

**SAFETY DATA SHEET**  
**Oxygen, Refrigerated Liquid**

Issue Date: 16.01.2013  
Last revised date: 29.06.2015

Version: 1.2

SDS No.: 000010021821  
1/13

**SECTION 1: Identification of the substance/mixture and of the company/undertaking**

**1.1 Product identifier**

**Product name:** Oxygen, Refrigerated Liquid

**Additional identification**

**Chemical name:** oxygen

**Chemical formula:** O<sub>2</sub>

**INDEX No.** 008-001-00-8

**CAS-No.** 7782-44-7

**EC No.** 231-956-9

**REACH Registration No.** Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.

**1.2 Relevant identified uses of the substance or mixture and uses advised against**

**Identified uses:** Industrial and professional. Perform risk assessment prior to use. Balance gas for mixtures. Calibration gas. Carrier gas. Chemical synthesis. Combustion, melting and cutting processes. Food packaging gas. Laboratory use. Laser gas. Oxidising agent. Process gas. Shielding gas in gas welding. Test gas. Use of gas to manufacture pharmaceutical products.

**Uses advised against** Industrial or technical grade unsuitable for medical and/or food applications or inhalation. Consumer use.

**1.3 Details of the supplier of the safety data sheet**

**Supplier**

BOC  
Priestley Road, Worsley  
M28 2UT Manchester

**Telephone:** 0800 111 333

**E-mail:** ReachSDS@boc.com

**1.4 Emergency telephone number:** 0800 111 333

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**SECTION 2: Hazards identification**

**2.1 Classification of the substance or mixture**

Classification according to Directive 67/548/EEC or 1999/45/EC as amended.

O; R8

The full text for all R-phrases is displayed in section 16.

Classification according to Regulation (EC) No 1272/2008 as amended.

**Physical Hazards**

Oxidising gases	Category 1	H270: May cause or intensify fire; oxidiser.
Gases under pressure	Refrigerated liquefied gas	H281: Contains refrigerated gas; may cause cryogenic burns or injury.

**2.2 Label Elements**



**Signal Words:** Danger

**Hazard Statement(s):** H270: May cause or intensify fire; oxidiser.  
H281: Contains refrigerated gas; may cause cryogenic burns or injury.

**Precautionary Statement**

**Prevention:** P220: Keep/Store away from combustible materials.  
P244: Keep valves and fittings free from oil and grease.  
P282: Wear cold-insulating gloves/face shield/eye protection.

**Response:** P336+P315: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.  
P370+P376: In case of fire: Stop leak if safe to do so.

**Storage:** P403: Store in a well-ventilated place.

**Disposal:** None.

**2.3 Other hazards:** None.

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**SECTION 3: Composition/information on ingredients**

**3.1 Substances**

Chemical name	oxygen
INDEX No.:	008-001-00-8
CAS-No.:	7782-44-7
EC No.:	231-956-9
REACH Registration No.:	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.
Purity:	100 % The purity of the substance in this section is used for classification only, and does not represent the actual purity of the substance as supplied, for which other documentation should be consulted.
Trade name:	-

**SECTION 4: First Aid Measures**

**General:** Move the exposed person to fresh air at once.

**4.1 Description of first aid measures**

**Inhalation:** Move the exposed person to fresh air at once.

**Eye contact:** Rinse the eye with water immediately. Remove contact lenses, if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

**Skin Contact:** Contact with evaporating liquid may cause frostbite or freezing of skin. If clothing is saturated with the liquid and adhering to the skin then the area should be thawed with lukewarm water prior to removing the clothing.

**Ingestion:** Ingestion is not considered a potential route of exposure.

**4.2 Most important symptoms and effects, both acute and delayed:** Continuous inhalation of concentrations higher than 75% may cause nausea, dizziness, respiratory difficulty and convulsion. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

**4.3 Indication of any immediate medical attention and special treatment needed**

**Hazards:** Continuous inhalation of concentrations higher than 75% may cause nausea, dizziness, respiratory difficulty and convulsion. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

**Treatment:** Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

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**SECTION 5: Firefighting Measures**

**General Fire Hazards:** Heat may cause the containers to explode.

**5.1 Extinguishing media**

**Suitable extinguishing media:** Water Spray or Fog. Dry powder. Foam. Carbon dioxide.

**Unsuitable extinguishing media:** None.

**5.2 Special hazards arising from the substance or mixture:** Supports combustion.

**Hazardous Combustion Products:** None.

**5.3 Advice for firefighters**

**Special fire fighting procedures:** In case of fire: Stop leak if safe to do so. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.

