



# MATERIAL SAFETY DATA SHEET



ISO 9001 : 2000 Cert.No. : 622578

## HYDROGEN

### 1 CHEMICAL PRODUCT & COMPANY IDENTIFICATION

Product name	Hydrogen, compressed
Chemical name/formula	Hydrogen / H <sub>2</sub>
Company identification	See header and footer
Emergency phone no.	See footer

### 2 COMPOSITION / INFORMATION ON INGREDIENTS

Substance/Preparation	Substance
Components Impurities	Contains no other components or impurities, which will influence the classification of the product.
CAS No.	1333-74-0

### 3 HAZARDS IDENTIFICATION

General	<ul style="list-style-type: none"><li>▶ Compressed gas.</li><li>▶ Extremely flammable.</li></ul>
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### 4 FIRST-AID MEASURES

Inhalation	<ul style="list-style-type: none"><li>▶ In high concentrations may cause asphyxiation. Symptoms may include loss of mobility or consciousness. Victim may not be aware of asphyxiation.</li><li>▶ In low concentrations, may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.</li><li>▶ Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested.</li><li>▶ Call a doctor. Apply artificial respiration if breathing stopped.</li></ul>
Skin/Eye contact	<ul style="list-style-type: none"><li>▶ No adverse effects anticipated.</li></ul>
Ingestion	<ul style="list-style-type: none"><li>▶ Ingestion is not considered a potential route of exposure.</li></ul>

### 5 FIRE-FIGHTING MEASURES

Specific hazards	<ul style="list-style-type: none"><li>▶ Exposure to fire may cause containers to rupture or explode.</li></ul>
Hazardous combustion products	<ul style="list-style-type: none"><li>▶ None</li></ul>
Suitable extinguishing media	<ul style="list-style-type: none"><li>▶ All known extinguishants can be used.</li></ul>
Specific methods	<ul style="list-style-type: none"><li>▶ If possible, stop flow of product.</li><li>▶ Move container away or cool with water from a protected position.</li><li>▶ Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous or explosive re-ignition may occur.</li><li>▶ Extinguish any other fire.</li></ul>
Special protective Equipment (for fire fighters)	<ul style="list-style-type: none"><li>▶ In confined space, use a self-contained breathing apparatus.</li></ul>

### 6 ACCIDENTAL RELEASE MEASURES

Personal precautions	<ul style="list-style-type: none"><li>▶ Evacuate area.</li><li>▶ Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.</li><li>▶ Ensure adequate air ventilation.</li><li>▶ Eliminate ignition sources.</li><li>▶ Post warning notices.</li></ul>
Environmental precautions	<ul style="list-style-type: none"><li>▶ Try to stop release.</li></ul>
Clean up methods	<ul style="list-style-type: none"><li>▶ Ventilate area</li></ul>

### 7 HANDLING & STORAGE

General	<ul style="list-style-type: none"><li>▶ Ensure equipment is adequately earthed.</li><li>▶ Suck back of water into the container must be prevented. Do not allow back-feed into container.</li><li>▶ Purge air from system before introducing gas.</li><li>▶ Use only properly specified equipment, which is suitable for this product, its supply pressure and temperature.</li><li>▶ Keep away from ignition sources (including static discharges).</li><li>▶ Segregate from oxidant gases and other oxidants in store.</li><li>▶ Keep container below 50°C in a well-ventilated place.</li><li>▶ Refer to "safe handling, transport and storage of compressed gas cylinder" or contact AIG if in doubt.</li></ul>
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### 8 EXPOSURE CONTROLS & PERSONAL PROTECTION

Exposure limit value	<ul style="list-style-type: none"><li>▶ None</li></ul>
Personal protection	<ul style="list-style-type: none"><li>▶ Ensure adequate ventilation.</li><li>▶ Do not smoke while handling product.</li></ul>

### 9 PHYSICAL & CHEMICAL PROPERTIES

Molecular weight	2
Melting point	-259°C
Boiling point	-253°C
Critical temperature	-240°C
Relative density, gas	0.07 (air = 1)
Relative density, liquid	0.07 (water = 1)
Vapour pressure @20°C	Not applicable
Solubility mg/l water	1.6 mg/l
Appearance/Colour	Colourless gas
Odour	None
Auto-ignition temperature	560°C
Flammability range	4 – 75 volume % in air. Burns with colourless invisible flame.

## 10 STABILITY & REACTIVITY

- General
- ▶ Can form explosive mixture with air.
  - ▶ May react violently with oxidants.

## 11 TOXICOLOGICAL INFORMATION

- General
- ▶ No known toxicological effects from this product.

## 12 ECOLOGICAL INFORMATION

- General
- ▶ No known ecological effects from this product.

## 13 DISPOSAL CONSIDERATIONS

- General
- ▶ Do not discharge into areas where there is a risk of forming an explosive mixture with air.
  - ▶ Waste gas should be flared through a suitable burner with a flash back arrestor.
  - ▶ Do not discharge into any place where its accumulation could be dangerous.
  - ▶ Contact AIG if guidance is required.

## 14 TRANSPORT INFORMATION

UN No.	1049
Class/Division	2.1 (Flammable Gas)
Subsidiary risk	None
UN proper shipping name	Hydrogen, compressed
IMO/IATA shipping label	



- Other transport information
- ▶ 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 an emergency.

- Other transport information
- ▶ Before transporting product containers, ensure that they are firmly secured and:
    - compliance with applicable regulations;
    - cylinder valve is closed and not leaking;
    - valve outlet cap nut or plug (where provided) is correctly fitted;
    - valve protection device (where provided) is correctly fitted and
    - there is adequate ventilation.

## 15 REGULATORY INFORMATION

- General
- ▶ Singapore's Factories Act 2000, Sections 14, 34, 44 & 60A.
  - ▶ Singapore Standards:
    - CP 12:2000 Part 1
    - CP 98:2003
    - SS 152:2003
    - SS 286:1984 Part 1 to Part 5
- Risk and safety phrases
- ▶ R12 – Extremely flammable.
  - ▶ S9 – Keep container in well-ventilated place.
  - ▶ S16 – Keep away from ignition sources. No smoking.
  - ▶ S33 – Take precautionary measures against static discharge.

## 16 OTHER INFORMATION

- General
- ▶ Ensure all local regulations or legislations are observed.
  - ▶ Ensure operators or user understand the flammability hazard of this gas.
  - ▶ The hazard of asphyxiation is often overlooked and must be stressed before use.
  - ▶ Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
  - ▶ Details given in this document are believed to be correct at the time of revising.
  - ▶ 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.
  - ▶ This safety data sheet is for information purposes only and is subjected to change without notice.

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