

PRODUCT NAME: HYDROGEN SULFIDE

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: HYDROGEN SULFIDE

CHEMICAL NAME: Hydrogen Sulfide

COMMON NAMES/SYNONYMS: Dihydrogen Sulfide, Sulfur Hydride

2. Composition, Information on Ingredients

EXPOSURE LIMITS¹:

INGREDIENT	% VOLUME	PEL-OSHA ²	TLV	
Hydrogen Sulfide FORMULA: H ₂ S CAS: 7783-06-4	> 99.0	20 ppm Ceiling 50 ppm (10-min. max peak)	10 ppm	

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

3. Hazards Identification

EMERGENCY OVERVIEW

Colorless, poison, highly flammable gas with rotten egg odor. Irritating to the eyes, mucous membranes and respiratory system. Can cause respiratory paralysis, sudden collapse, and death. Dangerous fire and explosion hazard. Avoid heat, sparks, and flames. Contents under pressure. Use and store below 52 °C.

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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 No	Reproductive Hazard No	Mutagen No
Synergistic Effects None Reported		

Carcinogenicity: -- OSHA: No

EYE EFFECTS: Low concentrations will generally cause irritation to the conjunctiva. Repeated exposure to low concentrations is reported to cause conjunctivitis, photophobia, tears, pain and blurred vision.

SKIN EFFECTS: May irritate the skin upon contact.

INGESTION EFFECTS: Ingestion is unlikely. Hydrogen sulfide will irritate the mucous membranes causing a burning feeling with excess salivation likely. Irritation of the gastrointestinal tract may also occur.

INHALATION EFFECTS: Lethal concentrations of hydrogen sulfide cause respiratory paralysis and breathing stops. Life threatening pulmonary edema is common following prolonged exposure to concentrations between 250 and 600 ppm. Edema has been reported following prolonged exposure at concentrations as low as 50 ppm.

Sense of smell becomes rapidly fatigued and cannot be used as warning of exposure. Symptoms may include irritation, difficulty, breathing, conjunctivitis, nervousness, cough, nausea, and headache.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: May aggravate pre-existing eye, skin, respiratory, and central nervous system (CNS) disorder.

POTENTIAL ENVIRONMENTAL EFFECTS: The 96 hour TLm in the bluegill sunfish was 0.0448 mg/L in a flow-through bioassay (21-22 ° C). The LC₅₀ for inhalation in the fly is 1500 mg/m³/7 minutes.

4. First Aid Measures

EYES: PERSONS WITH POTENTIAL EXPOSURE TO HYDROGEN SULFIDE SHOULD NOT WEAR CONTACT LENSES. Flush contaminated eyes with large amounts of water for at least 15 minutes. Part eyelids with fingers to ensure complete flushing. If irritation persists or systemic poisoning is suspected, seek medical attention immediately.

SKIN: Flush affected area with water. If irritation persists or systemic poisoning is suspected, consult a physician.

INGESTION: Not anticipated. Treat in a manner similar to inhalation exposure. Seek medical attention as soon as possible.

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INHALATION: PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND SHOULD RECOGNIZE THE HAZARDS OF OVEREXPOSURE DUE TO OLFACTORY FATIGUE. An extreme fire hazard exists during rescue. Avoid use of rescue equipment which may contain ignition sources or cause static discharge. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing is difficult, administer oxygen. If breathing has stopped administer artificial resuscitation and supplemental oxygen or a mixture of 5% carbon dioxide in oxygen. Keep victim calm and warm. Further treatment should be symptomatic and supportive. Seek medical assistance immediately.

Note to physician: Acute hydrogen sulfide poisoning can be treated by induction of methemoglobinemia through parenteral injection of methemoglobin generating agents (i.e.: sodium nitrite). This acts as an antidote by restoring the normal activity of the sulfide inhibited enzyme.

5. Fire Fighting Measures

Conditions of Flammability: Flammable		
Flash point: Not Available	Method: Not Applicable	Autoignition Temperature: 290°C
LEL(%): 4.0	UEL(%): 44.0	
Hazardous combustion products: Sulfur Compounds including sulfur dioxide		
Sensitivity to mechanical shock: No Data		
Sensitivity to static discharge: No Data		

FIRE AND EXPLOSION HAZARDS: Hydrogen sulfide is heavier than air and may accumulate in low areas or travel along the ground to an ignition source and flash back. Product may explode or burn over a wide range of mixtures in air. Cylinder may vent rapidly or rupture violently from pressure when involved in a fire situation.

EXTINGUISHING MEDIA: Stop the flow of gas. Water, carbon dioxide, dry chemicals.

FIRE FIGHTING INSTRUCTIONS: If possible, stop the flow of gas. Inerting the atmosphere to reduce oxygen levels may extinguish flame, allowing capping of leaking container. Do not attempt this unless specifically trained. Reduce the rate of flow and inject an inert gas, if possible, before completely stopping the flow to prevent flashback. Do not extinguish the fire until the supply is shut off as otherwise an explosive reignition may occur. If the fire is extinguished and the flow of gas continues, use increased ventilation to prevent build-up of explosive atmosphere.