**Special protective equipment for firefighters:** Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Guideline: EN 469 Protective clothing for firefighters. Performance requirements for protective clothing for firefighting. EN 15090 Footwear for firefighters. EN 659 Protective gloves for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

**SECTION 6: Accidental Release Measures**

**6.1 Personal precautions, protective equipment and emergency procedures:** Evacuate area. Eliminate all ignition sources if safe to do so. Provide adequate ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Monitor the concentration of the released product.

**6.2 Environmental Precautions:** Prevent further leakage or spillage if safe to do so.

**6.3 Methods and material for containment and cleaning up:** Provide adequate ventilation. Liquid spillages can cause embrittlement of structural materials.

**6.4 Reference to other sections:** Refer to sections 8 and 13.

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**SECTION 7: Handling and Storage:**

**7.1 Precautions for safe handling:** Only experienced and properly instructed persons should handle gases under pressure. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Keep equipment free from oil and grease. Open valve slowly to avoid pressure shock. Use only oxygen approved lubricants and sealants. Use only with equipment cleaned for oxygen service and rated for the pressure. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Avoid suckback of water, acid and alkalis. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. When using do not eat, drink or smoke. Store in accordance with local/regional/national/international regulations. Never use direct flame or electrical heating devices to raise the pressure of a container. 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. Damaged valves should be reported immediately to the supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminants particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place.

**7.2 Conditions for safe storage, including any incompatibilities:** Containers should not be stored in conditions likely to encourage corrosion. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible material. Avoid asphalted locations for storage, transfer and use (ignition risk if spilt). Segregate from flammable gases and other flammable materials being stored.

**7.3 Specific end use(s):** None.

**SECTION 8: Exposure Controls/Personal Protection**

**8.1 Control Parameters**

**Occupational Exposure Limits**

None of the components have assigned exposure limits.

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## 8.2 Exposure controls

**Appropriate engineering controls:** Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Avoid oxygen rich (>23,5%) atmospheres. Gas detectors should be used when quantities of oxidising gases may be released. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Systems under pressure should be regularly checked for leakages. Preferably use permanent leak tight connections (eg. welded pipes). Do not eat, drink or smoke when using the product.

### Individual protection measures, such as personal protective equipment

**General information:** A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Keep self contained breathing apparatus readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

**Eye/face protection:** Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases.  
Guideline: EN 166 Personal Eye Protection.

#### Skin protection

**Hand Protection:** Wear cold insulating gloves.  
Guideline: EN 511 Protective gloves against cold.

**Body protection:** Wear appropriate clothing to prevent skin contamination or freezing.

**Other:** Wear safety shoes while handling containers  
Guideline: ISO 20345 Personal protective equipment - Safety footwear.

**Respiratory Protection:** Not required.

**Thermal hazards:** If there is a risk of contact with the liquid, all protective equipment should be suitable for extremely low temperatures.

**Hygiene measures:** Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.

**Environmental exposure controls:** For waste disposal, see section 13.

## SECTION 9: Physical And Chemical Properties

### 9.1 Information on basic physical and chemical properties

#### Appearance

Physical state:	Gas
Form:	Refrigerated liquefied gas
Colour:	Colourless
Odour:	Odourless

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Odour Threshold:	Odour threshold is subjective and is inadequate to warn of over exposure.
pH:	not applicable.
Melting Point:	-218.4 °C
Boiling Point:	-183 °C
Sublimation Point:	not applicable.
Critical Temp. (°C):	-118.0 °C
Flash Point:	Not applicable to gases and gas mixtures.
Evaporation Rate:	Not applicable to gases and gas mixtures.
Flammability (solid, gas):	This product is not flammable.
Flammability limit - upper (%)-:	not applicable.
Flammability limit - lower(%)-:	not applicable.
Vapour pressure:	4,053 kPa ( -124.1 °C)
Vapour density (air=1):	No data available.
Relative density:	1.1
Solubility(ies)	
Solubility in Water:	39 mg/l
Partition coefficient (n-octanol/water):	Not known.
Autoignition Temperature:	not applicable.
Decomposition Temperature:	Not known.
Viscosity	
Kinematic viscosity:	No data available.
Dynamic viscosity:	No data available.
Explosive properties:	Not applicable.
Oxidising Properties:	Oxidising
 9.2 Other information:	 None.
Molecular weight:	32 g/mol ( O2)

