BOC GASES

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: OXYGEN

1. Product and Company Identification

BOC India Limited
Oxygen House
P43 Taratala Road
Kolkata 700 088
West Bengal, India

BOC India Limited
Unit:

TELEPHONE NUMBER: (033) 24014708-20
Customer Service Center: 1800 345 6789

PRODUCT NAME: OXYGEN
CHEMICAL NAME: Oxygen
COMMON NAMES/SYNONYMS: None

2. Composition, Information on Ingredients

EXPOSURE LIMITS:

INGREDIENT	% VOLUME	PEL- OSHA	TLV
Oxygen FORMULA: O_2 CAS: 7782-44-7	99.6 to100.0	Not Applicable	Not Applicable

Refer to individual state or provincial regulations, as applicable, for limits, which may be more stringent than those listed here.
OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

3. Hazards Identification

EMERGENCY OVERVIEW

Odorless, colorless, non-flammable gas. Oxidizer. Will accelerate combustion and increase the risk of fire and explosion in combustible or flammable materials. Non-toxic. Prolonged inhalation of high concentrations may cause coughing and lung effects. Contents under pressure. Use and store below 52^{O}C.

ROUTE OF ENTRY

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
No	No	No	Yes	No

HEALTH EFFECTS:
Carcinogenicity: --OSHA: No

EYE FFECTS: Harmful effects are not expected.

SKIN FFECTS: Harmful effects are not expected.

INGESTION EFFECTS: Not applicable. Product is a gas.

INHALATION EFFECTS:
Oxygen is not acutely toxic under normal pressure. Prolonged inhalation of high oxygen concentrations (> 75%) may affect coordination, attention, and cause tiredness or respiratory irritation. Inhalation for several hours may cause cough, sore throat, chest pain and difficulty in breathing.

Oxygen is more toxic when inhaled at elevated pressures. Depending upon pressure and duration of exposure, pure oxygen at elevated pressures (i.e.: divers) may cause cramps, dizziness, difficulty breathing, convulsions, edema, and death.

Elevated oxygen concentrations in incubators has caused visual impairment and blindness in premature infants. High oxygen concentrations primarily affect eyes, which are not fully developed (see Section 11).

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: May aggravate chronic obstructive pulmonary (lung) disease.

POTENTIAL ENVIRONMENTAL EFFECTS: Not expected to be toxic to fish and wildlife.

4. First Aid Measures

EYES: None required.

SKIN: None required.

INGESTION: None required.

INHALATION:
Overexposure to oxygen is not anticipated under normal working conditions. High oxygen concentrations in the air may present a fire and explosion hazard. PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES WHEN OXYGEN IS INHALED UNDER PRESSURE (i.e.: as in scuba diving). Unconscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Further treatment should be symptomatic and supportive. Inform the treating physician that the patient could be experiencing hyperoxia.

5. Fire Fighting Measures

Conditions of Flammability: Not flammable, Oxidizer		
Flash point: None	Method: Not applicable	Autoignition Temperature: None
LEL (%):None	UEL (%):None	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

FIRE AND EXPLOSION HAZARDS: High oxygen concentrations vigorously accelerate combustion. Will support or initiate combustion/ explosion of organic matter and other oxidizable material. Cylinder may vent rapidly or rupture violently from pressure when involved in a fire situation.

EXTINGUISHING MEDIA: Water spray to keep cylinders cool. Extinguishing agent appropriate for the combustible material.

FIRE FIGHTING INSTRUCTIONS: If possible, stop the flow of oxygen, which is supporting the fire. Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear. Continue to cool fire-exposed containers until well after flames are extinguished.

6. Accidental Release Measures

Evacuate all personnel from affected area. A leak near combustible or flammable materials may represent a severe fire or explosion hazard. Eliminate all ignition sources. Ventilate enclosed areas. If it can be done without risk, stop the flow of gas or remove cylinder to outside. Use appropriate protective equipment (See Section 8). If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOCI location.

7. Handling and Storage

Electrical classification: Non hazardous

Dry product is non corrosive and may be used with all materials of construction. Moisture causes metal oxides,

which are formed with air, to be hydrated so that they include volume and lose their protective role (rust formation). Concentrations of SO_2, $C1_2$, salt, etc. in the moisture enhances the rusting of metals in air. Carbon steels and low alloy steels are acceptable for use at lower pressures.

