SAFETY DATA SHEET

Based upon Regulation (EC) No 1907/2006, as amended by Regulation (EU) No 2015/830

hydrogen, compressed

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

1.1. Product identifier

Product name	:	hydrogen, compressed
Synonyms	:	dihydrogen, compressed; dihydrogène, compressed; E949; H2, compressed; hydrogen; hydrogen atoms, compressed; hydrogen molecule, compressed; molecular hydrogen, compressed; mol. hydrogen, compressed; orthohydrogen, compressed; parahydrogen, compressed; protium, compressed; R-702
Registration number REACH	:	
Product type REACH	:	Substance/mono-constituent
CAS number	:	1333-74-0
EC index number	:	001-001-00-9
EC number	:	215-605-7
RTECS number	:	MW8900000
Molecular mass	:	2.02 g/mol
Formula	:	H2

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

1.2.1 Relevant identified uses

Industrial and professional use. Before use: carry out a risk assessment

1.2.2 Uses advised against

No uses advised against known

1.3. Details of the supplier of the safety data sheet

Supplier of the safety data sheet

BALCHEM NV
Westvaartdijk 85
B-1850 Grimbergen Belgium
☎ +32 2 251 60 87
+32 2 252 17 51
info.grimbergen@balchem.com

Distributor of the product

BALCHEM NV
Westvaartdijk 85
B-1850 Grimbergen Belgium
☎ +32 2 251 60 87
+32 2 252 17 51
info.grimbergen@balchem.com

1.4. Emergency telephone number

24h/24h (Telephone advice: English, French, German, Dutch):

+32 14 58 45 45 (BIG)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classified as dangerous according to the criteria of Regulation (EC) No 1272/2008

Class	Category	Hazard statements
Flam. Gas	category 1	H220: Extremely flammable gas.
Press. Gas	Compressed gas	H280: Contains gas under pressure; may explode if heated.

2.2. Label elements

Signal word Danger

H-statements

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.

P-statements

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P381	Eliminate all ignition sources if safe to do so.
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P410 + P403	Protect from sunlight. Store in a well-ventilated place.

2.3. Other hazards

May be ignited by sparks

Large spills/in enclosed spaces: risk of oxygen deficiency

SECTION 3: Composition/information on ingredients

3.1. Substances

Name REACH Registration No	CAS No EC No	Conc. (C)	Classification according to CLP	Note	Remark
hydrogen	1333-74-0 215-605-7	C>99 %	Flam. Gas 1; H220 Press. Gas - Compressed gas; H280	(1)(10)(2)	Mono-constituent

(1) For H-statements in full: see heading 16

(2) Substance with a Community workplace exposure limit

(10) Subject to restrictions of Annex XVII of Regulation (EC) No. 1907/2006

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

General:

Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with laboured breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital.

After inhalation:

Remove the victim into fresh air. Respiratory problems: consult a doctor/medical service.

After skin contact:

Rinse with water. Take victim to a doctor if irritation persists.

After eye contact:

Not applicable.

After ingestion:

Not applicable.

4.2. Most important symptoms and effects, both acute and delayed

4.2.1 Acute symptoms

After inhalation:

EXPOSURE TO HIGH CONCENTRATIONS: Dizziness. Headache. Rapid respiration. Accelerated heart action. Feeling of weakness. Nausea. Vomiting. Disturbances of consciousness. Excited/restless. Cramps/uncontrolled muscular contractions. Respiratory difficulties.

After skin contact:

No effects known.

After eye contact:

Not irritating.

After ingestion:

Not applicable.

4.2.2 Delayed symptoms

No effects known.

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

If applicable and available it will be listed below.

SECTION 5: Firefighting measures

5.1. Extinguishing media

5.1.1 Suitable extinguishing media:

Water spray. Polyvalent foam. BC powder. Carbon dioxide.

5.1.2 Unsuitable extinguishing media:

No unsuitable extinguishing media known.

5.2. Special hazards arising from the substance or mixture

5.3. Advice for firefighters

5.3.1 Instructions:

If no hazard for/from the surroundings: controlled burning. If hazardous substances are nearby: consider extinguishment. Extinguish only if gas supply/leak can be shut afterwards. Cool tanks/drums with water spray/remove them into safety. Physical explosion risk: extinguish/cool from behind cover. Do not move the load if exposed to heat. After cooling: persistant risk of physical explosion.

