

Safety data sheet

Hydrogen, refrigerated liquid.

Creation date : 27.01.2005
Revision date : 09.08.2011

Version : 1.2

GB / E

SDS No. : 8319
page 1 / 5

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name

Hydrogen, refrigerated liquid.

EC No (from EINECS): 215-605-7

CAS No: 1333-74-0

Index-Nr. 001-001-00-9

Chemical formula H₂

REACH Registration number:

Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.

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

Relevant identified uses

Industrial and professional. Perform risk assessment prior to use.

Uses advised against

Consumer use.

1.3. Details of the supplier of the safety data sheet

Company identification

BOC, Priestley Road, Worsley, Manchester M28 2UT

E-Mail Address ReachSDS@boc.com

1.4. Emergency telephone number

Emergency phone numbers (24h): 0800 111 333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)

Press. Gas (Refrigerated liquefied gas) - Contains refrigerated gas; may cause cryogenic burns or injury.

Flam. Gas 1 - Extremely flammable gas.

Classification acc. to Directive 67/548/EEC & 1999/45/EC

F+; R12

Extremely flammable.

Risk advice to man and the environment

Refrigerated liquefied gas. Contact with product may cause cold burns or frostbite.

2.2. Label elements

- Labelling Pictograms



- Signal word

Danger

- Hazard Statements

H281

Contains refrigerated gas; may cause cryogenic burns or injury.

H220

Extremely flammable gas.

- Precautionary Statements

Precautionary Statement Prevention

P210

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P282

Wear cold insulating gloves/face shield/eye protection.

Precautionary Statement Response

P377

Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

P381

Eliminate all ignition sources if safe to do so.

P336+P315

Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

Precautionary Statement Storage

P403

Store in a well-ventilated place.

Precautionary Statement Disposal

None.

2.3. Other hazards

Contact with liquid may cause cold burns/frost bite.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances

Hydrogen, refrigerated liquid.

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Index-Nr.: 001-001-00-9

EC No (from EINECS): 215-605-7

REACH Registration number:

Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.

Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures

Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures

First Aid General Information:

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

First Aid Inhalation:

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

First Aid Skin / Eye:

In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance. Immediately flush eyes thoroughly with water for at least 15 minutes.

First Aid Ingestion:

Ingestion is not considered a potential route of exposure.

4.2. 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.

4.3. Indication of any immediate medical attention and special treatment needed

None.

Safety data sheet

Hydrogen, refrigerated liquid.

Creation date : 27.01.2005
Revision date : 09.08.2011

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GB / E

SDS No. : 8319
page 2 / 5

SECTION 5: Fire fighting measures

5.1. Extinguishing media

Suitable extinguishing media

Water. Foam. Dry powder. Use water spray or fog to control fire fumes.

Unsuitable extinguishing media

Carbon dioxide. Do not use a solid water stream.

5.2. Special hazards arising from the substance or mixture

Specific hazards

Exposure to fire may cause containers to rupture/explode.

Hazardous combustion products

None.

5.3. Advice for fire-fighters

Specific methods

If possible, stop flow of product. Move container away or cool with water from a protected position. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. If leaking do not spray water onto container. Water surrounding area (from protected position) to contain fire.

Special protective equipment for fire-fighters

Normal firefighters' equipment consists of an appropriate SCBA (open-circuit positive pressure compressed air type) in combination with fire kit. Equipment and clothing to the following standards will provide a suitable level of protection for firefighters.

Guideline:

EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking., EN 15090 Footwear for firefighters., EN 443 Helmets for fire fighting in buildings and other structures., EN 469:2005: Protective clothing for firefighters. Performance requirements for protective clothing for firefighting., EN 659 Protective gloves for firefighters.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Evacuate area. Use protective clothing. Ensure adequate air ventilation. Eliminate ignition sources. Consider the risk of potentially explosive atmospheres.

6.2. Environmental precautions

Try to stop release.

6.3. Methods and material for containment and cleaning up

Ventilate area. Liquid spillages can cause embrittlement of structural materials.

