



**MATERIAL SAFETY DATA SHEET**

**PRODUCT NAME: HYDROGEN**

**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:** HYDROGEN  
**CHEMICAL NAME:** Hydrogen  
**COMMON NAMES/SYNONYMS:** Normal Hydrogen

**2. Composition, Information on Ingredients**

**EXPOSURE LIMITS:**

<b>INGREDIENT</b>	<b>% VOLUME</b>	<b>PEL- OSHA</b>	<b>TLV</b>
Hydrogen FORMULA: H <sub>2</sub> CAS: 1333-74-0	≥99.5	None Established	Simple Asphyxiant

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, extremely flammable gas. Dangerous fire and explosion hazard. Avoid heat, sparks and flames. Simple Asphyxiant - This product does not contain oxygen and may cause asphyxia if released in a confined area. Maintain oxygen levels above 19.5%. Contents under pressure. Use and store below 52°C.

**ROUTE OF ENTRY**

<b>Skin Contact</b>	<b>Skin Absorption</b>	<b>Eye Contact</b>	<b>Inhalation</b>	<b>Ingestion</b>
No	No	No	Yes	No

**HEALTH EFFECTS:**

Carcinogenicity: --OSHA: No

**EYE EFFECTS:**

None known.

**SKIN EFFECTS:**

None known.

**INGESTION EFFECTS:**

None known. Ingestion is unlikely, as product is gas at room temperature.

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### INHALATION EFFECTS:

Product is a simple asphyxiant. High concentrations may exclude an adequate supply of oxygen to the lungs. Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgement, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma, and death.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** None known.

**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:

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. 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. Unconscious persons should be moved to an uncontaminated area, and if breathing has stopped, administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

### 5. Fire Fighting Measures

Conditions of Flammability: Flammable		
Flash point: Not Available	Method: Not Applicable	Autoignition Temperature: 570 °C
LEL (%): 4	UEL (%): 75	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: Yes		

**FIRE AND EXPLOSION HAZARDS:** Extremely flammable gas. Hydrogen is very light and may collect in the upper portions of storage areas. Hydrogen burns with an almost invisible flame. High pressure releases may ignite with no apparent ignition source possibly via static electricity. Rapid flame propagation and flashback possible. Easily ignited over a wide range of concentrations in air. Cylinder may vent rapidly or rupture violently from pressure when involved in a fire situation.

**EXTINGUISHING MEDIA:** Water, Dry chemical, Carbon dioxide.

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**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 re-ignition may occur. If the fire is extinguished and the flow of gas continues, use increased ventilation to prevent build-up of explosive atmosphere. A water fog may be used to create ventilation. Ventilation fans must be explosion proof. Use non-sparking tools to close container valves.

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 extinguish all ignition sources and provide maximum explosion-proof ventilation. Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. No smoking, flares, flames or sparks in hazard area. Evacuate all personnel from affected area. 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:** Class 1, Group B.

Earth-ground and bond all lines and equipment associated with the hydrogen system. All equipment should be non-sparking and explosion proof. Separate hydrogen from oxygen and other oxidizers by a minimum distance of 20 ft. or by a 5-ft. high barrier with a minimum fire resistance rating of a half an hour.

This gas mixture is noncorrosive. However, hydrogen can interact with some metals (hardened steels) to cause embrittlement.

Use only in well-ventilated areas. 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. Use a check valve in the discharge line to prevent hazardous back flow into the cylinder. 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 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. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "NO SMOKING" signs in use and storage areas. There should be no sources of ignition in areas where this product is being used or stored. Outside or detached storage is preferred.

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.

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**8. Exposure Controls, Personal Protection**

**ENGINEERING CONTROLS:**

Use local exhaust and general ventilation systems to prevent build up of flammable concentrations. Small quantities can be handled in forced ventilation hoods. If product is handled routinely where the potential for leaks exists, all electrical equipment must be rated for use in potentially flammable atmospheres.

**EYE/FACE PROTECTION:**

Safety goggles or glasses as appropriate for the job.

**SKIN PROTECTION:**

Protective gloves of material appropriate for the job. Cotton clothing is recommended to prevent static build-up.

**RESPIRATORY PROTECTION:**

For emergency release use a positive pressure NIOSH approved air-supplying respirator systems (SCBA or airline/escape bottle) using at a minimum Grade D air.

**OTHER GENERAL PROTECTION**

Safety shoes or other footwear as appropriate for the job.

**9. Physical and Chemical Properties**

<u>PARAMETER</u>	<u>VALUE</u>	<u>UNITS</u>
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Supercritical	
Vapor density at 0 °C (Air = 1)	: 0.069	
Evaporation point	: Not Available	
Boiling point	:-252.8	°C
Freezing point	:-259.2	°C
pH	: Not Applicable	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H <sub>2</sub> O @ 15.6 °C)	: 0.019	(vol/vol)
Odor threshold	: Not Applicable	
Odor and appearance	: Colorless, odorless gas	

**10. Stability and Reactivity**

**STABILITY:** Stable

**INCOMPATIBLE MATERIALS/CONDITIONS:** Oxidizers. Hydrogen ignites in bromine fluoride and explodes in nitrile fluoride. Avoid heat, sparks, and flame.

**HAZARDOUS DECOMPOSITION PRODUCTS:** None.

**HAZARDOUS POLYMERIZATION:** Does not occur.

**11. Toxicological Information**

**SKIN AND EYE:** No adverse effects have been noted in the open literature following contact with hydrogen.

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**INHALATION:** Hydrogen acts as a simple asphyxiant. Maintain atmospheric oxygen at or above 19.5%.

**OTHER:** No data.

## 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 PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOCI or authorized distributor for proper disposal.

## 14. TRANSPORT INFORMATION

PARAMETER	INDIA
PROPER SHIPPING NAME:	Hydrogen, compressed
IDENTIFICATION NUMBER:	UN 1049
SHIPPING LABEL:	FLAMMABLE GAS

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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