

**Danger**



### SECTION 1: Identification of the hazardous chemical and of the supplier

#### 1.1. Product identifier

Trade name : Hydrogen, Purified Hydrogen, Alphagaz™ Hydrogen  
Name : Hydrogen  
CAS-No. : 1333-74-0  
Formula : H<sub>2</sub>

#### 1.2. Other means of identification

Product code : ALM/SDS/62

#### 1.3. Recommended use of the chemical and restrictions on use

Recommended use : Test gas/Calibration gas.  
Laboratory use.  
Chemical reaction / Synthesis.  
Industrial and professional uses. Perform risk assessment prior to use.  
Use for manufacture of electronic/photovoltaic components.

Restrictions on use : Consumer use.  
Uses other than those listed above are not supported, contact your supplier for more information on other uses.

#### 1.4. Supplier details

AIR LIQUIDE MALAYSIA SDN. BHD.  
Lot PT 2317, No. 21, Jalan PTB 1  
Kawasan Perindustrian Tangga Batu, Mukim Sungai Udang,  
76400 Melaka  
Malaysia  
T +606-3513512

#### 1.5. Emergency phone number

Emergency number : +606-3513512

### SECTION 2: Hazards identification

#### 2.1. Classification of the hazardous chemical

Classification according to Industry Code of Practice on chemicals classification and hazard communication (2019)

Flammable gases, Category 1 H220  
Gases under pressure : Compressed gas H280

#### 2.2. Label elements

Labelling according to Industry Code of Practice on chemicals classification and hazard communication (2019)

Hazard pictograms (GHS MY) :



Signal word (GHS MY) : Danger  
Hazard statements (GHS MY) : H220 - Extremely flammable gas  
H280 - Contains gas under pressure; may explode if heated

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according to ICOP 2014,2019

Precautionary statements (GHS MY) : P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking  
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

### 2.3. Other hazards that do not result in classification

Other hazards which do not result in classification : Asphyxiant in high concentrations, These high concentrations are within the flammability range, The substance/mixture has no endocrine disrupting properties.

## SECTION 3: Composition and information of the ingredients of the hazardous chemical

### 3.1. Substances

Name	Product identifier	%
Hydrogen (Main constituent)	CAS-No.: 1333-74-0	100

Full text of H-statements: see section 16

### 3.2. Mixtures

Not applicable

## SECTION 4: First-aid measures

### 4.1. Description of necessary first aid measures

First-aid measures after inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.

First-aid measures after skin contact : Adverse effects not expected from this product.

First-aid measures after eye contact : Adverse effects not expected from this product.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

### 4.2. Most important symptoms/effects, acute and delayed

Most important symptoms and effects, both acute and delayed : In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. See section 11.

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

Other medical advice or treatment : None.

## SECTION 5: Fire-fighting measures

### 5.1. Suitable extinguishing media

Suitable extinguishing media : Water spray or fog. Dry powder. Carbon dioxide. Shutting off the source of the gas is the preferred method of control. Be aware of the risk of formation of static electricity with the use of CO2 extinguishers. Do not use them in places where a flammable atmosphere may be present.

Unsuitable extinguishing media : Do not use water jet to extinguish.

### 5.2. Physicochemical hazards arising from the chemical

Reactivity in case of fire : No reactivity hazard other than the effects described in sub-sections below.

Hazardous combustion products : None.

### 5.3. Special protective equipment and precautions for fire fighters

Special protective equipment for fire fighters : In confined space use self-contained breathing apparatus. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

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Specific methods	: Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire, Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems, If possible, stop flow of product, Use water spray or fog to knock down fire fumes if possible, Move containers away from the fire area if this can be done without risk.
EAC code	: 2SE

### SECTION 6: Accidental release measures

#### 6.1. Personal precautions, protective equipment, and emergency procedures

##### 6.1.1. For non-emergency personnel

Emergency procedures	: Act in accordance with local emergency plan. Try to stop release. Evacuate area. Eliminate ignition sources. Ensure adequate air ventilation. Stay upwind. See section 8 of the SDS for more information on personal protective equipment.
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##### 6.1.2. For emergency responders

Emergency procedures	: Monitor concentration of released product. Consider the risk of potentially explosive atmospheres. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. See section 5.3 of the SDS for more information.
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#### 6.2. Environmental precautions

Try to stop release.