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

The substance must be handled in accordance with good industrial hygiene and safety procedures. Suck back of water into the container must be prevented. Purge air from system before introducing gas. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Keep away from ignition sources (including static discharges). Refer to supplier's handling instructions. Purge system

with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Assess the risk of potentially explosive atmosphere and the need for explosion-proof equipment. Consider the use of only non-sparking tools. Do not smoke while handling product. Only experienced and properly instructed persons should handle gases under pressure. Protect containers from physical damage; do not drag, roll, slide or drop. 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 container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. 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. Ensure the complete gas system has been (or is regularly) checked for leaks before use. If user experiences any difficulty operating container valve discontinue use and contact supplier. Close container 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. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminants particularly oil and water. Never attempt to transfer gases from one container to another. Ensure equipment is adequately earthed. Take precautionary measures against static discharges.

7.2. Conditions for safe storage, including any incompatibilities

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

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No occupational exposure limit.

8.2. Exposure controls

Appropriate engineering controls

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Product to be handled in a closed system. Gas detectors should be used when quantities of flammable gases/vapours may be released. Keep concentrations well below lower explosion limits. Consider work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages. Provide adequate general or local ventilation. The substance is not classified for human health hazards or for environment effects and it is not PBT or vPvB so that no exposure assessment or risk characterisation is required. For tasks where the intervention of workers is required, the substance must be handled in accordance with good industrial hygiene and safety procedures.

Personal protective equipment

Safety data sheet

Hydrogen, refrigerated liquid.

Creation date : 27.01.2005
Revision date : 09.08.2011

Version : 1.2

GB / E

SDS No. : 8319
page 3 / 5

Eye and face protection

Protect eyes, face and skin from liquid splashes. Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases.

Skin protection

Hand protection

Advice: Wear cold insulating gloves.
Guideline: EN 511 Protective gloves against cold.

Advice: Wear working gloves and safety shoes while handling containers.

Body protection

Protect eyes, face and skin from contact with product. Keep suitable chemically resistant protective clothing readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

Guideline:

EN 943: Protective clothing against liquid and gaseous chemicals, including liquid aerosols and solid particles.

Other protection

Wear flame resistant/retardant clothing. Take precautionary measures against static discharges. Wear working gloves and safety shoes while handling containers. ISO 20345 Safety footwear. ISO/TR 2801:2007 Clothing for protection against heat and flame -- General recommendations for selection, care and use of protective clothing.

Respiratory protection

Not required

Thermal hazards

If there is a risk of contact with the liquid, all protective equipment should be suitable for extremely low temperatures.

Environmental Exposure Controls

Specific risk management measures are not required beyond good industrial hygiene and safety procedures. 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

9.1. Information on basic physical and chemical properties

General information

Appearance/Colour: Colourless liquid.

Odour: None.

Melting point: -259 °C

Boiling point: -253 °C

Flash point: Not applicable for gases and gas mixtures.

Flammability range: 4 %(V) - 77 %(V)

Vapour Pressure 20 °C: Not applicable.

Relative density, gas: 0,07

Solubility in water: 1,6 mg/l

Autoignition temperature: 560 °C

Explosive properties:

Explosive acc. EU legislation: Not explosive.

Explosive acc. transp. reg.: Not explosive.

Oxidising properties: Not applicable.

Molecular weight: 2 g/mol

Critical temperature: -240 °C

Relative density, liquid: 0,07

9.2. Other information

Burns with an invisible flame.

SECTION 10: Stability and reactivity

10.1. Reactivity

Unreactive under normal conditions.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Can form potential explosive atmosphere in air., May react violently with oxidants.

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

10.5. Incompatible materials

Oxidising agents. Air, Oxidiser. Cryogenic liquids can cause embrittlement of some metals and alter the physical properties of other materials. For material compatibility see latest version of ISO-11114.

10.6. 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

General

No known toxicological effects from this product.

