

Safety Data Sheet

Hydrogen, Compressed



Issue date: 31/03/2017
Revision date: 14/02/2023

Version: 2.4

SDS reference: MY000148
1/10**SECTION 1: Identification of the hazardous chemical and of the supplier**

- 1.1. **Product identifier**
- | | |
|--------------|---|
| Product form | Substance |
| Trade name | 1) Hydrogen, Compressed (Purified)
2) Hydrogen, Compressed (H.P.)
3) Hydrogen, Compressed (Trailer)
4) Hydrogen, Compressed (Pipeline) |
| CAS-No. | 1333-74-0 |
| Formula | H ₂ |
- 1.2. **Relevant identified uses of the substance or mixture and uses advised against**
- | | |
|---------------------|-------|
| Restrictions on use | None. |
|---------------------|-------|
- 1.3. **Supplier's details**
- Linde Gas Products Malaysia Sdn Bhd (453560-K)
P.O. Box 10633, GPO Kuala Lumpur, 50670 WPKL.
No. 1, Jalan Graphite 3, Kawasan Perindustrian Bandar Mahkota Banting,
42700 Banting, Kuala Langat, Selangor Darul Ehsan.
Toll Free: 1800 883 888 / +603 5651 7000
csc.lg.my@linde.com
- 1.4. **Emergency telephone number**
- Emergency phone number (24h): 1800 883 888
Poison center : Unit HAZMAT Malaysia, tel: 999

SECTION 2: Hazards identification

- 2.1. **Classification of the hazardous chemical**
- Classification according to Industry Code of Practice on chemicals classification and hazard communication (2014)
- | | |
|--------------------|------|
| Flam. Gas 1 | H220 |
| Press. Gas (Comp.) | H280 |
- 2.2. **Label elements**
- Labelling according to Industry Code of Practice on chemicals classification and hazard communication (2014)
- Hazard pictograms (GHS MY) :
- | | |
|---|---|
|  |  |
| GHS02 | GHS04 |
- Signal word (GHS MY) : Danger
- Hazard statements (GHS MY) : H220 - Extremely flammable gas
H280 - Contains gas under pressure; may explode if heated
- Precautionary statements (GHS MY)
- | | |
|--------------|--|
| - Prevention | : P210 - Keep away from heat/sparks/open flames/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 | : P410+P403 - Protect from sunlight. Store in a well-ventilated place |
- 2.3. **Other hazards not contributing to the 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**
- SDS_MY - MY000148



Safety Data Sheet

Hydrogen, Compressed

Issue date: 31/03/2017
Revision date: 14/02/2023

Version: 2.4

SDS reference: MY000148
2/10

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

3.2. Mixtures
Not applicable

SECTION 4: First aid measures

4.1. Description of 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 and effects, both 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 any immediate medical attention and special treatment needed

- Other medical advice or treatment** : None.

SECTION 5: Fire-fighting measures

5.1. 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. Special hazards arising from the substance or mixture

- Reactivity** : No reactivity hazard other than the effects described in sub-sections below.
- 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.
- Specific methods** : 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. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. 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

- General measures** : Try to stop release. Evacuate area. 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. Eliminate ignition sources. Ensure adequate air ventilation. Act in accordance with local emergency plan. Stay upwind.



Safety Data Sheet

Hydrogen, Compressed

Issue date: 31/03/2017
Revision date: 14/02/2023

Version: 2.4

SDS reference: MY000148
3/10

- 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.
- 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.
- 6.2. **Environmental precautions**
Try to stop release.
- 6.3. **Methods and material for containment and cleaning up**
Methods and material for containment and cleaning up : Ventilate area.

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.
- 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.

Safety Data Sheet

Hydrogen, Compressed

Issue date: 31/03/2017
Revision date: 14/02/2023

Version: 2.4

SDS reference: MY000148
4/10

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

1) Hydrogen, Compressed (Purified)		
2) Hydrogen, Compressed (H.P.)		
3) Hydrogen, Compressed (Trailer)		
4) Hydrogen, Compressed (Pipeline) (1333-74-0)		
New Zealand	Local name	Hydrogen
New Zealand	Remark (NZ)	Simple asphyxiant – may present an explosion hazard
USA - ACGIH	Remark (ACGIH)	Simple Asphyxiant

Exposure limit values for the other components

No additional information available

8.2. Monitoring

8.3. Appropriate engineering controls

Appropriate engineering controls : Provide adequate general and local exhaust ventilation. Product to be handled in a closed system. Systems under pressure should be regularly checked for leakages. 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.

8.4. Personal protective equipment

Wear safety shoes while handling containers.

Consider the use of flame resistant anti-static safety clothing. Standard EN ISO 14116 - Limited flame spread materials. Standard EN 1149-5 - Protective clothing: Electrostatic properties. Wear safety shoes while handling containers. Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

Hand protection:

Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risk, 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.



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.
Odour : Odourless.
Odour threshold : Odour threshold is subjective and inadequate to warn of overexposure.



