

1. Identification of the Substance / Preparation and of the Company

1.1 Product Name: Hydrogen

Chemical Formula: H₂

1.2 Relevant identified uses of the substance or mixture
And uses advised against.

Use of the substance/mixture: General Industrial.
Restrictions on use: no data available

1.3 Details of the supplier of the safety data sheet:
Energas Limited
Westmorland Street
Hull, HU2 0HX.

1.4 Emergency Telephone No (24hr): 01482 329333

Email: paul.rennison@energas.co.uk

2. Hazards Identification:

Classification according to regulation 1272/2008 (CPL)
Flammable Gases:
Category 1 H220: Extremely Flammable gas.
Liquefied Gas H280: Contains gas under pressure; may explode if heated.

Label elements according to regulation 1272/2008 (CLP)

Hazard pictograms/symbols



Signal Word: Danger

Hazard Statements:
H220: Extremely Flammable gas.
H280: Contains gas under pressure; may explode if heated

Prevention: P210;
Keep away from heat/sparks/open flame/hot surfaces- No Smoking.
Response:
P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381: Eliminate all ignition sources if safe to do so.
Storage:
P403 Store in a well-ventilated place

Classification (Directive)

F+ Extremely flammable.

R12 Extremely flammable.

Other hazards.

Burns with an invisible flame
Can ignite on contact with air
Can cause rapid suffocation.
Extremely flammable gas.
May form explosive mixtures in air.
Immediate fire and explosion hazard exists when mixed with air at concentrations exceeding the lower flammability limit (LFL)
High concentrations that can cause rapid suffocation are within the flammable range and should not be entered.
Avoid breathing gas.
Self-contained breathing apparatus (SCBA) may be required.

Environmental Effects

Not harmful.

3. Composition/ Information on Ingredients

Substance/ Preparation: Substance

Components	Einecs/Elincs Number	CAS Number	Concentration (Volume)
Hydrogen	215-605-7	1333-74-0	100%
Components	Classification (Directive)	Classification (CLP)	REACH Reg #
Hydrogen	F+ R12	Flam. Gas 1 Press. Gas	

If REACH registration numbers do not appear the substance is either exempt from registration, does not meet the minimum volume threshold for registration or the registration date has not yet come due.

4. First Aid Measures

Description of first aid measures:

General advice:

Remove victim to uncontaminated area wearing self-contained breathing apparatus.
Keep victim warm and rested. Call a doctor.
Apply artificial respiration if breathing has stopped

Skin Contact: Not applicable.

Ingestion: Ingestion is not considered a potential route of exposure.

Inhalation:

Move to fresh air. If breathing has stopped or is laboured, give assisted respirations. Supplemental oxygen may be indicated; if the heart has stopped trained personnel should begin cardio pulmonary resuscitation immediately.
Seek medical advice.

Most important symptoms and effects, both acute and delayed.

Exposure to oxygen deficient atmosphere may cause the following symptoms; Dizziness, salivation, nausea, vomiting and loss of mobility/consciousness.

Indication of any immediate medical attention and special treatment needed.

No data available.

5. Fire Fighting Measures

Suitable Extinguishing Media:

All known extinguishants can be used.

Specific Hazards:

Ignitable by static electricity. Burns with an invisible flame, gas is lighter than air and can accumulate in the upper sections of enclosed space. If flames are accidentally extinguished. Spontaneous, explosive re-ignition may occur; therefore appropriate measures should be taken (e.g. total evacuation to protect persons from cylinder fragments and toxic fumes should a rupture occur).extinguish any other fire. Upon exposure to intense heat or flame, cylinder will vent rapidly or rupture violently. Keep adjacent cylinders cool by spraying with large amounts of water until fire burns itself out.

Special Protective Equipment for Fire Fighters:

Wear self-contained breathing apparatus for fire fighting if necessary.

Further information; The presence of a hydrogen flame can be detected by approaching cautiously with an outstretched straw broom to make the flame visible.

6. Accidental Release Measures

Personal Precautions.

Evacuate personnel to safe areas. Remove all sources of ignition. Never enter a confined space or other area where the flammable gas concentration is greater than 10% of its lower flammability limit.

Ventilate area.

