

SAFETY DATA SHEET

Version 1.17
Revision Date 04.06.2015
Supercedes Version: 1.16

SDS Number 300000000110
Print Date 04.02.2016

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

1.1. Product identifier : Oxygen

Chemical formula : O₂

Synonyms : Oxygen, Oxygen gas, Gaseous Oxygen, GOX

Refer to Section 3 for REACH information

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

Use of the Substance/Mixture : General Industrial

Restrictions on Use : No data available.

1.3 Details of the supplier of the safety data sheet : Air Products Plc
2 Millennium Gate
Westmere Drive
Crewe
Cheshire

Email Address – Technical Information : GASTECH@airproducts.com

Telephone : +44(0)8457 020202

1.4. Emergency telephone number : 1. Cylinder 0500 020202 / +44 870 190 6874
2. Bulk 0500 020202 / +44 2030 240 571
3. Medical 0500 020202 / +44 1270 218 050

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Oxidizing gases - Category 1 H270:May cause or intensify fire; oxidiser.

Gases under pressure - Compressed gas. H280:Contains gas under pressure; may explode if heated.

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2.2. Label elements

Hazard pictograms/symbols



Signal Word: Danger

Hazard Statements:

H270: May cause or intensify fire; oxidiser.
H280: Contains gas under pressure; may explode if heated.

Precautionary Statements:

Prevention : P220: Keep away from clothing and other combustible materials.
P244: Keep valves and fittings free from oil and grease.
Response : 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

High pressure, oxidizing gas.
Vigorously accelerates combustion.
Keep oil, grease, and combustibles away.
May react violently with combustible materials.

SECTION 3: Composition/information on ingredients

Substance/Mixture : Substance

| Components | EINECS / ELINCS Number | CAS Number | Concentration (Volume) |
|------------|------------------------|------------|------------------------|
| Oxygen | 231-956-9 | 7782-44-7 | 100 % |

| Components | Classification (CLP) | REACH Reg. # |
|------------|---|--------------|
| Oxygen | Ox. Gas 1 ;H270 Press. Gas (Comp.) ;H280 | |

If REACH registration numbers do not appear the substance is either exempt from registration, does not meet the minimum volume threshold for registration, or the registration date has not yet come due.
Refer to section 16 for full text of each relevant R-phrases and H-phrases.

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Concentration is nominal. For the exact product composition, please refer to Air Products technical specifications.

SECTION 4: First aid measures

4.1 Description of first aid measures

- General advice : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
- Eye contact : Seek medical advice.
- Skin contact : Seek medical advice.
- Ingestion : Ingestion is not considered a potential route of exposure.
- Inhalation : Consult a physician after significant exposure. Move to fresh air. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately.

4.2 Most important symptoms and effects, both acute and delayed

- Symptoms : No data available.

4.3 Indication of any immediate medical attention and special treatment needed

No data available.

SECTION 5: Fire-fighting measures

5.1 Extinguishing media

- Suitable extinguishing media : All known extinguishing media can be used.

- Extinguishing media which must not be used for safety reasons. : No data available.

5.2 Special hazards arising from the substance or mixture

- : Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Oxidant. Strongly supports combustion. May react violently with combustible materials. Some materials which are noncombustible in air may burn in the presence of an oxidizer. Move away from container and cool with water from a protected position. Keep adjacent cylinders cool by spraying with large amounts of water until the fire burns itself out. If possible, stop flow of product.

5.3 Advice for fire-fighters

- : Wear self contained breathing apparatus for fire fighting if necessary. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. Standard EN 469 - Protective clothing for

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firefighters. Standard - EN 659: Protective gloves for firefighters.

Further information : Some materials that are noncombustible in air will burn in the presence of an oxygen enriched atmosphere (greater than 23.5%). Fire resistant clothing may burn and offer no protection in oxygen rich atmospheres.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures : Clothing exposed to high concentrations may retain oxygen 30 minutes or longer and become a potential fire hazard. Stay away from ignition sources. Evacuate personnel to safe areas. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ventilate the area.

6.2 Environmental precautions : Do not discharge into any place where its accumulation could be dangerous. Prevent further leakage or spillage if safe to do so.

6.3 Methods and material for containment and cleaning up : Ventilate the area.

Additional advice : If possible, stop flow of product. Increase ventilation to the release area and monitor concentrations. If leak is from cylinder or cylinder valve, call the Air Products emergency telephone number. If the leak is in the user's system, close the cylinder valve, safely vent the pressure, and purge with an inert gas before attempting repairs.

