

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND THE COMPANY/UNDERTAKING

Identification of the substance/preparation	: Oxygen
Chemical formula	: O ₂
Other means of identification	: Oxygen, Oxygen gas, Gaseous Oxygen, GOX
Use of the Substance/Mixture	: General Industrial
Restrictions on Use	: No data available.
Manufacturer/Importer/Distributor	: Versum Materials Singapore Pte. Ltd. 2 International Business Park #03-24, The Strategy Singapore 609930 Toll Free No: 800 448 1755
Email Address – Technical Information	: prodinfo@airproducts.com
Telephone	: 800 448 1755
Emergency telephone number (24h)	: 800-101-2201 / +(65)-31581349

2. HAZARDS IDENTIFICATION

GHS classification

Oxidizing gases - Category 1
Gases under pressure - Compressed gas.

GHS 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:

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- 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.

Other hazards which do not result in classification

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/Mixture : Substance

Components	Chemical formula	CAS Number	Concentration (Volume)
Oxygen	O ₂	7782-44-7	100 %

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

4. 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 : IF exposed or concerned: Get medical advice/attention.
- Skin contact : Adverse effects not expected from this product. IF exposed or concerned: Get medical advice/attention.
- 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.

Notes to physician

Treatment : If exposed or concerned: Get medical attention/advice.

5. FIRE-FIGHTING MEASURES

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

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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.

Special protective equipment 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 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.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions : 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.

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

Methods for 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 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.

7. HANDLING AND STORAGE

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 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

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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).

Storage

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.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Ensure adequate ventilation.

Personal protective equipment

- | | |
|--------------------------|---|
| 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 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 | : Ensure adequate ventilation, especially in confined areas. |

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protection and hygiene

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Compressed gas. Colorless gas
Odor	: No odor warning properties.
Odor threshold	: No data available.
pH	: Not applicable.
Melting point/range	: -362 °F (-219 °C)
Boiling point/range	: -297 °F (-183 °C)
Flash point	: Not applicable.
Evaporation rate	: Not applicable.
Flammability (solid, gas)	: Refer to product classification in Section 2
Upper/lower explosion/flammability limit	: No data available.
Vapor pressure	: Not applicable.
Water solubility	: 0.039 g/l
Relative vapor density	: 1.1 (air = 1)
Relative density	: 1.1 (water = 1)
Partition coefficient (n-octanol/water)	: Not applicable.
Auto-ignition temperature	: No data available.
Decomposition temperature	: No data available.
Viscosity	: Not applicable.
Molecular Weight	: 32 g/mol
Density	: 0.081 lb/ft ³ (0.0013 g/cm ³) at 70 °F (21 °C) Note: (as vapor)
Specific Volume	: 12.08 ft ³ /lb (0.7540 m ³ /kg) at 70 °F (21 °C)

10. STABILITY AND REACTIVITY

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Chemical Stability : Stable under normal conditions.

Reactivity/Incompatible Materials : Flammable materials.
Organic materials.
Avoid oil, grease and all other combustible materials.

11. TOXICOLOGICAL INFORMATION

Likely routes of exposure

Effects on Eye : In case of direct contact with eyes, seek medical advice.

Effects on Skin : Adverse effects not expected from this product.

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.

Inhalation : No data is available on the product itself.

Acute Dermal Toxicity : No data is available on the product itself.

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

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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.

Aspiration hazard : No data available.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

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

Toxicity to other organisms : No data available.

Persistence and degradability

Biodegradability : No data is available on the product itself.

Mobility : Because of its high volatility, the product is unlikely to cause ground pollution.

Bioaccumulation : Refer to Section 9 "Partition Coefficient (n-octanol/water)".

Further information

No ecological damage caused by this product.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products : 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.

Contaminated packaging : Return cylinder to supplier.

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

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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
Segregation Group: : None

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 customer service.

15. REGULATORY INFORMATION

Workplace Safety and Health Act & Workplace Safety and Health (General Provisions) Regulations

Workplace Health and Safety Act , SS586 Labeling.

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
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.

16. OTHER INFORMATION

Ensure all national/local regulations are observed.

Prepared by : Versum Materials, Product Regulatory Department

For additional information, please visit our Versum Materials' Product Stewardship web site.
<http://www.versummaterials.com/productstewardship/>

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