Use water spray to cool surrounding containers. Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers. Direct 500 GPM water stream onto containers above liquid level with remote monitors. Limit the number of personnel in proximity of fire and evacuate surrounding areas in all directions.

Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear. Continue to cool fire-exposed cylinders until well after flames are extinguished.

6. Accidental Release Measures

Immediately evacuate all personnel from affected area and extinguish all ignition sources. No smoking, sparks, flames, or flares in hazard area. Deny entry to 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. Use water spray to knock down vapors and protect personnel. Dilute waters to non-flammable mixtures. Do not allow clean up waters to enter 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: Class 1, Group C

Earth-ground and bond all lines and equipment associated with the hydrogen sulfide system. All equipment should be non-sparking or explosion proof.

Do not rely on the olfactory sense to detect the presence of hydrogen sulfide. Analytical devices and instrumentation are readily available for this purpose. Perform frequent analytical tests to be certain that the TWA is not exceeded. Many metals corrode rapidly with wet hydrogen sulfide. Anhydrous hydrogen sulfide can be handled in carbon steel, aluminum Inconel[®], Stellite[®] and 304 and 316 stainless steels. Avoid hard steels, which are highly stressed since they may be susceptible to hydrogen embrittlement from hydrogen sulfide. Multipoint air samplers with alarms for plant production units should be provided to constantly monitor the air in and around the units.

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 the discharge rate of product from the cylinder. Use a check valve or trap 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 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 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 OR OPEN FLAMES" signs in the storage area or use area. There should be no sources of ignition in the storage or use area.

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 acceptable exposure limits. Exhaust gas should be vented to a gas treatment system. If product is handled routinely where the potential for leaks exists, all electrical equipment must be rated for use in potentially flammable atmospheres. Consult the National Electrical Code for details.

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EYE/FACE PROTECTION: Gas-tight chemical goggles or full-face piece respirator.

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 manufacture's specific data. (Neoprene, butyl rubber, PVC, polyethylene are generally suitable).

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 showers and an emergency eyewash station should be available. Personnel with potential exposure to hydrogen sulfide should work in pairs, wear a gas mask with an all purpose canister or light three minute unit with a self contained air supply for instantaneous use, and carry wet lead acetate paper on wrists or belt for detection of dangerous concentrations of hydrogen sulfide. (turns black in the presence of minute amounts of hydrogen sulfide)

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Vapor	
Vapor pressure	: 267 (1840 kPa)	psia
Vapor density at STP (Air = 1)	: 1.21	
Evaporation point	: Not Available	
Boiling point	: -60	°C
Freezing point	: -82.2	°C
PH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H ₂ O)	: Not Available	
Odor threshold	: Soluble	
Odor and appearance	: Not Available	
	: Colorless vapor with rotten egg odor.	

10. Stability and Reactivity

STABILITY: Stable

INCOMPATIBLE MATERIALS/CONDITIONS: Dangerously reactive when mixed with concentrated nitric acid or other strong oxidizing agents. Vapors will ignite spontaneously when mixed with vapors of chlorine, oxygen difluoride or nitrogen trifluoride. Avoid heat, sparks, and flames.

HAZARDOUS DECOMPOSITION PRODUCTS: Oxides of sulfur.

HAZARDOUS POLYMERIZATION: Will not occur.

11. Toxicological Information

INHALATION: Inhalation of 1000-3000 (dogs) was lethal. Respiration ceased after several breaths at 3000 ppm and death occurred within 15-20 minutes at concentrations of 1000 ppm.

SKIN AND EYE: Concentrations of 50-500 ppm cause eye and respiratory irritation. Ocular toxicity has been reported at hydrogen sulfide concentrations ranging from 5-30 ppm.

OTHER: Hydrogen sulfide is not considered a cumulative poison; however, headaches fatigue, dizziness, irritability, and loss of libido have been reported following chronic exposure. It is unclear whether low level exposures, repeated unmeasured acute exposures, or pre-existing neurological disease are responsible for the above symptoms.

12. Ecological Information

Does not contain Class I or Class II ozone depleting substances. Hydrogen sulfide is a CERCLA Hazardous Substance with a Reportable Quantity (RQ) of 100 pounds and 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.

14. Transport Information

PARAMETER	India	
PROPER SHIPPING NAME:	Hydrogen Sulfide	
HAZARD CLASS:	2.3 (2.1)	
IDENTIFICATION NUMBER:	UN 1053	
SHIPPING LABEL:	POISON GAS, FLAMMABLE GAS	

Additional Marking Requirement: "Inhalation Hazard"

If net weight of product \geq 100 pounds, the container must be also marked with the letters "RQ".

Additional Shipping Paper Description Requirement: "Poison-Inhalation Hazard, Zone B" If net weight of product \geq 100 pounds, the shipping papers must be also marked with the letters "RQ".

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.

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