Safety data sheet · UN 1049

Hydrogen (H2)

Safety Data Sheet

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Hydrogen (H_2, CAS 1333-74-0, UN 1049) is extremely flammable in air across an exceptionally wide band, 4 % to 75 %, and burns with a nearly invisible pale-blue flame. At 0.0837 kg/m³ it is the lightest gas there is, so it rises and collects overhead rather than pooling at floor level.

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Safety data sheet (kigl.co.in/sds/acetylene)

UN 1049
UN number (compressed)

1333-74-0
CAS number

4.0 % to 75.0 %
Flammable range in air

About 560 to 574 °C depending on test method
Autoignition temperature

Nearly invisible in daylight
Flame visibility

Section 1 — Identification

Product name

Hydrogen, compressed **Chemical formula:** H_2 **CAS number:** 1333-74-0 · **EC number:** 215-605-7 · **UN number:** UN 1049

Identified uses

Reducing atmospheres in heat treatment and metallurgy; hydrogenation; ammonia and methanol synthesis; generator cooling in power stations; carrier and fuel gas in laboratory instruments; fuel cells. **Uses advised against:** Any service using equipment not rated for hydrogen. Any use in an unventilated enclosed space.

Supplier

The Kamrup Industrial Gases Limited.

Section 2 — Hazards identification

GHS classification

Flammable gases — Category 1. Gases under pressure — compressed gas.

Signal word

DANGER

Hazard statements

- H220 — Extremely flammable gas.
- H280 — Contains gas under pressure; may explode if heated.

The two facts that define this gas.

It is flammable from 4 % to 75 % in air. Most fuel gases give you a narrow band in which a leak is dangerous. Hydrogen gives you almost the entire range between pure air and pure gas. Practically, any leak that mixes with air at all should be assumed ignitable, and the ignition energy required is very low — static discharge from clothing will do it.

The flame is nearly invisible. Hydrogen burns to water vapour with essentially no soot, so there is nothing glowing to see. In daylight a substantial hydrogen fire can be effectively invisible, and people have walked into one. It also radiates little heat sideways, so the usual instinctive warning of approaching a fire is absent.

Section 3 — Composition

Component	CAS	Concentration
Hydrogen	1333-74-0	>99 %

Single-substance product.

Section 4 — First aid

Inhalation

Hydrogen is a simple asphyxiant. Remove to fresh air — **but do not enter an oxygen-deficient or potentially flammable atmosphere without air-supplied breathing apparatus and a standby person outside**. Give oxygen if trained. If breathing has stopped, give artificial respiration. Seek immediate medical attention.

Burns

Treat as thermal burns. Because the flame is invisible, assess for burns even where the casualty reports no flame — cool with water, do not remove adhered clothing, cover with a sterile dressing and seek immediate medical attention.

Skin or eye contact (rapidly expanding gas)

Frostbite is possible near the point of release. Flush with tepid water, do not rub, and seek medical attention.

Section 5 — Firefighting

Suitable media

Dry chemical, carbon dioxide. Water spray to cool surrounding cylinders and structures.

The rule that matters: stop the flow, do not extinguish the flame

Putting out a hydrogen flame while gas continues to escape converts a controlled burn into an unignited flammable cloud, which will reach another ignition source and deflagrate. Isolate the supply if it can be done safely. If it cannot, let the flame burn and protect everything around it.

Specific hazards

Cylinders exposed to fire may rupture. Cool from a protected position or evacuate. Use a thermal camera or a raised broom straw to locate an invisible flame before approaching.

Section 6 — Accidental release

Evacuate and eliminate all ignition sources — flames, hot surfaces, electrical switching, static, mobile phones, vehicles. Ventilate **at high level**: hydrogen rises immediately and collects under roofs, in ceiling voids and at the tops of stairwells.

Do not approach a suspected leak without checking for an invisible flame. Do not attempt to stop a leak against pressure. Isolate upstream where it is safe to do so.

Section 7 — Handling and storage

Equipment

Hydrogen-rated regulators, hoses and fittings only, with the left-hand thread connection that exists to prevent cross-connection. Never adapt a fitting, never substitute equipment from another gas service, and use no oil or grease anywhere in the system.

Bonding and earthing

Ground and bond the system. Static discharge is a sufficient ignition source for hydrogen.

Handling

Secure cylinders upright. Open valves slowly. Check for leaks with soap solution or a hydrogen-specific detector — never with a flame.

Storage

Well-ventilated area with ventilation at high level, separated from oxidisers, particularly oxygen and nitrous oxide. Keep away from heat, sparks and open

flames, secured, capped, and below 52 °C. Outdoor or purpose-built storage is preferred.

Section 8 — Exposure controls

Hydrogen has no occupational exposure limit; it is not toxic. Two control parameters apply.

Flammability

Keep the atmosphere well below the 4 % lower flammable limit. Fixed detection should be positioned at high level, and calibrated for hydrogen.

Oxygen concentration

19.5 % is the widely used minimum for safe entry.

