk Management Measures  
PBT - Persistent, Bioaccumulative and Toxic  
vPvB - Very Persistent and Very Bioaccumulative  
STOT- SE : Specific Target Organ Toxicity - Single Exposure  
CSA - Chemical Safety Assessment  
EN - European Standard  
UN - United Nations  
ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road  
IATA - International Air Transport Association  
IMDG code - International Maritime Dangerous Goods  
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail  
WGK - Water Hazard Class  
STOT - RE : Specific Target Organ Toxicity - Repeated Exposure  
Training advice : None. Ensure operators understand the hazard of oxygen enrichment.

*This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.*