1. Product and company identification

1.1. Product Identifier

Commercial Name : Hydrogen

Chemical description : Hydrogen

N° CAS : 1333-74-0

N° CE : 215-605-7

N° Index : 001-001-00-9

Chemical formula : H2

Registration Number : Listing in Annex IV/V of REACH, exempt from registration.

1.2. Product Identifier

Identified relevant uses : Professional and industrial.

Fuel, fuel cells.

Calibration or test gas

Synthesis / Chemical reaction

Combustion

Manufacturing of electronic or photovoltaic components.

Laboraotry uses.

Consumer usage.

Non-recommended uses : Because of the risk of explosion, do not use to inflate balloons (toys and advertising).

1.3. Information about the supplier of the safety data sheet :

Supplier : LHYFE

66 Boulevard de Berlin - CS 34228

44042 NANTES CEDEX 1

Tél : +33 221 650 111

fds@lhyfe.com https://fr.lhyfe.com/

1.4. In case of emergency phone number

ORFILA (INRS) number : +33 1 45 42 59 59

2. Hazard identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP]

Physical hazards	Category 1, Flammale gas	H220
	Pressurised gas: Compressed gas	H280

2.2. Labeling information

Labeling according to (EC) regulation No. 1272/2008 [CLP]

Hazard pictograms (CLP):

Signal word (CLP): : Hazard

Hazard statements (CLP) : H220 - Extremely flammable gas.

H280 - Contains pressurised gas; may explode if heated..

Safety precautions (CLP) :

- Prevention : P210 - Keep away from heat, hot surfaces, sparks, open flames and any other source of ignition. Do not smoke.
- Response : P377 - Leaking flammable gas: If leak cannot be stopped without risk, do not extinguish
  P381 - In case of leak, eliminate all ignition sources.
- Storage: P403 - Store in a well-ventilated place..

2.3. Other hazards

None

3. Composition/information on the ingredients

3.1. Substances

Name	Product identifier		%	Classification
Hydrogen	Number CAS : Number CE : Index Number: Registry Number:	1333-74-0 215-605-7 001-001-00-9 Referred to in Annex IV/V of REACH, exempt from registration	100	Flam. Gas 1, H220 Press. Gas (Comp.), H280

3.2. Blends

Not applicable

4. First Aid

4.1. Description of first aid measures :

Inhalation : High concentrations may cause asphyxiation. Symptoms may include loss of consciousness or motor skills. The victim may not be aware of the asphyxiation. Move the victim to an uncontaminated area, using a Self-Contained Breathing Apparatus. Keep the victim warm and call a doctor. If breathing has stopped, give artificial respiration.

Eye contact : No harmful effects expected..

Skin contact : No harmful effects expected.

Ingestion : Oral ingestion is not considered as a possible route of exposure..

4.2. Main symptoms and effects, both acute and delayed

Respiratory arrest.

4.3. Immediate medical attention and special treatment needed

Non – required

5. Fire-fighting measures

5.1. Extinguishing methods

Suitable extinguishing agents : Spray or misty water. Dry powder. Foam..

Unsuitable extinguishing agents : Carbon dioxide.

5.2. Special hazards caused by the substance or mixture

Specific risks:

Fire exposure may cause the rupture and explosion of gas containers. It can be ignited by static electricity.

Burns with an invisible flame.

This gas is lighter than air and can concentrate in the upper parts of closed rooms.

Hazardous combustion products : None .

5.3. Advice for firefighters

Appropiate extinguishing agents :

Use extinguishing agents appropriate to the surrounding fire.

Move away from container and spray with cooling water from a protected area.

If possible, stop the flow of gas.

Do not extinguish a gas leak unless it is absolutely necessary. A sudden and explosive re-ignition may occur; therefore, appropriate measures must be taken to protect personnel in the event of a container rupture, such as total evacuation.

Nearby containers should be cooled by spraying with large quantities of water until the fire is extinguished.

Special protective Equipment for firefighters: Fireproof clothing, helmet with face mask, gloves, rubber boots and in closed spaces, a self-contained breathing apparatus.

- Standard EN 137 - Self-contained open-circuit compressed air apparatus with a full face mask.
- Standard EN 469 - Protective clothing for firefighters.
- Standard EN 659 - Protective gloves.

6. Measures in the event of an accidental spill

6.1. Personal safety precautions, protective equipment and emergency procedures

Try to stop the leak.

Clear the area..

Ensure effective air flow.

Eliminate all ignition sources.

Monitor the concentration of the released product.

Consider the risks of explosive atmospheres (ATEX

Wear self-contained breathing apparatus (SCBA) when entering the area (unless you have checked that it is safe).

Act in accordance with the local emergency plan.

Keep upstream of the wind.

6.2. Environmental precautions

Attempt to stop the leak if it can be done safely.

Do not discharge into any area where the residue could be dangerous.

6.3. Methods and equipment for containment and cleaning up

Ventilate the area

6.4. Re and ference to other headings

See sections 8 and 13.

7. Handling and storage

7.1. Safety precautions for handling

The product must be handled in accordance with health & safety rules and procedures.

Only persons with the appropriate experience and training should handle pressurised gases.

