

HYDROGEN GAS (COMPRESSED, CHLOR-ALKALI CO-PRODUCT)

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SECTION 1: IDENTIFICATION

1.1 GHS Product identifier:

HYDROGEN GAS (COMPRESSED, CHLOR-ALKALI CO-PRODUCT)
Hydrogen, Compressed; Dihydrogen
CAS: 1333-74-0

Other means of identification:

Not relevant

1.2 Recommended use of the chemical and restrictions on use:

Relevant uses: By-product hydrogen recovered from the chlor-alkali (membrane cell) electrolysis process, supplied compressed in cylinders for use as a chemical feedstock/reducing gas, fuel gas, hydrogenation processes, metallurgical and electronics applications. For industrial user only.
Uses advised against: All uses not specified in this section or in section 7.3. Not for uncontrolled/domestic use.

1.3 Supplier's details:

SURAJ CHEMICALS
No 92, Govindappa Naicken Street, Shiva Complex, Chennai – 600001, Tamil Nadu, India
Tel: +91 - 7092722822, +91 - 9840284032 / +91 - 44 - 25393652, 42130281
Email: sales@surajchemicals.com | Website: www.surajchemicals.com
GST No: 33ACEPV8190L1ZZ

1.4 Emergency phone number:

Emergency Contact No: +91 - 7092722822, +91 - 9840284032

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture:

GHS:
Classification of this product has been carried out in accordance with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), based on the harmonised/standard classification for hydrogen.

Flam. Gas 1	Flammable gases, Category 1, H220
Press. Gas (Comp.)	Gases under pressure (Compressed gas), H280

2.2 GHS label elements, including precautionary statements:

GHS: Danger

Hazard statements:

Flam. Gas 1: H220 – Extremely flammable gas.
Press. Gas (Comp.): H280 – Contains gas under pressure; may explode if heated.

Precautionary statements:

P202: Do not handle until all safety precautions have been read and understood.
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P271: Use only outdoors or in a well-ventilated area.
P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381: Eliminate all ignition sources if safe to do so.
P403: Store in a well-ventilated place.
P410+P403: Protect from sunlight. Store in a well-ventilated place.
P501: Dispose of contents/container in accordance with local regulations.

2.3 Other hazards which do not result in classification:

Simple asphyxiant – in high concentration displaces oxygen and can cause asphyxiation in confined/poorly ventilated spaces. Very low ignition energy and wide flammability range make hydrogen an especially severe fire/explosion hazard; hydrogen flames are nearly invisible in daylight. Not identified as PBT/vPvB (gas).

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substances:

Chemical description: Hydrogen Gas, Compressed (chlor-alkali membrane-cell co-product)
In accordance with Annex 4.3.3 of the GHS, the product contains:

Identification	Chemical Name / Classification	Concentration
CAS: 1333-74-0	Hydrogen – Flam. Gas 1: H220; Press. Gas (Comp.): H280 – Danger	≥99.9% (chlor-alkali co-product grade; trace oxygen/moisture per product specification, available on request)

To obtain more information on the hazards of the substances, consult sections 11, 12 and 16.

3.2 Mixtures:

Non-applicable

SECTION 4: FIRST AID MEASURES

4.1 Description of necessary first-aid measures:

Request medical assistance immediately, showing the SDS of this product.

By inhalation:

Remove the person affected from the area of exposure to fresh air immediately. If breathing has stopped, apply artificial resuscitation and provide oxygen if trained/qualified to do so; seek immediate medical assistance.

By skin contact:

Not normally hazardous. If contact with rapidly expanding/escaping gas causes cold-burn (frostbite-like) injury, treat as for frostbite: warm the area gently with lukewarm water; do not rub. Seek medical attention.

By eye contact:

Not normally hazardous under standard handling. If a jet of gas contacts the eyes, rinse with plenty of water for several minutes and seek medical attention if irritation persists.

By ingestion/aspiration:

Non-applicable (gas).

4.2 Most important symptoms/effects, acute and delayed:

Asphyxiation in oxygen-deficient atmospheres (headache, dizziness, drowsiness, unconsciousness). Not toxic in the conventional sense. See sections 2 and 11.

4.3 Indication of immediate medical attention and special treatment needed, if necessary:

Administer oxygen and treat symptomatically for asphyxiation/hypoxia.

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Suitable extinguishing media:

Suitable: Carbon dioxide, dry chemical powder, water spray (for cooling exposed containers) – extinguish surrounding fire, not the gas jet itself if safe to let it burn out in a controlled manner.
Unsuitable: Do not attempt to extinguish a hydrogen jet/leak fire unless the supply can be safely shut off first – re-ignition/explosion risk from accumulated unburned gas.