For high pressure applications stainless steels are acceptable as are copper and its alloys, nickel and its alloys, brass bronze, silicon alloys, Monel ®, Inconel ® and Beryllium. Lead and silver or lead tin alloys are good gasket materials. Non halogenated polymers ® or Kel-F ® are preferred non-metallic gasket materials.

Oxygen should not be used as a substitute for compressed air in pneumatic equipment since this type generally contains lubricants. Equipment to contain oxygen must be “cleaned for oxygen service”. Check with the supplier to verify oxygen compatibility for the service conditions.

Stationary vessels at customer site should operate in accordance with the manufacturer’s and BOCI’s instruction. Do not attempt to repair, adjust or in any other way modify the operation of these vessels. If there is a malfunction or other type of operations problem with the vessel, contact the Customer Care or the closest BOCI location immediately.

Valve protection caps must remain in place. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure-reducing regulator when connecting cylinder to lower pressure piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. When oxygen cylinder is used in gas cutting or welding application, use a flash back arrestor in the discharge line to prevent hazardous back flow into the system. Do not insert any object (i.e.: screwdriver) into valve cap openings as this can damage the valve causing leakage.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas, emergency exits, flammables and combustibles. Do not allow the temperature where cylinders are stored to exceed 52^{o}C. Cylinders should be firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "NO SMOKING " signs in the storage or use area. There should be no sources of ignition in the storage or use area.

Do not release in a confined area. Never carry compressed gas cylinders or a container of the gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, or a toxic exposure.

8. Exposure Controls, Personal Protection

ENGINEERING CONTROLS: Use general ventilation and/or local exhaust as necessary to keep oxygen concentrations below 23.5%.

EYE/FACE PROTECTION: Safety goggles or glasses as appropriate for the job.

SKIN PROTECTION: Protective gloves made of any suitable material appropriate for the job. Gloves must be clean and free from oil and grease.

OTHER GENERAL PROTECTION: Safety shoes

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Above critical temp	
Vapor density (Air = 1)	: 1.11	
Evaporation point	: Not Available	
Boiling point	: - 182.9	°C
Freezing point	: - 218.8	°C

pH	: Not Applicable	
Specific gravity at STP	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H_20)	: Slight 0.0491	v/v @ 0 °C
Odor threshold	: Not Applicable	
Odor and appearance	: Colorless, odorless gas	

10. Stability and Reactivity

STABILITY: Stable.

INCOMPATIBLE MATERIALS/CONDITIONS: All flammable, organic, and combustible materials. Avoid heat, sparks, flames, and other ignition sources.

HAZARDOUS DECOMPOSITION PRODUCTS: None.

HAZARDOUS POLYMERIZATION: Will not occur.

11. Toxicological Information

SKIN AND EYE: The incompletely developed retinal circulation is more susceptible to toxic levels of oxygen. In premature infants, arterial oxygen tension above 150 mm Hg may cause retrolental fibroplasia. Permanent blindness may occur several months later. One case of severe retinal damage in an adult was reported. An individual suffering from myasthenia gravis developed irreversible retinal atrophy after breathing 80% oxygen for 150 days.

INHALATION:
Human volunteers who inhaled 90-95% oxygen through a face mask for 6 hours showed signs of tracheal irritation and fatigue. Other symptoms (which might have been caused by placing a tube into the trachea during the experiment) included sinusitis, conjunctivitis, fever, and symptoms of acute bronchitis.

Poisoning began in dogs 36 hours after inhalation of pure oxygen at atmospheric pressure. Distress was seen within 48 hours and death within 60 hours.

12. Ecological Information

Product does not contain Class I or Class II ozone depleting substances. Not toxic. Will not bioconcentrate

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container POPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOCI or authorized distributor for proper disposal.

15.Transport Information

PARAMETER	INDIA
PROPER SHIPPING NAME:	Oxygen, compressed
IDENTIFICATION NUMBER:	UN 1072
SHIPPING LABEL:	NONFLAMMABLE GAS, OXIDIZER

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user' s intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).