

**SAFETY DATA SHEET**Revised edition no : 2  
Date : 12/05/2014**Oxygen Gas (All grades)**

PG 020

**SECTION 1. IDENTIFICATION OF THE PRODUCT AND COMPANY UNDERTAKING**

<b>Trade Name</b>	Instrument Grade, Instrument "O" Grade, Ultra High Purity
<b>Chemical Family</b>	Inorganic oxygen compound, elemental oxygen, molecular oxygen, diatomic oxygen, compressed gas
<b>Chemical Name</b>	Oxygen gas
<b>Synonyms</b>	Molecular oxygen, Oxygen, Oxygen compressed
<b>Chemical Abstract no</b>	7782-44-7
<b>NIOSH No</b>	6601
<b>UN no</b>	1072
<b>Company:</b>	<b>Puregas (Pty) Ltd</b> PO Box 123884, Alrode, 1451, South Africa <b>Tel :</b> (011) 903 9760 <b>Fax:</b> (011) 903 9766 <b>Cellphone:</b> 082 889 6946 (1 <sup>st</sup> ) 082 885 7475 (2 <sup>nd</sup> ) Info@puregas.co.za <b>Emergency Tel:</b> 0800 172 743 (Rapid Spill Response)

**SECTION 2. HAZARDS IDENTIFICATION**

<b>Main Hazard</b>	Oxygen is non-flammable, but readily supports combustion. Never permit oil, grease or other readily combustible substance to come into contact with high concentrations of oxygen Central Nervous system toxicity including dizziness, convulsions and loss of consciousness after only 2-3 hours of exposure to pure oxygen at 2 or more atmospheres e.g. sports and deep-sea diving. Essentially non-toxic
<b>Flammability</b>	Not found
<b>Chemical hazard</b>	Oxygen is non-flammable, but strongly supports combustion (including some materials which do not normally burn in air). Since dry oxygen is non-corrosive most materials of construction are suitable. Avoid all flammable materials.
<b>Biological hazard</b>	No known effect
<b>Reproduction hazard</b>	No known effect
<b>Eye effects</b>	No known effect. Oxygen gas is not irritating
<b>Health effects – skin</b>	No known effect. Oxygen gas is not irritating
<b>Health effects – ingestion</b>	Not applicable. Oxygen is a gas
<b>Health effects – inhalation</b>	Pure oxygen is a local irritant to mucous membranes and, with extended continued exposure, can be destructive to lung tissue
<b>Carcinogenicity</b>	Oxygen is not listed as a carcinogen
<b>Mutagenicity</b>	No human or animal in vivo studies have been reported. High oxygen concentrations (40 to 99%) at atmospheric pressure caused chromosomal aberrations, sister chromatid exchanges and other mutagenic effects in cultured mammalian cells.
<b>Neurotoxicity</b>	A variety of central nervous system effects can occur from breathing oxygen at partial pressures greater than 2 atm, including dizziness, impaired coordination, visual and hearing disturbances, and seizures

	<b>SAFETY DATA SHEET</b>	Revised edition no : 2 Date : 12/05/2014
	<b>Oxygen Gas (All grades)</b>	PG 020

<b>SUMMARY OF RISKS</b>	<p>Adults can satisfactorily breathe pure oxygen for extended periods at 0.33 atm, or at 1 atm for several days at least 5 hours a day. However, irritation of mucous membranes may occur when 100% oxygen is inhaled continuously for several hours. Chest pains and cough can result from breathing O<sub>2</sub> at 1 atm for 8 to 24 hours or 2 atm for 2 to 3 hours or from an atmosphere of 60% oxygen for several days. A variety of central nervous system effects can occur from breathing oxygen at partial pressures greater than 2 atm, including dizziness, impaired coordination, visual and hearing disturbances, and seizures. Contact with liquid can cause severe frostbite/freeze burns. Prolonged breathing of very cold atmospheres can produce lung damage. Prolonged exposure to cold areas can result in hypothermia. Primarily entry: Inhalation.</p>
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SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS	
<b>Hazardous components</b>	Oxygen
<b>EEC Classification</b>	N/A
<b>R Phrases</b>	R8, R37, R48