5.3.2 Special protective equipment for fire-fighters:

Gloves. Protective clothing. Large spills/in enclosed spaces: compressed air apparatus. Heat/fire exposure: compressed air/oxygen apparatus.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Keep upwind. Close doors and windows of adjacent premises. Stop engines and no smoking. No naked flames or sparks. Spark- and explosionproof appliances and lighting equipment.

6.1.1 Protective equipment for non-emergency personnel

See heading 8.2

6.1.2 Protective equipment for emergency responders

Gloves. Protective clothing. Large spills/in enclosed spaces: compressed air apparatus.

Suitable protective clothing

See heading 8.2

6.2. Environmental precautions

Contain released substance, pump into suitable containers. Plug the leak, cut off the supply.

6.3. Methods and material for containment and cleaning up

Damaged/cooled tanks must be emptied. Do not use compressed air for pumping over spills. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling. Transport drums/containers according to local rules.

6.4. Reference to other sections

See heading 13.

SECTION 7: Handling and storage

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

7.1. Precautions for safe handling

Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Use earthed equipment. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Gas/vapour lighter than air at 20°C. Observe normal hygiene standards.

7.2. Conditions for safe storage, including any incompatibilities

7.2.1 Safe storage requirements:

Storage temperature: <50 °C. Keep out of direct sunlight. Keep container in a well-ventilated place. Ventilation at floor level. Fireproof storeroom. Provide for an automatic sprinkler system. Provide the tank with earthing. Under a shelter/in the open. Detached building. Meet the legal requirements.

7.2.2 Keep away from:

Heat sources, ignition sources, combustible materials, oxidizing agents, halogens.

7.2.3 Suitable packaging material:

Steel, stainless steel, monel steel, copper, bronze, aluminium.

7.2.4 Non suitable packaging material:

No data available

7.3. Specific end use(s)

If applicable and available, exposure scenarios are attached in annex. See information supplied by the manufacturer.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 Occupational exposure

a) Occupational exposure limit values

If limit values are applicable and available these will be listed below.

b) National biological limit values

If limit values are applicable and available these will be listed below.

8.1.2 Sampling methods

If applicable and available it will be listed below.

8.1.3 Applicable limit values when using the substance or mixture as intended

If limit values are applicable and available these will be listed below.

8.1.4 DNEL/PNEC values

If applicable and available it will be listed below.

8.1.5 Control banding

If applicable and available it will be listed below.

8.2. Exposure controls

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

8.2.1 Appropriate engineering controls

Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Use earthed equipment. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Measure the oxygen concentration in the air. Work under local exhaust/ventilation.

8.2.2 Individual protection measures, such as personal protective equipment

Observe normal hygiene standards. Do not eat, drink or smoke during work.

a) Respiratory protection:

High vapour/gas concentration: self-contained respirator.

b) Hand protection:

- materials (good resistance)

Chlorosulfonated polyethylene, polyethylene, PVC, neoprene/SBR, nitrile rubber/PVC.

c) Eye protection:

Safety glasses.

d) Skin protection:

Protective clothing.

8.2.3 Environmental exposure controls:

See headings 6.2, 6.3 and 13

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical form	Compressed gas
Odour	Odourless
Odour threshold	Not applicable
Colour	Colourless
Particle size	Not applicable (gas)
Explosion limits	4 - 75 vol %
Flammability	Extremely flammable gas.
Log Kow	0.45 ; Estimated value
Dynamic viscosity	0.00001 Pa.s ; -253 °C
Kinematic viscosity	No data available
Melting point	-259 °C
Boiling point	-253 °C
Flash point	No data available
Evaporation rate	No data available
Relative vapour density	0.07
Vapour pressure	1649200 hPa ; 20 °C
Solubility	water ; 0.00016 g/100 ml
Relative density	0.07 ; -253 °C
Decomposition temperature	No data available
Auto-ignition temperature	> 500 °C
Explosive properties	No chemical group associated with explosive properties
Oxidising properties	No chemical group associated with oxidising properties
pH	No data available

9.2. Other information

Minimum ignition energy	0.01 mJ
Critical temperature	-240 °C
Critical pressure	12966 hPa
Absolute density	0.082 kg/m³

SECTION 10: Stability and reactivity

10.1. Reactivity

May be ignited by sparks.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Reacts violently with many compounds e.g.: with (strong) oxidizers, with (some) metal powders, with (some) halogens and with oxygen with (increased) risk of fire/explosion.

10.4. Conditions to avoid

Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Use earthed equipment. Keep away from naked flames/heat. Keep away from ignition sources/sparks.

10.5. Incompatible materials

Combustible materials, oxidizing agents, halogens.