Environmental Precautions

Should not be released into the environment .Do not discharge into any place where its accumulation could be dangerous. Prevent further leakage if safe to do so.

Clean Up Methods

Ventilate the area. Approach suspected leak areas with caution.

Additional advice:

Increase ventilation to the release area and monitor concentrations. If leak is from cylinder or cylinder valve, call the Energas emergency number.

If leak is in the users system, close the cylinder valve, safely vent the pressure, and purge with an inert gas before attempting repairs

7. Handling and Storage

Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C (12°2F) only experienced and properly trained persons should handle compressed gases/cryogenic liquids. Before using the product determine its identity by reading the label. Know and understand the properties and hazards of the product before use. When in doubt as to the correct handling procedure for a particular gas, contact the supplier.

Do not remove or deface content identifying labels. When moving cylinders, even for short distances, use cylinder trolley or hand truck designed to transport cylinders. Leave valve protection guards in place. Secure cylinders against either a wall or bench or place in a cylinders stand. Before connecting cylinder, check the complete gas system for suitability, in particular check pressure rating and material compatibility. Open valve slowly. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close cylinder valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Do not subject cylinders to abnormal mechanical shocks, which may cause damage to their valve or safety devices. Never attempt to lift a cylinder by its valve protection cap or guard. Do not use cylinders as rollers or supports or for any purpose other than to contain the gas as supplied. Never strike an arc on a compressed gas cylinder or make a cylinder part of an electrical circuit. Do not smoke while handling product or cylinders. Never recompress a gas or a gas mixture. Never attempt to transfer gases from one cylinder to another. Always use backflow protection devices in piping. Never use direct flame or electrical heating devices to raise the pressure of a cylinder. Prolonged periods of cold temperature below -30°C (-20F°) should be avoided.

Suck back of water into container must be prevented.

Purge air from system before introducing gas.

Do not allow backfeed into the container.

Never permit liquefied gases to become trapped in parts of the system as this may result in hydraulic rupture.

Use only properly specified equipment, which is suitable for this product, its supply pressure and temperature.

Contact Energas Limited if in doubt.

Refer to supplier's container handling instructions.

Conditions for safe storage, including any incompatibilities.

Full cylinders should be stored so that oldest stock is used first. Cylinders should be stored in a purpose built compound, which should be well ventilated, preferably in the open air. Observe all regulations and local requirements regarding storage of cylinders. Stored cylinders should be periodically checked for general condition and leakage. Protect cylinders stored in the open against rusting and extremes of weather. Cylinders should not be stored in conditions likely to encourage corrosion. Cylinders should be stored in the vertical position and



SAFETY DATA SHEET FOR HYDROGEN COMPRESSED

Rev 7 (09/2010)

properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Cylinder valve guards or caps should be in place. Keep cylinders tightly closed in a cool well-ventilated place. Store cylinders in a location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Keep cylinders below 50°C in a well-ventilated place. Smoking should be prohibited within storage areas and while handling product or cylinders. Display No "Smoking or Naked Flames" signs in the storage area. The amounts of flammable or toxic gases in storage should be kept to a minimum. Return empty cylinders in a timely manner.

Technical measures/precautions.

Cylinders should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc) and in accordance with local regulations. Keep away from combustible material. All electrical equipment in the storage areas should be compatible with the flammable materials stored. Cylinders containing flammable gases should be stored away from other combustible materials. Where necessary cylinders containing oxygen and oxidants should be separated from flammable gases by a fire resistant partition.

Specific end use(s)
Refer to section 1.

8. Exposure Controls/ Personal Protection

Exposure Controls

Engineering measures:

Provide natural or explosion-proof ventilation that is adequate to ensure flammable gas does not reach its lower explosive limit

Personal protective equipment:

Respiratory protection:

High concentrations that can cause rapid suffocation are within the flammable range and should not be entered.

Hand protection:

Sturdy work gloves are recommended for handling cylinders. The breakthrough time of the selected gloves must be greater than the intended use period.

Eye protection: Safety glasses recommended when handling cylinders.

Skin and body protection: Safety footwear is recommended when handling cylinders.

Special instructions for protection and hygiene:

Ensure adequate ventilation, especially in confined areas.