5.2 Specific hazards arising from the chemical:

Extremely flammable gas with a very wide flammability range (approx. 4–75% in air) and very low ignition energy; hydrogen-air mixtures can be readily ignited by static discharge and burn with a nearly invisible, very hot flame. Cylinders may rupture/explode (BLEVE risk) when exposed to fire or excessive heat.

5.3 Special protective actions for fire-fighters:

Evacuate the area. Approach from upwind, shut off the gas supply if it can be done safely, and cool fire-exposed cylinders with large quantities of water from a protected position/maximum possible distance. Wear self-contained breathing apparatus and full protective clothing. Use a flame/heat detector, as hydrogen flames are difficult to see in daylight.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures:

For non-emergency personnel:

Evacuate the area immediately, eliminate all ignition sources, and ventilate the area (hydrogen rises and disperses rapidly in open/well-ventilated spaces but can accumulate at high points in confined spaces).

For emergency responders:

Wear appropriate flame-resistant protective clothing and self-contained breathing apparatus if entering a confined or oxygen-deficient space. Use non-sparking tools.

6.2 Environmental precautions:

Not classified as an environmental hazard; the primary concern in the event of release is fire/explosion, not environmental contamination.

6.3 Methods and materials for containment and cleaning up:

If safe to do so, shut off the source of the leak. Ventilate the area thoroughly. Allow gas to disperse; do not attempt to contain the gas itself.

6.4 Reference to other sections:

See sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling:

A. General precautions for safe use:

Use only in well-ventilated areas, away from all ignition sources, open flames, sparks and static electricity. Use only appropriate pressure-rated equipment, regulators and fittings designed for hydrogen service.

B. Technical recommendations for the prevention of fires and explosions:

Bond and earth all equipment used in transfer/handling to control static electricity. Use non-sparking tools. Install hydrogen gas detectors and adequate ventilation in enclosed handling areas. Cylinders must be secured upright and protected from mechanical damage.

C. Technical recommendations on general occupational hygiene:

Not applicable beyond standard industrial gas handling hygiene practice.

D. Technical recommendations to prevent environmental risks:

Not applicable (non-toxic, non-persistent gas); focus on fire/explosion prevention.

7.2 Conditions for safe storage, including any incompatibilities:

A. Specific storage requirements:

Minimum Temp.	Ambient (protect cylinders from freezing/moisture ingress at valves)
Maximum Temp.	<50°C; keep away from direct sunlight and heat sources
Maximum time	Consult cylinder re-test/inspection schedule per applicable gas cylinder regulations

B. General conditions for storage:

Store cylinders upright, secured against falling, in a dedicated, well-ventilated, fire-resistant storage area away from oxidisers, ignition sources and incompatible materials (Section 10.5), in accordance with the Gas Cylinders Rules, 2016 and applicable Static and Mobile Pressure Vessels (Unfired) Rules.

7.3 Specific end use(s):

Except for the instructions already specified, it is not necessary to provide any special recommendation regarding the uses of this product.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters:

No occupational exposure limit is established for hydrogen, as it is not toxic in the conventional sense; the relevant control parameter is maintenance of adequate atmospheric oxygen content (minimum 19.5% v/v) in enclosed/confined spaces.

Identification	Occupational Exposure Limit Type	Value
Hydrogen CAS: 1333-74-0	Simple asphyxiant – no substance-specific TWA/STEL; maintain minimum oxygen level	Minimum 19.5% v/v oxygen in the workplace atmosphere

8.2 Appropriate engineering controls:

Use in well-ventilated areas or under local exhaust ventilation. Install continuous hydrogen gas and/or oxygen-deficiency monitoring/alarm systems in enclosed handling areas.

B. Respiratory protection:

Not required under normal, well-ventilated conditions. Use self-contained breathing apparatus for entry into confined/oxygen-deficient or leak-affected spaces.

C. Specific protection for the hands:

Protective gloves recommended when handling cylinders/fittings, to protect against mechanical hazards and cold-burn from escaping gas.

D. Eye and face protection:

Safety glasses recommended when handling cylinders and connections.

E. Bodily protection:

Anti-static, flame-resistant work clothing recommended in hydrogen handling areas; safety footwear.

F. Additional emergency measures:

Fixed and portable hydrogen gas detectors, emergency shut-off valves, and adequate means of egress should be provided in hydrogen storage/use areas.

Environmental exposure controls:

Not applicable (non-toxic, non-persistent gas).