SECTION 12: Ecological information

12.1. Toxicity

Can cause frost damage to vegetation.

12.2. Persistence and degradability

Not applicable.

12.3. Bioaccumulative potential

Not applicable.

12.4. Mobility in soil

The substance is a gas, not applicable.

12.5. Results of PBT and vPvB assessment

Not classified as PBT or vPvB.

12.6. Other adverse effects

Not applicable.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

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. Do not discharge into any place where its accumulation could be dangerous. Contact supplier if guidance is required. 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.

Gases in pressure containers (including halons) containing dangerous substances

EWC Nr. 16 05 04*

Safety data sheet

Hydrogen, refrigerated liquid.

Creation date : 27.01.2005
Revision date : 09.08.2011

Version : 1.2

GB / E

SDS No. : 8319
page 4 / 5

SECTION 14: Transport information

ADR/RID

14.1. UN number
1966

14.2. UN proper shipping name
Hydrogen, refrigerated liquid

14.3. Transport hazard class(es)
Class: 2
Classification Code: 3F
Labels: 2.1
Hazard number: 223
Tunnel restriction code: (B/D)
Emergency Action Code: 2YE

14.4. Packing group (Packing Instruction)
P203

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

IMDG

14.1. UN number
1966

14.2. UN proper shipping name
Hydrogen, refrigerated liquid

14.3. Transport hazard class(es)
Class: 2.1
Labels: 2.1
EmS: FD, SU,

14.4. Packing group (Packing Instruction)
P203

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

IATA

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

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. Before transporting product containers ensure that they are firmly secured. Ensure adequate ventilation. Ensure compliance with applicable regulations.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Seveso Directive 96/82/EC: Listed

Other regulations

Chemical Hazards Information and Packaging for Supply (CHIP, 1994 No. 3247)
Control of Major Accident Hazards Regulations (COMAH, 1999 No. 743)
Control of Substances Hazardous to Health Regulations (COSHH, 2002 No. 2677)
Dangerous Substances and Explosive Atmospheres Regulations (DSEAR 2002 No. 2776)
Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations (EPS, 1996 No. 192)
The Regulatory Reform (Fire Safety) Order 2005 (2005 No. 1541)
Management of Health and Safety at Work Regulations (1999 No. 3242)
Pressure Systems Safety Regulations (PER, 2000 No. 128)
Personal Protective Equipment Regulations (1992 No. 2966)
Provision and Use of Work Equipment Regulations (PUWER, 1998 No. 2306)

15.2. Chemical safety assessment

A CSA does not need to be carried out for this product.

SECTION 16: Other information

Ensure all national/local regulations are observed. Ensure operators understand the flammability hazard. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice

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

Further information

Note:

When using this document care should be taken, as the decimal sign and its position complies with rules for the structure and drafting of international standards, and is a comma on the line. As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

References

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to: European Chemical Agency: Guidance on the Compilation of Safety Data Sheets., European Chemical Agency: Information on Registered Substances <http://apps.echa.europa.eu/registered/registered-sub.aspx#search> , European Industrial Gases Association (EIGA) Doc. 918/11 Classification, Labelling and Safety data sheet guide., ISO 10156:2010 Gases and gas mixtures -- Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets., International Programme on Chemical Safety (<http://www.inchem.org/>), Matheson Gas Data Book, 7th Edition., National Institute for Standards and Technology (NIST) Standard Reference Database Number 69, The ESIS (European Chemical Substances 5 Information System) platform of the former European

Safety data sheet

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Revision date : 09.08.2011

Version : 1.2

GB / E

SDS No. : 8319
page 5 / 5

Chemicals Bureau (ECB) ESIS (<http://ecb.jrc.ec.europa.eu/esis/>),
The European Chemical Industry Council (CEFIC) ERICards.,
United States of America's National Library of Medicine's toxicology
data network TOXNET (<http://toxnet.nlm.nih.gov/index.html>),
Substance specific information from suppliers.
EH40 (as ammended) Workplace exposure limits.

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