<b>SECTION 10: Stability and Reactivity</b>
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10.1 Reactivity:	No reactivity hazard other than the effects described in sub-section below.
10.2 Chemical Stability:	Stable under normal conditions.
10.3 Possibility of Hazardous Reactions:	Violently oxidises organic material. May react violently with combustible materials. May react violently with reducing agents.
10.4 Conditions to Avoid:	None.

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**10.5 Incompatible Materials:** Cryogenic liquids can cause embrittlement of some metals and alter the physical properties of other materials. Combustible materials Reducing Agents. Keep equipment free from oil and grease. For material compatibility see latest version of ISO-11114. Consider the potential toxicity hazard due to the presence of chlorinated or fluorinated polymers in high pressure (>30 bar) oxygen lines and equipment in case of combustion.

**10.6 Hazardous Decomposition Products:** Under normal conditions of storage and use, hazardous decomposition products should not be produced.

<b>SECTION 11: Toxicological Information</b>
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**General information:** None.

**11.1 Information on toxicological effects**

**Acute toxicity - Oral Product** Based on available data, the classification criteria are not met.

**Acute toxicity - Dermal Product** Based on available data, the classification criteria are not met.

**Acute toxicity - Inhalation Product** **Not classified for acute toxicity based on available data.**

**Skin Corrosion/Irritation Product** Based on available data, the classification criteria are not met.

**Serious Eye Damage/Eye Irritation Product** Based on available data, the classification criteria are not met.

**Respiratory or Skin Sensitisation Product** Based on available data, the classification criteria are not met.

**Germ Cell Mutagenicity Product** Based on available data, the classification criteria are not met.

**Carcinogenicity Product** Based on available data, the classification criteria are not met.

**Reproductive toxicity Product** Based on available data, the classification criteria are not met.

**Specific Target Organ Toxicity - Single Exposure Product** Based on available data, the classification criteria are not met.

**Specific Target Organ Toxicity - Repeated Exposure Product** Based on available data, the classification criteria are not met.



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**Aspiration Hazard**  
**Product**

Not applicable to gases and gas mixtures..

**SECTION 12: Ecological Information**

**12.1 Toxicity**

**Acute toxicity**  
**Product**

No ecological damage caused by this product.

**12.2 Persistence and Degradability**  
**Product**

Not applicable to gases and gas mixtures..

**12.3 Bioaccumulative Potential**  
**Product**

The product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.

**12.4 Mobility in Soil**  
**Product**

Because of its high volatility, the product is unlikely to cause ground or water pollution.

**12.5 Results of PBT and vPvB**  
**assessment**  
**Product**

Not classified as PBT or vPvB.

**12.6 Other Adverse Effects:**

No ecological damage caused by this product.

**SECTION 13: Disposal Considerations**

**13.1 Waste treatment methods**

**General information:**

Do not discharge into any place where its accumulation could be dangerous. Vent to atmosphere in a well ventilated place.

**Disposal methods:**

Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org>) 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.

**European Waste Codes**

**Container:**

16 05 04\*: gases in pressure containers (including halons) containing dangerous substances

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**SECTION 14: Transport Information**

**ADR**

14.1 UN Number: UN 1073  
14.2 UN Proper Shipping Name: OXYGEN, REFRIGERATED LIQUID  
14.3 Transport Hazard Class(es)  
Class: 2  
Label(s): 2.2, 5.1  
Hazard No. (ADR): 225  
Tunnel restriction code: (C/E)  
Emergency Action Code: 2P  
14.4 Packing Group: -  
14.5 Environmental hazards: not applicable  
14.6 Special precautions for user: -

**RID**

14.1 UN Number: UN 1073  
14.2 UN Proper Shipping Name: OXYGEN, REFRIGERATED LIQUID  
14.3 Transport Hazard Class(es)  
Class: 2  
Label(s): 2.2, 5.1  
14.4 Packing Group: -  
14.5 Environmental hazards: not applicable  
14.6 Special precautions for user: -