10.6. Hazardous decomposition products

No data available.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

11.1.1 Test results

Acute toxicity

hydrogen, compressed

No (test)data available

Conclusion

Not classified for acute toxicity

Corrosion/irritation

hydrogen, compressed

No (test)data available

Conclusion

Not classified as irritating to the skin

Not classified as irritating to the eyes

Not classified as irritating to the respiratory system

Respiratory or skin sensitisation

hydrogen, compressed

No (test)data available

Conclusion

Not classified as sensitizing for skin

Not classified as sensitizing for inhalation

Specific target organ toxicity

hydrogen, compressed

No (test)data available

Conclusion

Not classified for subchronic toxicity

Mutagenicity (in vitro)

hydrogen, compressed

No (test)data available

Mutagenicity (in vivo)

hydrogen, compressed

No (test)data available

Carcinogenicity

hydrogen, compressed

No (test)data available

Reproductive toxicity

hydrogen, compressed

No (test)data available

Conclusion CMR

Not classified for carcinogenicity

Not classified for mutagenic or genotoxic toxicity

Not classified for reprotoxic or developmental toxicity

Toxicity other effects

hydrogen, compressed

No (test)data available

Chronic effects from short and long-term exposure

hydrogen, compressed

No effects known.

SECTION 12: Ecological information

12.1. Toxicity

hydrogen, compressed

No (test)data available

Conclusion

Not harmful to aquatic organisms

Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008

12.2. Persistence and degradability

hydrogen, compressed

Half-life soil (t1/2 soil)

Method	Value	Primary degradation/mineralisation	Value determination
Not applicable			

Conclusion

Biodegradability: not applicable

12.3. Bioaccumulative potential

hydrogen, compressed

Log Kow

Method	Remark	Value	Temperature	Value determination
		0.45		Estimated value

Conclusion

Low potential for bioaccumulation (Log Kow < 4)

12.4. Mobility in soil

Not applicable (gas)

12.5. Results of PBT and vPvB assessment

The criteria of PBT and vPvB as listed in Annex XIII of Regulation (EC) No 1907/2006 do not apply to inorganic substances.

12.6. Other adverse effects

hydrogen, compressed

Global warming potential (GWP)

Not included in the list of fluorinated greenhouse gases (Regulation (EC) No 517/2014)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009)

SECTION 13: Disposal considerations

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

13.1. Waste treatment methods

13.1.1 Provisions relating to waste

Waste material code (Directive 2008/98/EC, Decision 2000/0532/EC).
16 05 04* (gases in pressure containers and discarded chemicals: gases in pressure containers (including halons) containing dangerous substances).
Depending on branch of industry and production process, also other waste codes may be applicable. Hazardous waste according to Regulation (EU) No 1357/2014.

13.1.2 Disposal methods

Refer to manufacturer/supplier for information on recovery/ recycling. Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals.

13.1.3 Packaging/Container

Waste material code packaging (Directive 2008/98/EC).
15 01 10* (packaging containing residues of or contaminated by dangerous substances).

SECTION 14: Transport information

Road (ADR)

14.1. UN number

UN number	1049

14.2. UN proper shipping name

Proper shipping name	Hydrogen, compressed

14.3. Transport hazard class(es)

Hazard identification number	23
Class	2
Classification code	1F

14.4. Packing group

Packing group	
Labels	2.1

14.5. Environmental hazards

Environmentally hazardous substance mark	no

14.6. Special precautions for user

Special provisions	660
Special provisions	
Special provisions	662
Limited quantities	none.

Rail (RID)

14.1. UN number

UN number	1049

14.2. UN proper shipping name

Proper shipping name	Hydrogen, compressed

14.3. Transport hazard class(es)

Hazard identification number	23
Class	2
Classification code	1F

14.4. Packing group

Packing group	
Labels	2.1 (+13)

14.5. Environmental hazards

Environmentally hazardous substance mark	no

14.6. Special precautions for user

Special provisions	660
Special provisions	662
Limited quantities	none.

Inland waterways (ADN)

14.1. UN number

UN number	1049

14.2. UN proper shipping name

Proper shipping name	Hydrogen, compressed

14.3. Transport hazard class(es)

Class	2
Classification code	1F

14.4. Packing group

Packing group	
Labels	2.1

14.5. Environmental hazards

Environmentally hazardous substance mark	no

14.6. Special precautions for user

Special provisions	660
Special provisions	662
Limited quantities	none.