#### 6.3. Methods and materials for containment and cleaning up

Methods and material for containment and cleaning up	: Ventilate area.
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### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

Safe handling of the gas receptacle	: Refer to supplier's container handling instructions. Do not allow backfeed into the container. Protect containers from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminants particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one cylinder/container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the content of the container. Suck back of water into the container must be prevented. Open valve slowly to avoid pressure shock.
Safe use of the product	: Do not breathe gas. Avoid release of product into work area. The product must be handled in accordance with good industrial hygiene and safety procedures. Only experienced and properly instructed persons should handle gases under pressure. Consider pressure relief device(s) in gas installations. Ensure the complete gas system was (or is regularly) checked for leaks before use. Do not smoke while handling product. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Avoid suck back of water, acid and alkalis. Assess the risk of potentially explosive atmospheres and the need for explosion-proof equipment. Purge air from system before introducing gas. Take precautionary measures against static discharge. Keep away from ignition sources (including static discharges). Consider the use of only non-sparking tools. Ensure equipment is adequately earthed.

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### 7.2. Conditions for safe storage, including any incompatibilities

Conditions for safe storage, including any incompatibilities

: Segregate from oxidant gases and other oxidants in store. All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere. Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Container valve guards or caps should be in place. Containers should be stored in the vertical position and properly secured to prevent them from falling over. Stored containers should be periodically checked for general condition and leakage. Keep container below 50°C in a well ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials.

## SECTION 8: Exposure controls and personal protection

### 8.1. Control parameters

No additional information available

### Exposure limit values for the other components

No additional information available

#### 8.1.1 Biological monitoring

No additional information available

### 8.2. Appropriate engineering controls

Appropriate engineering controls

: Provide adequate general and local exhaust ventilation. Product to be handled in a closed system. Gas detectors should be used when flammable gases/vapours may be released. Consider the use of a work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages.

### 8.3. Individual protection measures, such as PPE

#### **Hand protection:**

Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risks, performance level 1 or higher.

#### **Eye protection:**

Wear safety glasses with side shields. Standard EN 166 - Personal eye-protection - specifications

#### **Respiratory protection:**

Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres. Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

### **Personal protective equipment symbol(s):**



Thermal hazard protection

: None in addition to the above sections.

Environmental exposure controls

: Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

## SECTION 9: Physical and chemical properties

Physical state

: Gas

Appearance

: No data available

Colour

: Colourless.

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Odour	: Odourless.
Odour threshold	: Odour threshold is subjective and inadequate to warn of overexposure.
pH	: Not applicable for gases and gas mixtures.
Melting point	: -259 °C
Freezing point	: No data available
Boiling point	: -253 °C
Flash point	: Not applicable for gases and gas mixtures.
Evaporation rate	: No data available
Flammability (solid, gas)	: Extremely flammable gas.
Explosive limits	: Upper explosion limit: 77 vol % Lower explosion limit: 4 vol %
Vapour pressure	: Vapour pressure: Not applicable. Vapour pressure at 50°C: Not applicable.
Relative vapour density at 20°C	: Not applicable.
Relative density	: 0.07 Relative gas density: 0.07
Solubility	: Water: 1.6 mg/l
Partition coefficient n-octanol/water (Log Pow)	: No data available
Partition coefficient n-octanol/water (Log Kow)	: Not applicable for inorganic products.
Critical temperature	: -240 °C
Auto-ignition temperature	: 560 °C
Decomposition temperature	: Not applicable.
Viscosity, kinematic	: No reliable data available.
Viscosity, dynamic	: No reliable data available.
Density	: Not applicable for gases and gas mixtures.
Critical pressure	: 1293 kPa
Molecular mass	: 2 g/mol
Oxidising properties	: No oxidising properties.
Additional information	: Burns with an invisible flame.