SECTION 4. FIRST AID MEASURES	
<b>Eye contact</b>	Not applicable. Non-irritating gas.
<b>Skin contact</b>	Not applicable. Non-irritating gas.
<b>Ingestion</b>	Ingestion is not an applicable route of exposure to gases
<b>Inhalation</b>	If symptoms are experienced, remove source of contamination or move victim to fresh air and obtain medical advice.
<b>Hypothermia</b>	Remove victim to a warm (not hot) area. Remove contaminated clothing, if possible. Wrap person in blankets. Slowly restore body temperature. Get medical help

SECTION 5. FIRE-FIGHTING MEASURES	
<b>Extinguishing Media</b>	As oxygen is non-flammable, but strongly supports combustion, the correct type of extinguisher should be used depending on the combustible material involved. If possible, shut off the source of escaping oxygen. All cylinders should be removed from the fire. Cylinders that cannot be removed should be cooled with water from a safe distance
<b>Special Hazards</b>	Oxygen vigorously accelerates combustion. Materials that would not normally burn in air could combust vigorously in atmospheres having high concentrations of oxygen.
<b>Protective Clothing</b>	Safety goggles, gloves and safety shoes should be worn when handling cylinders



## SAFETY DATA SHEET

Revised edition no : 2  
Date : 12/05/2014

### Oxygen Gas *(All grades)*

PG 020

#### SECTION 6. ACCIDENTAL RELEASE MEASURES

<b>Personal Precautions</b>	Workers handling liquid oxygen should wear safety glasses, clean approved insulated gloves and other approved protective clothing as required to prevent skin contact. Gloves and protective clothing must be of material that is resistant to ignition on contact with liquid oxygen; leather gloves and safety shoes have been recommended. Safety shoes and safety glasses are recommended when handling cylinders of compressed gas. Clothing that has been overexposed or contaminated with oxygen should be removed and considered unsafe (highly flammable) to wear for at least 30 minutes. If oxygen-enriched clothing catches fire, extinguish the flame under a safety shower; a fire blanket may not be effective in this situation. Use a continuous water spray to soak the clothing of a rescuer who must operate in an oxygen-enriched fire area.
<b>Environmental Precautions</b>	As gas is heavier than air, pockets of oxygen-enriched air could occur. These could lead to the fire spreading rapidly. If possible ventilate the affected area
<b>Small spills/ Large spills</b>	Notify safety personnel of leaks or spills. Evacuate all personnel from the danger area. Provide optimum exhaust ventilation. Shut off the source of the oxygen leak if you can do so without risk. Remove source of heat, ignition and, if feasible, separate combustibles from the leak. Small leaks in an oxygen system in an enclosed, unventilated area can build up a hazardous oxygen level. To increase the rate of controlled evaporation of spilled liquid oxygen (when desired) spray the spill with large amounts of water (This may generate a fog and reduce visibility)

#### SECTION 7. HANDLING AND STORAGE

<b>Suitable material</b>	N/A
<b>Handling/storage precautions</b>	Do not allow cylinders to slide or come into contact with sharp edges. Cylinders of oxygen should not be stored near cylinders of acetylene or other combustible gases. Oxygen cylinders may be stacked horizontally provided that they are firmly secured at each end to prevent rolling. Prevent dirt, grit of any sort, oil or any other lubricant from entering the cylinder valves, and store cylinders well clear of any corrosive influence e.g. battery acid. Compliance with all relevant legislation is essential. Use a "first in – first out" inventory system to prevent full cylinders from being stored for excessive periods of time Keep out of reach of children. NO SMOKING in areas of storage. Do not perform any welding, cutting, soldering, drilling or other hot work on an empty vessel, container or piping until all material has been cleared. No contact with incompatible materials such as oil and grease. Do not open cylinder if damaged. Never use excessive force when opening. Make sure valves on gas cylinders are fully opened when gas is used. Open and shut valve at least once a day, while cylinder is in use to avoid "freezing". Make sure cylinders are labeled clearly. Do not lift cylinders by the cap or with a lifting magnet. Shut flow off at cylinder valve and not just at the regulator after use. Regularly check cylinders for evidence of corrosion or leak. Keep empty cylinders under slightly positive pressure. Have suitable emergency equipment for fires, spills and leaks readily available. Practice good housekeeping. Maintain handling equipment. Comply with applicable regulations.