9. Physical and Chemical Properties

Appearance/ Colour: Compressed gas, Colourless gas.
Odour: None

Odour threshold; No data available
pH: Not applicable.
Melting point range: -259.2 °C
Boiling point range: -259.2 °C
Flash point: Not applicable
Evaporation Range: Not applicable.
Flammability (solid/gas) Upper/Lower: No data available
Explosion/flammability limit: 75% (V) / 4% (V)
Vapour pressure: Not applicable
Water solubility; 0.0016g/l
Relative vapour density; 0.07 (air = 1)
Relative density: 0.07 (water = 1)
Partition coefficient (n-octanol/water): Not applicable
Autoignition temperature: 560 °C
Decomposition temperature: No data available
Viscosity: Not applicable.
Explosive properties: No data available
Oxidizing properties: No data available
Molecular weight: 2.02g/mol
Density: 0.0001 g/cm³ at 21°C
Note; (as vapour)
Specific volume: 11.9830 m³/kg at 21°C
Upper flammability limit: 75% (V)
Lower flammability limit: 4% (V)

10. Stability and Reactivity

Reactivity: refer to possibility of hazardous reactions and/or incompatible materials sections.

Chemical Stability: Stable under normal conditions.

Possibility of hazardous reactions: No data available.

Conditions to avoid: Heat, flame, sparks.

Incompatible materials: Oxygen, oxidizing agents.

Hazardous decomposition products. No data available

11. Toxicological Information

Information on toxicological effects.

Likely routes of exposure.

Effects on eyes:

No data available

Effects on skin:

No adverse effects

Inhalation effects:

In high concentrations may cause asphyxiation. Victim may not be aware of asphyxiation. Asphyxiation may bring about unconsciousness without warning and so rapidly that victim may be unable to protect themselves.

Ingestion effects: Ingestion is not considered a potential route of exposure.

Symptoms: Exposure to oxygen deficient atmosphere may cause the following symptoms; dizziness, Salivation, Nausea, Vomiting, Loss of mobility/consciousness.

Acute toxicity.

Acute oral toxicity: No data available on the product itself.

Inhalation: No data available on the product itself.

Acute dermal Toxicity: No data available on the product itself.

Skin corrosion/irritation: No data available

Serious eye damage/eye irritation: No data available

Sensitisation: No data available.

Chronic toxicity or effects from long-term exposure.

Carcinogenicity: No data available

Reproductive toxicity:
No data available on the product itself.

Gem cell mutagenicity:
No data available on the product itself.

Specific target organ systemic toxicity (single exposure):
No data available.

Specific target organ systemic toxicity(repeated exposure):
No data available on the product itself.

Aspiration hazard: No data available.

12. Ecological Information

Toxicity

Aquatic toxicity: No data available on the product itself.

Toxicity to other organisms:
No data available on the product itself.

Persistence and degradability:
No data available on the product itself.

Bio accumulative potential:
No data available on the product itself.

Mobility in soil: No data available on the product itself.

Results of PBT and vPvB assessment:
If applicable refer to extended version of SDS for further information on CSA.

Other adverse effects:

This product has no known eco-toxicological effects.

13. Disposal Considerations

Waste treatment methods.

Contact supplier if guidance is required.
Return unused product in original cylinder to supplier.
Do not discharge into areas where there is a risk of forming explosive mixtures with air. Waste gas should be flared through a suitable burner with flash back arrestor.

Contaminated packaging: Return cylinder to supplier.

14. Transport Information

ADR

UN ID No. : 1049
Proper Shipping Name : Hydrogen, Compressed
Class/ Division : 2.1
Tunnel code : (B/D)
Hazard Identification No. : 23
Label(s) : 2.1

IATA

UN ID No. : 1049
Proper Shipping Name : Hydrogen, Compressed
Class/ Division : 2.1
Label(s) : 2.1

IMDG

UN ID No. : 1049
Proper Shipping Name : Hydrogen, Compressed
Class/ Division : 2.1
Label(s) : 2.1

RID

UN ID No. : 1049
Proper Shipping Name : Hydrogen, Compressed
Class/ Division : 2.1

Label(s) : 2.1

Avoid transport on vehicles where the load space is not separated from the driver's compartment.

Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or emergency. The transport information is not intended to convey all specific regulatory data relating to this material. Before transporting product containers check that they are firmly secured and ensure:

- Cylinder valve outlet is closed and not leaking.
- Valve outlet cap, nut or plug (where provided) is correctly fitted.
- Valve protection device (where provided) is correctly fitted).
- Adequate ventilation.
- Compliance with applicable regulations.

15. Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture,

Country	Regulatory list	Notification
UK / EU	EINECS	Included on Inventory
USA	TCSA	Included on Inventory
Canada	DSL	Included on Inventory

WGK Identification Number: Not water endangering.

Chemical Safety Assessment

This product is exempt from REACH, does not meet the minimum volume threshold for a CSA or the CSA has not yet been completed.

16. Other Information

Ensure all national/ local regulations are observed.

R-phrases – Components; R12 Extremely flammable

Hazard statements:

H220 Extremely flammable gas.

H280 Contains gas under pressure; may explode if heated.

Cylinder Identification:

Valve Connection:

BS 341 No 4

Details given in this document are believed correct at the time of going to press.

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

Refer to Energas Limited General Safety and Handling Data Sheet for further details.

**CYLINDER IDENTIFICATION TO BSEN 1089-3
GROUND COLOUR: FLAME RED (RAL 3000) GREEN NECK RING**

ENERGAS GENERAL SAFETY AND HANDLING DATA

1. GENERAL

Only trained persons should handle compressed gases.
Observe all regulations and local requirements regarding the storage of containers.
Do not remove or deface labels provided by the supplier for the identification of the container contents.
Ascertain the identity of the gas before using it.
Know and understand the properties and hazards associated with each gas before using it.
When doubt exists as to the correct handling procedure for a particular gas contact the supplier.

2. HANDLING AND USE

Wear stout gloves.
Never lift a container by the cap or guard unless the supplier states it is designed for that purpose.
Use a trolley or other suitable device or technique for transporting heavy containers, even for a short distance.
Where necessary wear suitable eye and face protection. The choice between safety glasses, chemical goggles, or full face shield will depend on the pressure and nature of the gas being used.

Where necessary for toxic gases see that self-contained positive pressure breathing apparatus or full face air line respirator is available in the vicinity of the working area.
Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with a lower pressure rating than that of the container.
Ascertain that all electrical systems in the area are suitable for service with each gas.

Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 45°C.
Never re-compress a gas mixture without consulting the supplier. Never attempt to transfer gases from one container to another.
Do not use containers as rollers or supports, or for any other purpose than to contain the gas as supplied.
Never permit oil, grease or other readily combustible substances to come into contact with valves of containers containing oxygen or other oxidants.

Keep container valve outlets clean and free from contaminants, particularly oil and water.
Do not subject containers to abnormal mechanical shocks which may cause damage to their valves or safety devices.

Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier.
Close the container valve whenever gas is not required even if the container is still connected to the equipment.

3. STORAGE

Containers should be stored in a well ventilated area. Some gases will require a purpose built area.
Store containers in a location free from fire risk and away from sources of heat and ignition. Designation as a no smoking area may be desirable.

Gas containers should be segregated in the storage area according to the various categories.

The storage area should be kept clear and access should be restricted to authorized persons only, the area should be clearly marked as a storage area and appropriate hazard warning signs displayed (Flammable Toxic etc.).
The amount of flammable or toxic gases should be kept to a minimum.
Flammable gases should be stored away from other combustible materials.

Containers held in storage should be periodically checked for general condition and leakage.
Containers in storage should be properly secured to prevent toppling or rolling.
Vertical storage is recommended where the container is designed for this.
Container valves should be tightly closed and where appropriate, valve outlets should be capped or plugged. Protect containers stored in the open against rusting and extremes of weather.
Containers should not be stored in conditions likely to encourage corrosion.
Store full and empty containers separately and arrange full containers so that the oldest stock is used first.

PRODUCTION SITE ADDRESSES

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Fax: 01332 291590

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Fax: 01274 548181

FOR FURTHER INFORMATION CONTACT YOUR NEAREST DISTRIBUTION CENTRE