INTERNATIONAL INDUSTRIAL GASES LTD

Safety Data Sheet

HYDROGEN

Material Safety Data Sheet
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1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: HYDROGEN

Manufacturer's Registered Office: 146 Andul Road, Howrah - 711103, India

Manufacturer's Website: www.iigas.com · www.thegases.com

Telephone Number: (+91 033) 2668 4725

2. HAZARDS IDENTIFICATION

DANGER!

EMERGENCY OVERVIEW

Extremely flammable gas — flammable in air over a very wide range (4% to 75%).

Burns with a nearly invisible, pale-blue flame.

High pressure compressed gas. Simple asphyxiant in confined spaces.

Much lighter than air — accumulates at the highest points of enclosed spaces.

Keep away from heat, sparks, open flames and other ignition sources. Keep at temperatures below 52°C / 125°F.

Appearance / State / Odor: Colorless | Physical State: Compressed Gas | Odor: Odorless

POTENTIAL HEALTH EFFECTS:

Principal Routes of Exposure: Inhalation

Inhalation: Hydrogen is a simple asphyxiant. In high concentrations it displaces oxygen and may cause rapid breathing, headache, dizziness, unconsciousness and death depending on the degree of oxygen deficiency.

Eyes: None known. Contact with rapidly expanding gas near the point of release may cause frostbite.

Skin: None known. Contact with rapidly expanding gas near the point of release may cause frostbite.

Ingestion: None known.

Chronic Effects: None known.

Environmental Hazard: See Section 12 for additional Ecological Information.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Volume %	Chemical Formula
Hydrogen	1333-74-0	>99	H_2

4. FIRST AID MEASURES

Eye Contact: None under normal use. Get medical attention if symptoms occur.

Skin Contact: None under normal use. Get medical attention if symptoms occur.

Inhalation: Move victim to fresh air. If breathing has stopped, give artificial respiration. Seek immediate medical attention/advice.

Ingestion: None under normal use. Get medical attention if symptoms occur.

Notes to Physician: Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flammable Properties: Extremely flammable gas. Flammable range 4.0% – 75.0% in air. Autoignition temperature ~565 °C. Burns with a nearly invisible flame — approach a suspected hydrogen fire with extreme caution.

Suitable Extinguishing Media: Stop the flow of gas if possible — extinguishing the flame without stopping the gas can create an explosive re-ignition hazard. Use water spray to cool surroundings and cylinders; dry chemical or CO_2 for small fires.

Specific Hazards: Gas accumulates at ceiling level and can travel to remote ignition sources. Cylinders may rupture under extreme heat. Continue to cool fire-exposed cylinders until flames are extinguished. Damaged cylinders should be handled only by specialists.

Protective Equipment for Firefighters: SCBA, pressure-demand, NIOSH approved or equivalent, and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Evacuate the area and eliminate all ignition sources immediately. Ventilate, particularly at high points. Monitor flammable-gas concentration — hydrogen detectors are required, as leaks are invisible and odourless. Stop the flow of gas or remove the cylinder outdoors if this can be done without risk. Return cylinder to IIGAS.

7. HANDLING AND STORAGE

Handling

Earth (ground) and bond all lines and equipment in hydrogen service — static discharge can ignite hydrogen-air mixtures. Use only spark-resistant tools and explosion-proof equipment in hydrogen areas. Fit flame/flashback arrestors where hydrogen is burned. Hydrogen embrittles some steels at elevated temperature and pressure — use materials specified for hydrogen service. Post "NO SMOKING — FLAMMABLE GAS" signs in storage and use areas. Separate hydrogen cylinders from oxygen and other oxidiser cylinders by at least 20 ft or a half-hour-fire-rated barrier 5 ft high.

Use only in well-ventilated areas. Never attempt to lift a cylinder by its valve protection cap. Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for a short distance, use a cart designed to transport cylinders. Use equipment rated for cylinder pressure. Use a backflow preventive device in the piping. Never insert an object (e.g., wrench, screwdriver, pry bar) into valve cap openings — doing so may damage the valve and cause a leak.

Close the valve after each use and when empty. If a user experiences any difficulty operating the cylinder valve, discontinue use and contact the supplier. Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder part of an electrical circuit.

For additional recommendations consult rules 18 & 20 of the Gas Cylinder Rules, 2016.

Storage

Protect from physical damage. Cylinders should be stored upright with the valve protection cap in place and firmly secured to prevent falling. Store in a cool, dry, well-ventilated area of non-combustible construction away from high-traffic areas and emergency exits. Keep at temperatures below 52°C / 125°F.

Full and empty cylinders should be segregated. Use a "First-In-First-Out (FIFO)" inventory system to prevent full cylinders from being stored for excessive periods. Always store and handle compressed gas cylinders in accordance with rule 21 of the Gas Cylinder Rules, 2016.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines: Simple asphyxiant (ACGIH). No occupational exposure limits established.

Ventilation: Use explosion-proof local exhaust and general ventilation to prevent accumulation; ventilate roof spaces.

Eye/Face Protection: Safety glasses recommended when handling cylinders.

Skin and Body Protection: Work gloves and safety shoes; flame-retardant clothing recommended in hydrogen service areas.

Respiratory Protection: SCBA or positive-pressure airline with mask for oxygen-deficient atmospheres.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety practices.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Colorless
Odor	Odorless
Physical State	Compressed gas

Molecular Weight	2.016
Boiling Point	−252.8 °C / −423.0 °F
Vapor Density	0.0837 kg/m³ (0.0052 lb/ft³) @ 21.1 °C — lightest of all gases
Specific Volume @ 21.1 °C & 1 atm	192 ft³/lb
Autoignition Temperature	~565 °C / 1,050 °F
Flammability Limits in Air	Lower: 4.0% — Upper: 75.0%
Critical Temperature	−240.0 °C / −400.0 °F
Critical Pressure	188 psia
Water Solubility	Very slightly soluble

10. STABILITY AND REACTIVITY

Stability: Stable.

Incompatible Products: Oxidisers (oxygen, chlorine, fluorine, nitrous oxide). Forms explosive mixtures with air and oxygen.

Conditions to Avoid: Heat, sparks, open flames, static discharge and all other ignition sources.

Hazardous Decomposition Products: None known.

Hazardous Polymerization: Does not occur.

11. TOXICOLOGICAL INFORMATION

Hydrogen is a simple asphyxiant; no toxic effects are known. Symptoms of oxygen deficiency include rapid breathing, headache, dizziness, unconsciousness and death. Contains no ingredient listed as a carcinogen.

12. ECOLOGICAL INFORMATION

Ecotoxicity: Will not bioconcentrate. Disperses rapidly to the upper atmosphere.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods: Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container properly labelled, with any valve outlet plugs or caps secured and valve protection cap in place, to IIGAS for proper disposal.

14. TRANSPORT INFORMATION

DOT / ADR

Proper Shipping Name: Hydrogen, compressed

Hazard Class: 2.1

UN-Number: UN1049

Description: UN1049, Hydrogen, compressed, 2.1

Labels: 2.1 Flammable gas

15. REGULATORY INFORMATION

SARA 311/312 Hazard Categories

Acute Health Hazard: No **Chronic Health Hazard:** No **Fire Hazard:** Yes

Sudden Release of Pressure Hazard: Yes **Reactive Hazard:** No

Store, transport and handle in accordance with the Gas Cylinder Rules, 2016 and other applicable national / local regulations.

16. OTHER INFORMATION

General: Ensure all national / local regulations are observed.

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