



**MATERIAL SAFETY DATA SHEET**

**PRODUCT NAME: SULFUR DIOXIDE**

**1. Product and Company Identification**

BOC India Limited,  
Oxygen House  
P-43 Taratala Road  
Kolkata 700 0888

BOC India Limited  
Unit:

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

PRODUCT NAME: SULFUR DIOXIDE  
CHEMICAL NAME: Sulfur Dioxide  
COMMON NAMES/SYNONYMS: Bisulfite, Sulfurous Anhydride, Sulfurous Oxide, Sulfur Oxide

**2. Composition, Information on Ingredients**

**EXPOSURE LIMITS<sup>1</sup>:**

INGREDIENT	% VOLUME	PEL	TLV	
Sulfur Dioxide FORMULA: SO <sub>2</sub> CAS: 7446-09-5	< 100.0	5 ppm TWA	2 ppm	

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

**3. Hazards Identification**

**EMERGENCY OVERVIEW**

Colorless nonflammable poison gas with highly irritating pungent odor. Irritating and corrosive to exposed tissues. Inhalation of vapors may cause dangerous retention of body fluid in the lungs (pulmonary edema) and chemical pneumonitis. Reacts with water to produce sulfuric acid. Contents under pressure. Use and store below 52° C.

**PRODUCT NAME: SULFUR DIOXIDE****ROUTE OF ENTRY:**

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion No
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**HEALTH EFFECTS:**

Exposure Limits Yes	Irritant Yes	Sensitization No
Teratogen Yes	Reproductive Hazard Yes	Mutagen Yes
Synergistic Effects Sulfur dioxide may act as a cocarcinogen with benzo[alpyrene in rodents		

Carcinogenicity: -- OSHA: No

**EYE EFFECTS:** Corrosive and irritating to the eyes. Vapors will cause irritation. Liquid may cause frostbite or painful burns and ulceration. Burns to the eyes result in lesions and possible loss of vision.

**SKIN EFFECTS:** Corrosive and irritating to the skin and all living tissue. High concentrations of gas may cause skin irritation. Liquid may cause frostbite or acid-like burns and skin lesions resulting in early necrosis and scarring.

**INGESTION EFFECTS:** Ingestion unlikely. Gas at room temperature.

**INHALATION EFFECTS:** Corrosive and irritating to the upper and lower respiratory tract and all mucosal tissue. Initial symptoms of exposure include nose and throat irritation, becoming steadily worse, suffocating and painful. The irritation extends to the chest causing a cough reflex, which may be violent and painful and may include the discharge of blood or vomiting with eventual collapse. Other symptoms include headache, general discomfort and anxiety. Chemical pneumonitis and pulmonary edema may result from exposure to the lower respiratory tract and deep lung.

Repeated or prolonged low level exposures may impair lung function and cause corrosion of the teeth.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** May aggravate pre-existing eye, skin, and respiratory disorders. Smokers and persons with pre-existing respiratory, nasal, and cardiovascular disease may be more susceptible to effects of sulfur dioxide exposure.

**POTENTIAL ENVIRONMENTAL EFFECTS:** Ecotoxicity data was unavailable. Toxic effects are expected to be similar to those seen in test animals.

#### 4. First Aid Measures

**EYES:** PERSONS WITH POTENTIAL EXPOSURE SHOULD NOT WEAR CONTACT LENSES. Flush contaminated eyes with copious quantities of water. Part eyelids to assure complete flushing. Continue for a minimum of 15 minutes. Seek immediate medical attention.

**SKIN:** Remove contaminated clothing as rapidly as possible. Flush affected area with copious quantities of water. Seek immediate medical attention.

**INGESTION:** Not required.

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**INHALATION:** PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVER EXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

### 5. Fire Fighting Measures

Conditions of Flammability: Nonflammable		
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:** Nonflammable. Cylinder may vent rapidly or rupture violently from pressure when involved in a fire situation.

**EXTINGUISHING MEDIA:** Use media appropriate for surrounding materials. Sulfur dioxide forms sulphuric acid solutions with water.

**FIRE FIGHTING INSTRUCTIONS:** Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear with additional chemical protective clothing as necessary to prevent exposure. Continue to cool fire-exposed cylinders until well after flames are extinguished.

### 6. Accidental Release Measures

Immediately evacuate all personnel from affected area. Deny entry to all unauthorized and unprotected personnel. Use appropriate protective equipment (See Section 8). Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. Ventilate enclosed areas. Water spray may be used to knock down vapors and protect personnel. Prevent corrosive waters from entering waterways and sewers. Consult a Hazmat specialist and the appropriate emergency telephone number in Section 1 or your closest BOC location. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs.

### 7. Handling and Storage

**Electrical classification:** Nonhazardous.

Most metals corrode when in contact with wet sulfur dioxide.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. 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 rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into cylinder. Do not insert any object (i.e.: screwdriver) into valve cap openings as this can damage the valve causing leakage.