6.4 Reference to Other Sections : For more information refer to Sections 8 & 13

SECTION 7: Handling and storage

7.1 Precautions for safe handling

All gauges, valves, regulators, piping and equipment to be used in oxygen service must be cleaned for oxygen service. 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. Only experienced and properly instructed persons should handle compressed gases/cryogenic liquids. Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C (122°F). Before using the product, determine its identity by reading the label. Know and understand the properties and hazards of the product before use. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. 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. Use an adjustable strap wrench to remove over-tight or rusted caps. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Ensure the complete gas system is compatible for pressure rating and materials of construction. Ensure the complete gas system has been checked for leaks before use. Employ suitable pressure

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regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. If user experiences any difficulty operating cylinder valve discontinue use and contact 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. Damaged valves should be reported immediately to the supplier. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Do not smoke while handling product or cylinders. Never re-compress a gas or a gas mixture without first consulting the supplier. Never attempt to transfer gases from one cylinder/container to another. Always use backflow protective device in piping. When returning cylinder install valve outlet cap or plug leak tight. Never permit oil, grease, or other readily combustible substances to come into contact with valves or containers containing oxygen or other oxidants. Do not use rapidly opening valves (e.g. ball valves). Open valve slowly to avoid pressure shock. Never pressurize the entire system at once. Use only with equipment cleaned for oxygen service and rated for cylinder pressure. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50°C (122°F).

7.2 Conditions for safe storage, including any incompatibilities

Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. Full containers should be stored so that oldest stock is used first. Stored containers should be periodically checked for general condition and leakage. Observe all regulations and local requirements regarding storage of containers. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Container valve guards or caps should be in place. Keep containers tightly closed in a cool, well-ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50°C (122°F). Display "No Smoking or Open Flames" signs in the storage areas. Return empty containers in a timely manner.

Technical measures/Precautions

Containers should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc.) and in accordance with local regulations.

7.3 Specific end use(s)

Refer to section 1 or the extended SDS if applicable

SECTION 8: Exposure controls / personal protection

8.1 Control parameters

If applicable, refer to the extended section of the SDS for further information on CSA.

8.2 Exposure controls

Engineering measures

Ensure adequate ventilation.

Personal protective equipment

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| | |
|---|---|
| Respiratory protection | : Not required under normal use. Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmosphere. Users of breathing apparatus must be trained. |
| Hand protection | : Wear working gloves when handling gas containers. Gloves must be clean and free of oil and grease. Standard EN 388 - Protective gloves against mechanical risk. |
| Eye/face Protection | : Safety glasses recommended when handling cylinders. Standard EN 166 - Personal eye-protection. |
| Skin and body protection | : Safety shoes are recommended when handling cylinders. Standard EN ISO 20345 - Personal protective equipment - Safety footwear. |
| Special instructions for protection and hygiene | : Ensure adequate ventilation, especially in confined areas. |
| Environmental Exposure Controls | : If applicable, refer to the extended section of the SDS for further information on CSA. |

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

| | |
|--|--|
| (a/b) Physical state/Colour | : Compressed gas. Colorless gas |
| (c) Odour | : No odor warning properties. |
| (d) Density | : 0.0013 g/cm ³ (0.081 lb/ft ³) at 21 °C (70 °F) Note: (as vapor) |
| (e) Relative Density | : 1.1 (water = 1) |
| (f) Melting point / freezing point | : -362 °F (-219 °C) |
| (g) Boiling point/range | : -297 °F (-183 °C) |
| (h) Vapor pressure | : Not applicable. |
| (i) Water solubility | : 0.039 g/l |
| (j) Partition coefficient (n-octanol/water) | : Not applicable. |
| (k) pH | : Not applicable. |
| (l) Viscosity | : Not applicable. |
| (m) Particle characteristics | : No data available. |

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(n) Lower and upper explosion : No data available.
/ flammability limits

(o) Flash point : Not applicable.

(p) Autoignition temperature : No data available.

(q) Decomposition : No data available.
temperature

9.2. Other information

Explosive properties : No data available.

Oxidizing properties : Ci =1

Molecular Weight : 32 g/mol

Odor threshold : No data available.

Evaporation rate : Not applicable.

Flammability (solid, gas) : Refer to product classification in Section 2

Specific Volume : 0.7540 m³/kg (12.08 ft³/lb) at 21 °C (70 °F)

Relative vapor density : 1.1 (air = 1)

SECTION 10: Stability and reactivity

10.1 Reactivity : Refer to possibility of hazardous reactions and/or incompatible materials sections.

10.2. Chemical stability : Stable under normal conditions.

10.3. Possibility of hazardous : No data available.
reactions

10.4. Conditions to avoid : No data available.

10.5. Incompatible materials : Flammable materials.
Organic materials.
Avoid oil, grease and all other combustible materials.