### SECTION 10: Stability and reactivity

Reactivity	: No reactivity hazard other than the effects described in sub-sections below.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: Can form explosive mixture with air, May react violently with oxidants.
Conditions to avoid	: Keep away from heat/sparks/open flames/hot surfaces. – No smoking, Avoid moisture in installation systems.
Incompatible materials	: Air, Oxidisers, For additional information on compatibility refer to ISO 11114.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

Acute toxicity (oral)	: Not classified
Acute toxicity (dermal)	: Not classified
Acute toxicity (inhalation)	: Not classified
Skin corrosion or irritation	: Not classified pH: Not applicable for gases and gas mixtures.
Serious eye damage or eye irritation	: Not classified
Respiratory sensitization	: Not classified
Skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity (STOT) – single exposure	: Not classified
Specific target organ toxicity (STOT) – repeated exposure	: Not classified

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Aspiration hazard : Not classified

<b>hydrogen (1333-74-0)</b>	
Viscosity, kinematic	No reliable data available.

Other information : The substance/mixture has no endocrine disrupting properties.

### SECTION 12: Ecological information

#### 12.1. Ecotoxicity

Ecology - general : No ecological damage caused by this product.

Hazardous to the aquatic environment, short-term (acute) : Not classified

Hazardous to the aquatic environment, long-term (chronic) : Not classified

<b>hydrogen (1333-74-0)</b>	
Partition coefficient n-octanol/water (Log Kow)	Not applicable for inorganic products.

#### 12.2. Persistence and degradability

<b>hydrogen (1333-74-0)</b>	
Persistence and degradability	No ecological damage caused by this product.

#### 12.3. Bioaccumulative potential

<b>hydrogen (1333-74-0)</b>	
Partition coefficient n-octanol/water (Log Kow)	Not applicable for inorganic products.
Bioaccumulative potential	No ecological damage caused by this product.

#### 12.4. Mobility in soil

<b>hydrogen (1333-74-0)</b>	
Mobility in soil	No additional information available
Partition coefficient n-octanol/water (Log Kow)	Not applicable for inorganic products.
Ecology - soil	No ecological damage caused by this product.

#### 12.5. Other adverse effects

Ozone : Not classified

Effect on global warming : When discharged in large quantities may contribute to the greenhouse effect, Contains greenhouse gas(es).

GWP 100 years : 6

Effect on the ozone layer : No effect on the ozone layer.

Other adverse effects : No known effects from this product.

### SECTION 13: Disposal information

#### 13.1. Disposal methods

Waste treatment methods : Contact supplier if guidance is required. 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 flash back arrestor. Ensure that the emission levels from local regulations or operating permits are not exceeded. Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.eu> for more guidance on suitable disposal methods. Do not discharge into any place where its accumulation could be dangerous. Return unused product in original container to supplier.

Additional information : External treatment and disposal of waste should comply with applicable local and/or national regulations.

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### SECTION 14: Transportation information

#### 14.1. UN number

UN-No.(UN RTDG) : 1049  
UN-No. (IMDG) : 1049  
UN-No. (IATA) : 1049

#### 14.2. UN proper shipping name

Proper Shipping Name (UN RTDG) : HYDROGEN, COMPRESSED  
Proper Shipping Name (IMDG) : HYDROGEN, COMPRESSED  
Proper Shipping Name (IATA) : Hydrogen, compressed

#### 14.3. Transport hazard class(es)

##### UN RTDG

Transport hazard class(es) (UN RTDG) : 2.1  
Danger labels (UN RTDG) : 2.1



##### IMDG

Transport hazard class(es) (IMDG) : 2.1  
Danger labels (IMDG) : 2.1



##### IATA

Transport hazard class(es) (IATA) : 2.1  
Danger labels (IATA) : 2.1



#### 14.4. Packing Group, if applicable

Packing group (UN RTDG) : Not applicable  
Packing group (IMDG) : Not applicable  
Packing group (IATA) : Not applicable

#### 14.5. Environmental hazards

Dangerous for the environment : No  
Marine pollutant : No  
Other information : No supplementary information available

#### 14.6. Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code)

Special transport precautions : 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, Before transporting product containers: - Ensure there is adequate ventilation, - Ensure that containers are firmly secured, - Ensure valve is closed and not leaking, - Ensure valve outlet cap nut or plug (where provided) is correctly fitted, - Ensure valve protection device (where provided) is correctly fitted.