**IMDG**

14.1 UN Number: UN 1073  
14.2 UN Proper Shipping Name: OXYGEN, REFRIGERATED LIQUID  
14.3 Transport Hazard Class(es)  
Class: 2.2  
Label(s): 2.2, 5.1  
EmS No.: F-C, S-W  
14.3 Packing Group: -  
14.5 Environmental hazards: not applicable  
14.6 Special precautions for user: -

**IATA**

14.1 UN Number: UN 1073  
14.2 Proper Shipping Name: Oxygen, refrigerated liquid  
14.3 Transport Hazard Class(es)  
Class: 2.2  
Label(s): -  
14.4 Packing Group: -  
14.5 Environmental hazards: not applicable  
14.6 Special precautions for user: -  
Other information  
Passenger and cargo aircraft: Forbidden.  
Cargo aircraft only: Forbidden.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: not applicable

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**Additional identification:** 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 they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

**SECTION 15: Regulatory information**

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

**EU Regulations**

Directive 96/82/EC (Seveso II): on the control of major accident hazards involving dangerous substances:

Chemical name	CAS-No.	Concentration
oxygen	7782-44-7	100 %

Directive 98/24/EC on the protection of workers from the risks related to chemical agents at work:

Chemical name	CAS-No.	Concentration
oxygen	7782-44-7	100 %

**National Regulations**

Dangerous Substances and Explosive Atmospheres Regulations (DSEAR 2002 No. 2776). Management of Health and Safety at Work Regulations (1999 No. 3242). The Regulatory Reform (Fire Safety) Order 2005 (2005 No. 1541). Control of Substances Hazardous to Health Regulations (COSHH, 2002 No. 2677). Provision and Use of Work Equipment Regulations (PUWER, 1998 No. 2306). Personal Protective Equipment Regulations (1992 No. 2966). Control of Major Accident Hazards Regulations (COMAH, 2015 No. 483). Chemical Hazards Information and Packaging for Supply (CHIP, 1994 No. 3247) Pressure Systems Safety Regulations (PSSR, 2000 No. 128). Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.  
This Safety Data Sheet has been produced to comply with Regulation (EU) 453/2010.

**15.2 Chemical safety assessment:**

No Chemical Safety Assessment has been carried out.

**SECTION 16: Other Information**

**Revision Information:** Not relevant.

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**Key literature references and sources for data:**

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:  
Agency for Toxic Substances and Diseases Registry (ATSDR) (<http://www.atsdr.cdc.gov/>).  
European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.  
European Chemical Agency: Information on Registered Substances <http://apps.echa.europa.eu/registered/registered-sub.aspx#search>  
European Industrial Gases Association (EIGA) Doc. 169 Classification and Labelling guide.  
International Programme on Chemical Safety (<http://www.inchem.org/>)  
ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.  
Matheson Gas Data Book, 7th Edition.  
National Institute for Standards and Technology (NIST) Standard Reference Database Number 69.  
The ESIS (European chemical Substances Information System) platform of the former European Chemicals Bureau (ECB) ESIS (<http://ecb.jrc.ec.europa.eu/esis/>).  
The European Chemical Industry Council (CEFIC) ERICards.  
United States of America's National Library of Medicine's toxicology data network TOXNET (<http://toxnet.nlm.nih.gov/index.html>)  
Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).  
Substance specific information from suppliers.  
Details given in this document are believed to be correct at the time of publication.  
EH40 (as amended) Workplace exposure limits.

**Wording of the R-phrases and H-statements in sections 2 and 3**

H270	May cause or intensify fire; oxidiser.
H280	Contains gas under pressure; may explode if heated.
H281	Contains refrigerated gas; may cause cryogenic burns or injury.
R8	Contact with combustible material may cause fire.

**Training information:**

Users of breathing apparatus must be trained. Ensure operators understand the hazard of oxygen enrichment. Ensure operators understand the hazards.

**Classification according to Regulation (EC) No 1272/2008 as amended.**

Ox. Gas 1, H270  
Press. Gas Refrig. Liq. Gas,  
H281

**Other information:**

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. 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. Note: When the Product Name appears in the SDS header the decimal sign and its position comply with rules for the structure and drafting of international standards, and is a comma on the line. As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

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**Disclaimer:** 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.