10.6 Hazardous : No data available.
decomposition products

SECTION 11: Toxicological information

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11.1 Information on toxicological effects

Likely routes of exposure

| | | |
|--------------------|---|---|
| Effects on Eye | : | No adverse effect. |
| Effects on Skin | : | No adverse effect. |
| Inhalation Effects | : | Breathing 75% 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 pure oxygen under pressure may cause lung damage and also central nervous system effects. |
| Ingestion Effects | : | Ingestion is not considered a potential route of exposure. |
| Symptoms | : | No data available. |

Acute toxicity

| | | |
|-----------------------------------|---|---|
| Acute Oral Toxicity | : | No data is available on the product itself. |
| Acute Inhalation Toxicity | : | No data is available on the product itself. |
| Acute Dermal Toxicity | : | No data is available on the product itself. |
| Skin corrosion/irritation | : | No data available. |
| Serious eye damage/eye irritation | : | No data available. |
| Sensitization. | : | No data available. |

Chronic toxicity or effects from long term exposures

| | | |
|---|---|---|
| Carcinogenicity | : | No data available. |
| Reproductive toxicity | : | No data is available on the product itself. |
| Germ cell mutagenicity | : | No data is available on the product itself. |
| Specific target organ systemic toxicity (single exposure) | : | No data available. |
| Specific target organ systemic toxicity (repeated exposure) | : | Premature infants exposed to high oxygen concentrations may suffer delayed retinal damage 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 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. |

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Aspiration hazard : No data available.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic toxicity : No data is available on the product itself.

Toxicity to other organisms : No data is available on the product itself.

12.2. Persistence and degradability

No data available.

12.3. Bioaccumulative potential

No data is available on the product itself.

12.4 Mobility in soil

No data available.

12.5 Results of PBT and vPvB assessment

If applicable, refer to the extended section of the SDS for further information on CSA.

12.6 Other adverse effects

No ecological damage caused by this product.

Effect on the ozone layer

Ozone Depleting Potential : No data available.

Global Warming Potential : No data available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods : Return unused product in original cylinder to supplier. Contact supplier if guidance is required. 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. List of hazardous waste codes: 16 05 04: Gases in pressure containers (including halons) containing dangerous substances.

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Contaminated packaging : Return cylinder to supplier.

SECTION 14: Transport information

ADR

UN/ID No. : UN1072
Proper shipping name : OXYGEN, COMPRESSED
Class or Division : 2
Tunnel Code : (E)
Label(s) : 2.2 (5.1)
ADR/RID Hazard ID no. : 25
Marine Pollutant : No

IATA

UN/ID No. : UN1072
Proper shipping name : Oxygen, compressed
Class or Division : 2.2
Label(s) : 2.2 (5.1)
Marine Pollutant : No

IMDG

UN/ID No. : UN1072
Proper shipping name : OXYGEN, COMPRESSED
Class or Division : 2.2
Label(s) : 2.2 (5.1)
Marine Pollutant : No

RID

UN/ID No. : UN1072
Proper shipping name : OXYGEN, COMPRESSED
Class or Division : 2
Label(s) : 2.2 (5.1)
Marine Pollutant : No

Further 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. The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact an Air Products customer service representative.

SECTION 15: Regulatory information

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

| Country | Regulatory list | Notification |
|---------|-----------------|------------------------|
| USA | TSCA | Included on Inventory. |

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| | | |
|-------------|--------|------------------------|
| EU | EINECS | Included on Inventory. |
| Canada | DSL | Included on Inventory. |
| Australia | AICS | Included on Inventory. |
| South Korea | ECL | Included on Inventory. |
| China | SEPA | Included on Inventory. |
| Philippines | PICCS | Included on Inventory. |
| Japan | ENCS | Included on Inventory. |

15.2 Chemical safety assessment

If this product does not contain exposure scenarios, the components in this product are either exempt from REACH, do not meet the minimum volume threshold for a CSA, or the CSA has not yet been completed.

SECTION 16: Other information

Ensure all national/local regulations are observed.

Hazard Statements:

H270 May cause or intensify fire; oxidiser.

H280 Contains gas under pressure; may explode if heated.

Indication of Method:

Oxidizing gases Category 1 May cause or intensify fire; oxidiser. Calculation method

Gases under pressure Compressed gas. Contains gas under pressure; may explode if heated. Calculation method

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

ELINCS - European List of Notified Chemical Substances

CAS# - Chemical Abstract Service number

PPE - Personal Protection Equipment

Kow - octanol-water partition coefficient

DNEL - Derived No Effect Level

LC50 - Lethal Concentration to 50 % of a test population

LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose)

NOEC - No Observed Effect Concentration

PNEC - Predicted No Effect Concentration

RMM - Risk Management Measure

OEL - Occupational Exposure Limit

PBT - Persistent, Bioaccumulative and Toxic

vPvB - Very Persistent and Very Bioaccumulative

STOT - Specific Target Organ Toxicity

CSA - Chemical Safety Assessment

EN - European Standard

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UN - United Nations

ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road

IATA - International Air Transport Association

IMDG - International Maritime Dangerous Goods

RID - Regulations concerning the International Carriage of Dangerous Goods by Rail

WGK - Water Hazard Class

Key literature references and sources for data:

ECHA - Guidance on the compilation of safety data sheets

ECHA - Guidance on the application of the CLP Criteria

ARIEL database

Prepared by : Air Products and Chemicals, Inc. Global EH&S Product Safety Department

For additional information, please visit our Product Stewardship web site at
<http://www.airproducts.com/productstewardship/>

This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws. Commission Regulation (EU) No 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

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