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties:

Appearance

Physical state at 20°C	Gas
Appearance	Compressed gas
Color	Colorless
Odor	Odourless
Odour threshold	Not relevant *
Volatility	
Boiling point at atmospheric pressure	-252.9°C
Vapour pressure at 20°C / 50°C	Not relevant (permanent gas above critical temperature) *
Evaporation rate at 20°C	Not relevant *
Product Description	
Density (gas) at 0°C, 1 atm	Approx. 0.0899 kg/m³
Dynamic / Kinematic viscosity	Not relevant *
Concentration	≥99.9% (chlor-alkali co-product grade)
pH	Non-applicable (gas)
Vapour density at 20°C (air = 1)	Approx. 0.07 (much lighter than air – rises and disperses rapidly)
Partition coefficient n-octanol/water 20°C	Not relevant (elemental gas)
Solubility in water at 20°C	Very low, approx. 1.6 mg/L
Decomposition temperature	Not relevant *
Melting point/freezing point	-259.2°C
Flammability	
Flash Point	Non-applicable (gas)
Flammability (solid, gas)	Extremely flammable gas
Autoignition temperature	Approx. 500°C
Lower / Upper flammability limit	Approx. 4% – 75% (v/v in air)
Particle Characteristics	
Median equivalent diameter	Non-applicable (gas)

* Not relevant due to the nature of the product, not providing information on the properties of its hazards.

9.2 Other information:

Explosive properties	Forms explosive mixtures with air/oxidisers over a very wide concentration range (approx. 4–75% v/v)
Oxidising properties	Not oxidising – hydrogen is a reducing gas
Corrosive to metals	Not corrosive; certain high-strength steels may be susceptible to hydrogen embrittlement under specific conditions
Heat of combustion	Approx. 120 kJ/g (lower heating value)
Surface tension at 20°C	Not relevant *
Refraction index	Not relevant *

SECTION 10: STABILITY AND REACTIVITY

- 10.1 Reactivity:**
Reacts vigorously/explosively with strong oxidisers (oxygen, chlorine, fluorine) when mixed within the flammable range and an ignition source is present. Can cause hydrogen embrittlement of certain metals under specific high-pressure/high-temperature conditions.
- 10.2 Chemical stability:**
Chemically stable under the indicated conditions of storage, handling and use.
- 10.3 Possibility of hazardous reactions:**
Mixing with air or oxidising gases within the flammable range, in the presence of an ignition source (including static discharge), presents a severe fire/explosion hazard.
- 10.4 Conditions to avoid:**

Shock/Friction	Contact with Air	Increase in Temperature	Sunlight	Humidity
Avoid static discharge/sparks	Forms flammable/explosive mixtures	Cylinder rupture risk on heating/fire exposure	Keep cylinders out of direct sun/heat	Not applicable

10.5 Incompatible materials:

Oxygen / Air	Halogens (Chlorine, Fluorine)	Strong Oxidising Agents	Ignition Sources
Forms flammable/explosive mixtures	Reacts vigorously, fire/explosion risk	Fire/explosion risk	Immediate ignition risk within flammability range

- 10.6 Hazardous decomposition products:**
None (elemental gas); combustion product is water vapour.

SECTION 11: TOXICOLOGICAL INFORMATION

- 11.1 Information on toxicological effects:**
Hydrogen is not toxic in the conventional sense; its principal physiological hazard is as a simple asphyxiant by displacement of atmospheric oxygen:
- A. Ingestion (acute effect):**
Non-applicable (gas).
- B. Inhalation (acute effect):**
Not classified for acute inhalation toxicity. In high concentration (displacing oxygen), can cause dizziness, headache, impaired coordination, unconsciousness and asphyxiation.
- C. Contact with skin and eyes (acute effect):**
Not classified as irritating; rapidly expanding/escaping gas from a high-pressure leak may cause localised cold-burn (frostbite-like) injury.
- D. CMR effects (carcinogenicity, mutagenicity, reproductive toxicity):**
Classification criteria for carcinogenicity, mutagenicity and reproductive toxicity are not met based on available data.
- E. Sensitizing effects:**
Classification criteria for respiratory or skin sensitisation are not met based on available data.
- F. Specific target organ toxicity (STOT) – single exposure:**

Classification criteria are not met based on available data (asphyxiation effect is addressed separately, see 11.1.B).

G. Specific target organ toxicity (STOT) – repeated exposure:

Classification criteria are not met based on available data.

H. Aspiration hazard:

Non-applicable (gas).