	<b>SAFETY DATA SHEET</b>	Revised edition no : 2 Date : 12/05/2014
	<b>Oxygen Gas</b> <i>(All grades)</i>	PG 020

## SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational exposure limits : **No TWA established**

The minimum oxygen content in workplace air is 18% by volume

<b>Engineering control measures</b>	Where oxygen may be released, provide adequate ventilation to prevent excessive oxygen enrichment of the workplace atmosphere (holding at < 3% O <sub>2</sub> by volume) is recommended for fire safety. Personnel who have been exposed to high concentrations of oxygen should stay in a well-ventilated or open area for 15 minutes before going into a confined space or near an ignition source.
<b>Personal protection – respiratory</b>	No specific guidelines are available.
<b>Personal protection – hand.</b>	Workers handling liquid oxygen should wear clean approved insulated gloves (Gloves must be of material that is resistant to ignition on contact with liquid oxygen; leather gloves have been recommended)
<b>Personal protection – eye</b>	Workers handling liquid oxygen should wear safety glasses.
<b>Personal protection – skin</b>	Workers should wear approved protective clothing as required to prevent skin contact. (Protective clothing must be of material that is resistant to ignition on contact with liquid oxygen; leather safety shoes have been recommended) Clothing that has been overexposed or contaminated with oxygen should be removed and considered unsafe (highly flammable) to wear for at least 30 minutes. If oxygen-enriched clothing catches fire, extinguish the flame under a safety shower; a fire blanket may not be effective in this situation. Use a continuous water spray to soak the clothing of a rescuer who must operate in an oxygen-enriched fire area.
<b>Other protection</b>	N/A

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance:</b> Oxygen is a clear colourless gas <b>Odour:</b> Odourless <b>pH:</b> N/A <b>Boiling point:</b> -183°C <b>Melting point:</b> -219°C <b>Flash point:</b> Not found <b>Flammability:</b> Not found <b>Auto flammability:</b> Not found	<b>Explosive properties:</b> N/A <b>Oxidizing properties:</b> N/A <b>Vapour pressure:</b> @ -199°C mmHg : ca 100 <b>Density:</b> (Air = 1) 1.1 <b>Solubility - water:</b> cm/100g @ 25°C : 3.16 <b>Solubility - solvent:</b> N/A <b>Solubility - coefficient :</b> (oil/water) : Log P(oct) = 0.65
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## SECTION 10. STABILITY AND REACTIVITY

<b>Conditions to Avoid</b>	The build-up of oxygen-enriched atmospheres, as, depending on temperature, oxygen reacts with all of the elements, excepting the inert gases, to form oxides. These reactions can sometimes be violent, as with highly combustible materials such as oil and grease. Never use cylinders as rollers or supports, or for any other purpose than the storing of oxygen. Never expose cylinders to excessive heat, as this may cause sufficient build-up of pressure to rupture the cylinders.
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	<b>SAFETY DATA SHEET</b>	Revised edition no : 2 Date : 12/05/2014
	<b>Oxygen Gas</b> <i>(All grades)</i>	PG 020

<b>Incompatible materials</b>	Since dry oxygen is non-corrosive most materials of construction are suitable. Avoid all flammable materials.
<b>Hazardous decomposition products</b>	No known effect

SECTION 11. TOXICOLOGICAL INFORMATION	
<b>Acute toxicity</b>	Inhalation: Numerous animal studies demonstrate that high oxygen concentrations or pressures cause respiratory, central nervous system (CNS) and visual effects. Mortality in animals is generally related to lung damage and pulmonary edema
<b>Skin and eye contact</b>	No known effect
<b>Chronic toxicity</b>	No known effect
<b>Carcinogenicity</b>	No known effect
<b>Mutagenicity</b>	High oxygen concentrations at atmospheric pressure caused chromosomal aberrations and mutations in Chinese hamster lung cells. A mutagenic effect of 70 to 95% oxygen was reported in Syrian hamster embryo fibroblasts. 95% oxygen/1% carbon dioxide induced chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells
<b>Reproductive hazards</b>	No known effect