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Protect cylinders from physical damage. Store in cool, dry, well-ventilated areas of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 52°C. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full & empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Never carry a compressed gas cylinder or a container of a 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, asphyxiation or a toxic exposure.

## 8. Exposure Controls, Personal Protection

**ENGINEERING CONTROLS:** Use enclosures and local exhaust ventilation as necessary to limit exposure below the ceiling limit. Exhaust gas should be vented to a gas treatment system.

**EYE/FACE PROTECTION:** Full-face piece respirator or gas-tight goggles with full face shield recommended.

**SKIN PROTECTION:** Appropriate protective and chemical-resistant gloves, clothing and splash protection, or fully encapsulating vapor protective clothing to prevent exposure. For materials of construction, consult protective clothing manufacturer's specific data. (Saranex↔ and barricade are effective for exposures greater than 8 hours.)

**RESPIRATORY PROTECTION:** For emergency release and conditions with exposures above the applicable exposure limits use a positive pressure NIOSH approved air-supplying respirator system (SCBA or airline/escape bottle) using a full face-mask and a minimum Grade D air.

**OTHER/GENERAL PROTECTION:** Safety shoes, safety shower, eyewash "fountain"

## 9. Physical and Chemical Properties

<b>PARAMETER</b>	<b>VALUE</b>	<b>UNITS</b>
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: 49.1	psia
Vapor density (Sulfur dioxide) (Air = 1)	: 2.26	
Evaporation point	: Not Available	
Boiling point	: -10.0	°C
Freezing point	: -75.5	°C
PH	: Not Available	
Specific gravity	: 2.26	
Oil/water partition coefficient	: Not Available	
Solubility (H <sub>2</sub> O)	: Soluble	
Odor threshold	: Not Available	
Odor and appearance	: Colorless gas with highly irritating, pungent odor.	

## 10. Stability and Reactivity

**STABILITY:** Stable

**INCOMPATIBLE MATERIALS/CONDITIONS:** Reacts violently with peroxides, chromates, bichromates, permanganates and oxygen difluoride. It also reacts with chlorates to form chlorine, which may become explosive at elevated temperatures. Forms sulfuric acid solutions with water.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Sulfurous acids in water. Sulfur oxides in fire.

**HAZARDOUS POLYMERIZATION:** Will not occur.

## 11. Toxicological Information

**INHALATION:** The irritant action of sulfur dioxide is believed to be caused by the formation of sulfurous acid when the gas dissolves. Bronchoconstriction caused by sulfur dioxide is concentration related. Fifteen humans which inhaled 1, 5, or 25-ppm sulfur dioxide for 6 hours (nose-breathing) exhibited reduced forced expiratory volume and forced expiratory flow at all concentrations. Significant reduction in nasal mucous flow rate was seen following exposure to 5 and 25 ppm.

**SKIN AND EYE:** Sulfur dioxide can cause irritation at relatively low levels (1-5 ppm); however, workers may become acclimated even to initially unbearable concentrations (25 ppm). Pure sulfur dioxide may damage the skin, eyes, and mucous membranes.

**OTHER:** Repeated exposure to sulfur dioxide has caused thickening of the mucous layer in the trachea and increases in goblet cells and mucous glands in test animals indicating the potential for chronic respiratory disease in humans.

Dogs exposed continuously for 225 days to 5 ppm sulfur dioxide exhibited decreased lung compliance and increased pulmonary flow-resistance. Sulfur dioxide may act as a promotor. Substantial increase in respiratory tract squamous cell carcinomas was reported in rats following exposure to benzo[a]pyrene and sulfur dioxide at 4 or 10 ppm (1-6 H/day, 5 days/week) compared to carcinomas resulting from exposure to SO<sub>2</sub> or B[a]P alone. Sulfur dioxide has failed consistently to induce genotoxicity in intact rodents.

Experimental inhalation exposures of rats and mice at 1.5 to 32 ppm resulted in toxicity to both the male and female reproductive systems. Effects included menstrual cycle changes and toxic effects to testes. Developmental abnormalities were observed in newborn of exposed pregnant animals.

## 12. Ecological Information

Does not contain Class I or Class II ozone depleting substances. See Section 3 for ecotoxicity information. Sulfur dioxide is listed as an Extremely Hazardous Substance (EHS) with a Threshold Planning Quantity (TPQ) of 500 pounds.

## 13. Disposal Considerations

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

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#### 14. Transport Information

PARAMETER	India	
PROPER SHIPPING NAME:	<b>Sulfur Dioxide</b>	
HAZARD CLASS:	<b>2.3 (8)</b>	
IDENTIFICATION NUMBER:	<b>UN 1079</b>	
SHIPPING LABEL:	<b>POISON GAS, CORROSIVE</b>	

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

**DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:**

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