Safety Data Sheet

Hydrogen, Compressed

Issue date: 31/03/2017
Revision date: 14/02/2023

Version: 2.4

SDS reference: MY000148
5/10

pH	: Not applicable for gases and gas mixtures.
Melting point, Freezing point	: Melting point: -259 °C Freezing point: -259 °C
Boiling point	: -253 °C
Flash point	: Not applicable for gases and gas mixtures.
Critical temperature	: -240 °C
Auto-ignition temperature	: 560 °C
Decomposition temperature	: Not applicable.
Flammability	: Extremely flammable gas.
Vapour pressure	: Vapour pressure: Not applicable. Vapour pressure at 50°C: Not applicable.
Evaporation rate	: Relative evaporation rate (ether=1): Not applicable for gases and gas mixtures.
Explosive limits	: 4 – 77 vol %
Lower explosion limit	: 4 vol %
Upper explosion limit	: 77 vol %
Explosive properties	: Not applicable.
Minimum ignition energy	: No data available
Solubility	: Water: 1.6 mg/l
Density	: Density: Not applicable for gases and gas mixtures. Relative density: 0.07
Relative density	: Relative vapour density at 20°C: Not applicable. Relative gas density: 0.07
Viscosity	: Viscosity, dynamic: No reliable data available. Viscosity, kinematic: 0.07No reliable data available.
Critical pressure	: 1293 kPa
Gas group	: Compressed gas
Partition coefficient n-octanol/water (Log Pow)	: Not applicable for inorganic products.
Molecular mass	: 2 g/mol
Oxidising properties	: No oxidising properties.
Additional information	: Burns with an invisible flame.

SECTION 10: Stability and reactivity

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

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



Safety Data Sheet

Hydrogen, Compressed

Issue date: 31/03/2017
Revision date: 14/02/2023

Version: 2.4

SDS reference: MY000148
6/10

Skin corrosion or irritation	: Not classified pH: Not applicable for gases and gas mixtures.
Serious eye damage or eye irritation	: Not classified
Respiratory or skin sensitisation	: 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
Aspiration hazard	: Not classified

- | |
|---|
| 1) Hydrogen, Compressed (Purified)
2) Hydrogen, Compressed (H.P.)
3) Hydrogen, Compressed (Trailer)
4) Hydrogen, Compressed (Pipeline) (1333-74-0) |
|---|

Viscosity, kinematic (calculated value) (40 °C)	No reliable data available.
---	-----------------------------

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

SECTION 12: Ecological information

12.1. Toxicity

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

- | |
|---|
| 1) Hydrogen, Compressed (Purified)
2) Hydrogen, Compressed (H.P.)
3) Hydrogen, Compressed (Trailer)
4) Hydrogen, Compressed (Pipeline) (1333-74-0) |
|---|

Partition coefficient n-octanol/water (Log Kow)	Not applicable for inorganic products.
---	--

Partition coefficient n-octanol/water (Log Pow)	Not applicable for inorganic products.
---	--

12.2. Persistence and degradability

- | |
|---|
| 1) Hydrogen, Compressed (Purified)
2) Hydrogen, Compressed (H.P.)
3) Hydrogen, Compressed (Trailer)
4) Hydrogen, Compressed (Pipeline) (1333-74-0) |
|---|

Persistence and degradability	No ecological damage caused by this product.
-------------------------------	--

12.3. Bioaccumulative potential

- | |
|---|
| 1) Hydrogen, Compressed (Purified)
2) Hydrogen, Compressed (H.P.)
3) Hydrogen, Compressed (Trailer)
4) Hydrogen, Compressed (Pipeline) (1333-74-0) |
|---|

Partition coefficient n-octanol/water (Log Pow)	See section 12.1 on ecotoxicology
---	-----------------------------------

Partition coefficient n-octanol/water (Log Kow)	See section 12.1 on ecotoxicology
---	-----------------------------------

Bioaccumulative potential	No ecological damage caused by this product.
---------------------------	--

Safety Data Sheet

Hydrogen, Compressed

Issue date: 31/03/2017
Revision date: 14/02/2023

Version: 2.4

SDS reference: MY000148
7/10

12.4. Mobility in soil

1) Hydrogen, Compressed (Purified) 2) Hydrogen, Compressed (H.P.) 3) Hydrogen, Compressed (Trailer) 4) Hydrogen, Compressed (Pipeline) (1333-74-0)	
Mobility in soil	No additional information available
Partition coefficient n-octanol/water (Log Pow)	See section 12.1 on ecotoxicology
Partition coefficient n-octanol/water (Log Kow)	See section 12.1 on ecotoxicology
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. { Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.

SECTION 14: Transportation information

14.1. UN number

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

14.2. 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



Safety Data Sheet

Hydrogen, Compressed

Issue date: 31/03/2017
Revision date: 14/02/2023

Version: 2.4

SDS reference: MY000148
8/10

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

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. Special precautions for user

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

Limited quantities (UN RTDG) : 0

Excepted quantities (UN RTDG) : E0

Packing instruction (UN RTDG) : P200

- IMDG

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

Properties and observations (IMDG) : Flammable, odourless gas. Explosive limits: 4% to 75% Much lighter than air (0.07).



Safety Data Sheet

Hydrogen, Compressed

Issue date: 31/03/2017
Revision date: 14/02/2023

Version: 2.4

SDS reference: MY000148
9/10

MFAG-No : 115
- 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. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

IBC code : Not applicable.

14.8. 14.8. Hazchem or Emergency Action Code

EAC code : 2SE.

SECTION 15: Regulatory information

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

Occupational Safety and Health Act 1994 and relevant regulations:

Occupational Safety and Health (Classification, Labeling and Safety Data Sheet of Hazardous Chemicals) Regulations 2013.
Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000.

Environment Quality Act 1974 & regulations:

Environment Quality (Clean Air) Regulations 2014.
Environmental Quality (Scheduled Wastes) Regulations 2005.

15.2. 15.2. Chemical safety assessment

SECTION 16: Other information

Version : 2.4
Issue date : 31/03/2017
Revision date : 14/02/2023



Safety Data Sheet

Hydrogen, Compressed

Issue date: 31/03/2017
Revision date: 14/02/2023

Version: 2.4

SDS reference: MY000148
10/10

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> .

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Ensure equipment is adequately earthed. 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 information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.