SECTION 12. ECOLOGICAL INFORMATION	
<b>Aquatic toxicity – fish</b>	Oxygen is heavier than air and care should be taken to avoid the formation of oxygen enriched pockets. It does not pose a hazard to the ecology
<b>Aquatic toxicity – daphnia</b>	Oxygen is heavier than air and care should be taken to avoid the formation of oxygen enriched pockets. It does not pose a hazard to the ecology
<b>Aquatic toxicity – algae</b>	Oxygen is heavier than air and care should be taken to avoid the formation of oxygen enriched pockets. It does not pose a hazard to the ecology
<b>Biodegradability</b>	Oxygen is heavier than air and care should be taken to avoid the formation of oxygen enriched pockets. It does not pose a hazard to the ecology
<b>Bio-accumulation</b>	Oxygen is heavier than air and care should be taken to avoid the formation of oxygen enriched pockets. It does not pose a hazard to the ecology
<b>Mobility</b>	N/A
<b>German wgk</b>	N/A

	<b>SAFETY DATA SHEET</b>	Revised edition no : 2 Date : 12/05/2014
	<b>Oxygen Gas</b> <i>(All grades)</i>	PG 020

### SECTION 13. DISPOSAL CONSIDERATIONS

<b>Disposal methods</b>	Remove waste container or leaking cylinder to an open outdoor area away from combustibles and allow the oxygen to discharge at a moderate rate. Tag a leaking cylinder to indicate a defect, close the valve, and return the cylinder to its supplier
<b>Disposal packaging</b>	N/A

### SECTION 14. TRANSPORT INFORMATION

<b>UN no:</b> 1072	<b>IMDG - EMS No:</b> N/A
<b>ADR/RID Substance identity no:</b> 1072	<b>IMDG - MFAG table on :</b> N/A
<b>ADR/RID class:</b> 2 (2.2)	<b>IATA - class :</b> 2(2.2)
<b>ADR/RID item no:</b> N/A	<b>IATA - subsidiary risk(s):</b> Oxidizing agent
<b>ADR/RID hazard identity no:</b> N/A	<b>UK - description:</b> No available data
<b>IMDG - shipping name:</b> N/A	<b>UK emergency action class:</b> No available data
<b>IMDG - class:</b> 2 (2.2)	<b>UK classification:</b> No available data
<b>IMDG - packaging group:</b> N/A	<b>Tremcard No:</b> N/A
<b>IMDG - marine pollutant:</b> N/A	

### SECTION 15. REGULATORY INFORMATION

<b>EEC hazard classification :</b> Non-flammable
<b>Risk phrases :</b> R8 – Contact with combustible material may cause fire R37 – Irritating to respiratory system R48 - Danger of serious damage to health by prolonged exposure
<b>Safety phrases :</b> S2 – Keep out of reach of children S9 – Keep container in a well-ventilated place S15 – Keep away from heat S21 – When using do not smoke S27 – Take off immediately all contaminated clothing
<b>National Legislation :</b> <i>OSH Act, National Road Traffic Act (when promulgated)</i>

	<b>SAFETY DATA SHEET</b>	Revised edition no : 2 Date : 12/05/2014
	<b>Oxygen Gas</b> <i>(All grades)</i>	PG 020

## SECTION 16. OTHER INFORMATION

### SELECTED BIBLIOGRAPHY

1. Data sheets as supplied by various Suppliers and Manufacturers
2. Emergency Response Handbook - Annex A of SABS 0232-3
3. Handling Chemicals Safety, 2<sup>nd</sup>. Ed. Dutch Association of Safety Experts, Dutch Chemical Industry Association, Dutch Safety Institute, 1980
4. NIOSH Pocket Guide to Chemical Hazards, NIOSH, June 1990
5. Micromedex, Inc. TOMES CPS™ System Vol. 39
6. Patty's Industrial Hygiene Toxicology, 4<sup>th</sup> ed. Vol. II Part A, George D Clayton, Florence E Clayton
7. Supplement to NIOSH Manual of Analytical Methods, 3<sup>rd</sup> ed., NIOSH Publication No 84-100, 1985
8. Toxic & Hazardous Industrial Safety Manual - Industrial Chemicals Safety Manual for Handling and disposal with toxicity and hazard data
9. WinSpirs 2.1 as supplied by the Canadian Centre for Occupational Health and Safety.

**All reasonable care has been exercised in processing your request for information on the chemical listed in this Material Safety Data Sheet. No warranty is made, either express or implied and S.H.I.P does not hold itself liable for any injury, illness, loss or misinterpretation arising from the use of this data.**