Personal protection

flame-resistant clothing, anti-static footwear, face shield and gloves when making and breaking connections. Non-sparking tools. Intrinsically safe electrical equipment in the hazardous area.

Section 9 — Physical and

chemical properties

Property	Value	Source
Physical state	Gas (compressed)	—
Appearance	Colourless	—
Odour	Odourless — no warning property whatsoever	—
Molecular weight	2.016	Group technical data
Normal boiling point	−252.8 °C	Group technical data
Critical temperature	−240.0 °C	Group technical data
Critical pressure	188 psia (≈12.96 bar)	Group technical data
Vapour density	0.0837 kg/m³ at 21.1 °C	Group technical data
Specific volume	192 ft³/lb at 21.1 °C, 1 atm	Group technical data
Flammable limits in air	Lower 4.0 % · Upper 75.0 %	Group technical data
Autoignition temperature	About 560 to 574 °C depending on test method	IEC 60079-20-1 data; USCG CHRIS
Water solubility	Very slightly soluble	Group technical data

Odourless, colourless, invisible in flame, ignitable across seventy-one percentage points of mixture, and lighter than everything. Hydrogen removes every sensory warning a person normally relies on. Detection instruments are not a refinement here; they are the only thing standing between an operator and an atmosphere they cannot perceive.

Constants from group technical data.

Section 10 — Stability and reactivity

Stable under normal conditions.

Incompatible materials

Oxidisers — oxygen, chlorine, fluorine, nitrous oxide. Hydrogen forms explosive mixtures with air and with oxygen across a wide range.

Conditions to avoid

Heat, sparks, open flames, static discharge and all other ignition sources.

Materials of construction

Hydrogen can embrittle certain steels at pressure. Use only materials specified for hydrogen service.

Section 11 —

Toxicological information

Not toxic. A simple asphyxiant. In high concentration it displaces oxygen and causes rapid breathing, headache, dizziness, unconsciousness and death depending on the degree of deficiency. There are no chronic effects.

The realistic hazard to a person is fire and explosion, not toxicity.

Section 12 — Ecological information

Not classified as environmentally hazardous. Hydrogen burns to water vapour.

Section 13 — Disposal

Vent to atmosphere only through a properly designed and located vent stack, in a safe **outdoor** location, clear of ignition sources, building intakes, and any overhanging or roofed structure where the rising gas could accumulate. Return cylinders to the supplier.

Section 14 — Transport

UN number	UN 1049
Proper shipping name	HYDROGEN, COMPRESSED
Class	2.1 — Flammable gas
Labels	2.1

Transport upright and secured, valves closed, caps fitted, in an open or well-ventilated vehicle. **Never carry hydrogen cylinders in an enclosed passenger compartment.** Segregate from oxidisers in transit.

Section 15 — Regulatory information

- **Gas Cylinders Rules, 2016** (PESO)
- **IS 7285** — seamless steel cylinders
- **IS 3224** — cylinder valves
- **IS 4379** — cylinder identification colours
- **ADR 2025** — UN 1049

Section 16 — Other information

Revision 1, issued 10 August 2026.

Relates to hydrogen as supplied and does not release the user from assessing their own installation and application. A signed PDF copy is available on request for audit files; this HTML page is the current version.

PRODUCT	CAS NUMBER	UN NUMBER
Hydrogen, compressed	**1333-74-0**	**UN 1049**
TRANSPORT CLASS	REVISION	
2.1 — Flammable gas	**1 · 10 August 2026**	

Also known as: H2 · Dihydrogen · Compressed hydrogen

Hydrogen — frequently asked questions

What makes hydrogen more dangerous than other fuel gases? +

Is it true you cannot see a hydrogen flame? +

Does hydrogen collect at floor level like LPG? +

What is hydrogen embrittlement, and does it affect cylinders? +

Can I use the same regulator as for other gases? +

How should a hydrogen fire be tackled? +

References

Bureau of Indian Standards. (1981). *Identification of the contents of industrial gas cylinders* (IS 4379:1981).

Bureau of Indian Standards. (2021). *Identification of the contents of industrial gas cylinders* (IS 4379:2021, Second Revision).

Bureau of Indian Standards. (2021). *Valve for compressed gas cylinders excluding LPG cylinders — Specification* (IS 3224:2021, Fourth Revision).

Government of India. (2016). *Gas Cylinders Rules, 2016* (G.S.R. 1081(E)). Petroleum and Explosives Safety Organisation.

The Kamrup Industrial Gases Limited. (2026). *Company information and manufacturer's data* [Company statement].

ENQUIRIES

Request a quotation

State the gas or equipment, the quantity or capacity, and your location. KIGL will confirm the grade, the cylinder or plant size, and whether the location can be served from Noonmati, or through the agent network.

Request a quotation (kigl.co.in/contact)

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- Helium safety data sheet — the other light gas → (kigl.co.in/sds/helium)
- Hydrogen Technical Data: Formula, Flash Point, LEL → (kigl.co.in/guides/hydrogen-technical-data)
- Hydrogen hazards explained → (kigl.co.in/guides/hydrogen-safety-data-explained)

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