Product-specific toxicological information:

Identification	Acute Toxicity	Genus
Hydrogen CAS: 1333-74-0	LC50 inhalation: Not applicable – simple asphyxiant, no specific toxic mode of action	–
	LD50 oral/dermal: Non-applicable (gas)	–

SECTION 12: ECOLOGICAL INFORMATION

Not classified as hazardous to the aquatic environment (gas of very low water solubility, not persistent, no ecotoxic mode of action).

12.1 Toxicity:

Acute Toxicity	Species	Genus
LC50: Non-applicable (gas, negligible water solubility)	Non-applicable	Fish
EC50: Non-applicable (gas, negligible water solubility)	Non-applicable	Crustacean

12.2 Persistence and degradability:

Not applicable (elemental gas; rapidly disperses to atmosphere and is not persistent as an environmental contaminant).

12.3 Bioaccumulative potential:

Not expected to bioaccumulate.

12.4 Mobility in soil:

Koc	Henry	Dry Soil	Moist Soil
Not relevant (gas)	Not relevant	Disperses to atmosphere	Disperses to atmosphere

12.5 Results of PBT and vPvB assessment:

Non-applicable (elemental gas)

12.6 Other adverse effects:

Not described

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Disposal methods:

Return surplus/expired cylinders to the supplier. Do not attempt to dispose of compressed gas cylinders as ordinary waste. Uncontrolled venting should only be carried out by trained personnel in a safe, well-ventilated, ignition-source-free location, in accordance with local regulations.
Refer to national and local regulations on waste management and the Gas Cylinders Rules, 2016.

SECTION 14: TRANSPORT INFORMATION

Transport of dangerous goods by land (ADR 2023 / RID 2023):

14.1 UN number	UN1049
14.2 UN proper shipping name	HYDROGEN, COMPRESSED
14.3 Transport hazard class(es)	2.1
14.4 Packing group	N/A (gases are not assigned a packing group)
14.5 Environmental hazard	No
14.6 Special precautions for user	Physico-chemical properties: see section 9
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

Transport of dangerous goods by sea (IMDG 41-22):

14.1 UN number	UN1049
14.2 UN proper shipping name	HYDROGEN, COMPRESSED
14.3 Transport hazard class(es)	2.1
14.4 Packing group	N/A
14.5 Marine pollutant	No
14.6 Special precautions for user	EmS Codes: F-D, S-U
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

Transport of dangerous goods by air (IATA/ICAO 2024):

14.1 UN number	UN1049
14.2 UN proper shipping name	HYDROGEN, COMPRESSED
14.3 Transport hazard class(es)	2.1
14.4 Packing group	N/A
14.5 Environmental hazard	No
14.6 Special precautions for user	Forbidden on passenger aircraft; cargo aircraft only, subject to quantity limits – consult current IATA DGR
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations specific for the product in question:

It is recommended to use the information included in this safety data sheet as data used in a risk evaluation of local circumstances, in order to establish the necessary risk prevention measures for the manipulation, use, storage and disposal of this product.

Other legislation:

Gas Cylinders Rules, 2016
Static and Mobile Pressure Vessels (Unfired) Rules, 2016

SECTION 16: OTHER INFORMATION

Legislation related to safety data sheets:

This safety data sheet has been designed in accordance with Annex 4 – Guidance on the preparation of Safety Data Sheets of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Texts of the legislative phrases mentioned in sections 2 and 3:

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

The phrases indicated do not refer to the product itself; they are present merely for informative purposes and refer to the individual components which appear in section 3.

Advice related to training:

Personnel handling compressed hydrogen must be specifically trained in flammable/compressed gas handling, static electricity control, and emergency response, given the severe fire/explosion hazard of this product.

Principal bibliographical sources:

The United Nations Economic Commission for Europe (UNECE); publicly available GHS classification and physical/toxicological reference data for CAS 1333-74-0.

Abbreviations and acronyms:

ADR: European agreement concerning the international carriage of dangerous goods by road | IMDG: International maritime dangerous goods code | IATA: International Air Transport Association | ICAO: International Civil Aviation Organisation | LD50: Lethal Dose 50 | LC50: Lethal Concentration 50 | EC50: Effective Concentration 50 | BLEVE: Boiling Liquid Expanding Vapour Explosion

The information contained in this safety data sheet is based on sources, technical knowledge and current legislation, without being able to guarantee its accuracy. This information cannot be considered a guarantee of the properties of the product; it is simply a description of the security requirements. The occupational methodology and conditions for users of this product are not within Suraj Chemicals' awareness or control, and it is ultimately the responsibility of the user to take the necessary measures to obtain the legal requirements concerning the manipulation, storage, use and disposal of chemical products. The information on this safety data sheet only refers to this product, which should not be used for needs other than those specified.

END OF SAFETY DATA SHEET