Sea (IMDG/IMSBC)

14.1. UN number

UN number	1049

14.2. UN proper shipping name

Proper shipping name	Hydrogen, compressed

14.3. Transport hazard class(es)

Class	2.1

14.4. Packing group

Packing group	
Labels	2.1

14.5. Environmental hazards

Marine pollutant	-
Environmentally hazardous substance mark	no

14.6. Special precautions for user

Special provisions	
Limited quantities	none.

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Annex II of MARPOL 73/78	Not applicable

Air (ICAO-TI/IATA-DGR)

14.1. UN number

UN number	1049

14.2. UN proper shipping name

Proper shipping name	Hydrogen, compressed

14.3. Transport hazard class(es)

Class	2.1

14.4. Packing group

Packing group	
Labels	2.1

14.5. Environmental hazards

Environmentally hazardous substance mark	no

14.6. Special precautions for user

Special provisions	A1
Passenger and cargo transport: limited quantities: maximum net quantity per packaging	

SECTION 15: Regulatory information

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

European legislation:

VOC content Directive 2010/75/EU

VOC content	Remark
	Not applicable (inorganic)

REACH Annex XVII - Restriction

Subject to restrictions of Annex XVII of Regulation (EC) No. 1907/2006: restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles.

	Designation of the substance, of the group of substances or of the mixture	Conditions of restriction
· hydrogen	Substances classified as flammable gases category 1 or 2, flammable liquids categories 1, 2 or 3, flammable solids category 1 or 2, substances and mixtures which, in contact with water, emit flammable gases, category 1, 2 or 3, pyrophoric liquids category 1 or pyrophoric solids category 1, regardless of whether they appear in Part 3 of Annex VI to that Regulation or not.	1. Shall not be used, as substance or as mixtures in aerosol dispensers where these aerosol dispensers are intended for supply to the general public for entertainment and decorative purposes such as the following: — metallic glitter intended mainly for decoration, — artificial snow and frost, — “whoopee” cushions, — silly string aerosols, — imitation excrement, — horns for parties, — decorative flakes and foams, — artificial cobwebs, — stink bombs.2. Without prejudice to the application of other Community provisions on the classification, packaging and labelling of substances, suppliers shall ensure before the placing on the market that the packaging of aerosol dispensers referred to above is marked visibly, legibly and indelibly with: “For professional users only”.3. By way of derogation, paragraphs 1 and 2 shall not apply to the aerosol dispensers referred to Article 8 (1a) of Council Directive 75/ 324/EEC.4. The aerosol dispensers referred to in paragraphs 1 and 2 shall not be placed on the market unless they conform to the requirements indicated.

National legislation The Netherlands

Waste identification (the Netherlands)	LWCA (the Netherlands): KGA category 06
Waterbezwaarlijkheid	11

National legislation Germany

WGK	nwg; Classification non-water polluting in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 27 July 2005 (Anhang 1)

National legislation France

No data available

National legislation Belgium

No data available

Other relevant data

No data available

15.2. Chemical safety assessment

No chemical safety assessment has been conducted.

SECTION 16: Other information

Full text of any H-statements referred to under headings 2 and 3:

H220 Extremely flammable gas.
H280 Contains gas under pressure; may explode if heated.
(*) = INTERNAL CLASSIFICATION BY BIG
PBT-substances = persistent, bioaccumulative and toxic substances
CLP (EU-GHS) Classification, labelling and packaging (Globally Harmonised System in Europe)

The information in this safety data sheet is based on data and samples provided to BIG. The sheet was written to the best of our ability and according to the state of knowledge at that time. The safety data sheet only constitutes a guideline for the safe handling, use, consumption, storage, transport and disposal of the substances/preparations/mixtures mentioned under point 1. New safety data sheets are written from time to time. Only the most recent versions may be used. Old versions must be destroyed. Unless indicated otherwise word for word on the safety data sheet, the information does not apply to substances/preparations/mixtures in purer form, mixed with other substances or in processes. The safety data sheet offers no quality specification for the substances/preparations/mixtures in question. Compliance with the instructions in this safety data sheet does not release the user from the obligation to take all measures dictated by common sense, regulations and recommendations or which are necessary and/or useful based on the real applicable circumstances. BIG does not guarantee the accuracy or exhaustiveness of the information provided and cannot be held liable for any changes by third parties. This safety data sheet is only to be used within the European Union, Switzerland, Iceland, Norway and Liechtenstein. Any use outside of this area is at your own risk. Use of this safety data sheet is subject to the licence and liability limiting conditions as stated in your BIG licence agreement or when this is failing the general conditions of BIG. All intellectual property rights to this sheet are the property of BIG and its distribution and reproduction are limited. Consult the mentioned agreement/conditions for details.