##### UN RTDG

Special provisions (UN RTDG) : 392  
Limited quantities (UN RTDG) : 0  
Excepted quantities (UN RTDG) : E0

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Packing instruction (UN RTDG) : P200

### IMDG

Special provisions (IMDG) : 392, 974  
Limited quantities (IMDG) : 0  
Excepted quantities (IMDG) : E0  
Packing instructions (IMDG) : P200  
EmS-No. (Fire) : F-D - FIRE SCHEDULE Delta - FLAMMABLE GASES  
EmS-No. (Spillage) : S-U - SPILLAGE SCHEDULE Uniform - GASES (FLAMMABLE, TOXIC OR CORROSIVE)  
Stowage category (IMDG) : E  
Stowage and handling (IMDG) : SW2  
Segregation (IMDG) : SG46  
Properties and observations (IMDG) : Flammable, odourless gas. Explosive limits: 4% to 75% Much lighter than air (0.07).

### IATA

PCA Excepted quantities (IATA) : E0  
PCA Limited quantities (IATA) : Forbidden  
PCA limited quantity max net quantity (IATA) : Forbidden  
PCA packing instructions (IATA) : Forbidden  
PCA max net quantity (IATA) : Forbidden  
CAO packing instructions (IATA) : 200  
CAO max net quantity (IATA) : 150kg  
Special provisions (IATA) : A1  
ERG code (IATA) : 10L

### 14.7. Special precautions for user

IBC code : Not applicable.

### 14.8. Hazchem or Emergency Action Code

EAC code : 2SE.

## SECTION 15: Regulatory information

### 15.1. Safety, health, and environmental regulations specific for the hazardous chemical in question

hydrogen (1333-74-0)	
EHS Notification and Registration Scheme	Applicable
EHS Notification and Registration Scheme	Applicable
Environmental Quality (Chlorofluorocarbons Prohibition) Order 1993	Not applicable
Environmental Quality (Industrial Effluent) Regulations 2009	
Environmental Quality (Scheduled Wastes) Regulations 2007	
Control of Industrial Major Accident Hazards Regulations 1996	Group 3 Highly reactive substance
Prohibition of Use of Substance Order 1999	Not applicable
Use and Standards of Exposure of Chemical Hazardous to Health Regulations 2000	
Chemical Weapons Convention Act	
Corrosive and Explosive Substances and Offensive Weapons Act	
Dangerous Drugs Act	
Pesticides Act	
Petroleum (Safety Measures) Act	
Poisons Act 1952	
Poisons (Psychotropic Substances) Regulations 1989	



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### 15.2. International agreements

No additional information available

## SECTION 16: Other information

Version : 2.0  
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Supersedes : 31/12/2019

Abbreviations and acronyms : ATE - Acute Toxicity Estimate  
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008  
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006  
EINECS - European Inventory of Existing Commercial Chemical Substances  
CAS# - Chemical Abstract Service number  
PPE - Personal Protection Equipment  
LC50 - Lethal Concentration to 50 % of a test population  
RMM - Risk Management Measures  
PBT - Persistent, Bioaccumulative and Toxic  
vPvB - Very Persistent and Very Bioaccumulative  
STOT- SE : Specific Target Organ Toxicity - Single Exposure  
CSA - Chemical Safety Assessment  
EN - European Standard  
UN - United Nations  
ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road  
IATA - International Air Transport Association  
IMDG code - International Maritime Dangerous Goods  
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail  
WGK - Water Hazard Class  
STOT - RE : Specific Target Organ Toxicity - Repeated Exposure  
UFI : Unique Formula Identifier

Training advice : Ensure operators understand the flammability hazard.

Other information : Classification in accordance with the procedures and calculation methods of Regulation (EC) 1272/2008 (CLP). Key literature references and sources of data are maintained in EIGA doc 169 : 'Classification and Labelling Guide', downloadable at <http://www.Eiga.eu> .

Safety Data Sheet (SDS), Malaysia\_AL

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.