Only use the appropriate specified equipment for this product given its operating pressure and temperature.

Ensure that the entire gas installation has been (or is regularly) checked for leaks before use.

Do not smoke or use the telephone while handling the product.

Avoid backflow of water, acids and alkalis.

Assess the potential risks of an explosive atmosphere and the need for explosion-proof equipment (ATEX).

Purge the air from the installation before introducing the gas.

Take precautions against electrostatic discharges.

Keep away from all sources of ignition (including electrostatic charges).

Use only non-sparking tools.
Avoid exposing the product to air.
Ensure that the equipment is correctly grounded.
Refer to the supplier's instructions for handling the container. Protect the container from damage.
Never attempt to repair or modify a container valve or its pressure release devices.
Damaged valves must be reported to the supplier immediately.
Never attempt to transfer gas from one container to another.
Install non-return valves in the pipes.
Open the valve slowly to avoid sudden pressure build-up (water hammer).
Do not breathe the gas.

7.2. Requirements for safe storage, including any incompatibility issues

Comply with all local regulations and requirements for storing containers.
Containers must not be stored in conditions that could aggravate their corrosion.
Containers in storage should periodically be inspected for general condition and leaks.
Store the container in a well-ventilated area, at a temperature below 50°C.
Store containers in places where there is no risk of fire and away from sources of heat and ignition.
Keep away from all combustible materials.
Store away from combustible gases and other oxidising materials.
All electrical installations in the storage facilities must be compatible with the risk of exposure to potentially explosive atmospheres (ATEX).
Post "No Smoking" and "No Open Flames" signs in the storage area.

7.3. Particular end use(s)

None

8. Exposure controls/personal protection

8.1. Control settings

Occupational Exposure Limits: None of the components is subject to an exposure limit.

8.2. Exposure controls

8.2.1. Appropriate technical controls

Use the work permit for example for the maintenance activities.
Ensure adequate Local and Overall Air Ventilation.
Gas detectors should be used when quantities of flammable gases/vapours are likely to be released.
Pressurised systems should be regularly tested for leaks.
Product to be handled in a closed system. Use only permanent sealed installations.
Avoid the accumulation of electrostatic charges.

8.2.2. Personal protective equipment

A risk analysis of product usage must be carried out and documented in all workplaces where the product is being used, in order to select the appropriate personal safety equipment for the identified risks.
Choose Personal Protective Equipment that complies with the recommended EN/ISO standards.

Eye/face protection : Wear safety goggles with side shields.
Standard EN 166 - Personal eye protection - Specifications.

Skin protection :

- Hand protection :

Wear protective gloves when handling.
Standard EN 388-Protective gloves against mechanical risks.

- Body protection :

Wear anti-fire and anti-electricity clothing.

Standard EN ISO 14116 - Limited flame expansion materials.

Standard EN ISO 1149-5 - Protective clothing - Electrostatic properties.

- Others or Miscellaneous :

Wear safety shoes when handling.

Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

Respiratory protection :

Non-required

Thermal hazards :

No safety precautions are needed.

8.2.3. Environmental exposure controls

See section 13 for spefici methods for waste and gas treatments

9. Physical and chemical properties

9.1. General information about physical and chemical properties

Appearance

- -State : Gas
- -Form or shape: Compressed gas
- -Colour : Colourless
- Odour: Odourless

Olfactory threshold:	Detection of thresholds by odour is subjective and inappropriate for warning of overexposure.
pH:	Not applicable
Melting point / Freezing point: -	259 °C
Boiling point: -	253°C
Critical temperature:	-240 °C
Flash point:	Not applicable
Evaporation rate :	Not applicable
Flammability (solid, gas) :	Extremely flammable gas
Explosive limits:	4 - 77 vol % Vapour pressure: Not applicable
Vapour pressure:	Not applicable
Relative density, liquid (water=1):	0.07
Relative density, gas (air=1):	0.07
Water solubility:	1.6 mg/l
Partition coefficient (n-octanol/water) :	Not applicable to non-organic gases
Auto-ignition temperature:	560°C
Decomposition temperature:	Not applicable
Viscosity:	No reliable data available
Explosive properties:	Not applicable
Oxidising properties:	Not applicable

9.2. Other information

Molar mass:	2 g/mol
Other data :	Burns with an invisible flame

10. Reactivity and stability

10.1. Reactivity

No reactivity hazards other than those described in the below sections.

10.2. Chemical stability

Stable under normal conditions

10.3. Possible hazard reactions

May form explosive mixture with air.
May react violently with oxidizing agents.

10.4. Condition to avoid

Keep away from heat, sparks, open flames, hot surfaces and all other sources of ignition. Do not smoke.
Avoid moisture in installations.

10.5. Incompatibles substances

Air and oxidizers. For material compatibility see latest version of ISO 11114.

10.6. Hazardous decomposition products

No hazardous decomposition products under normal use and storage conditions.

11. Toxicological effects

11.1. Information about toxicological effects

Acute toxicity:	No known toxicological effects
Skin corrosion / skin irritation :	No known effect
Serious eye damage / irritation :	No known effect
Skin or respiratory sensitivity:	No known effects
Cells mutagenicity :	No known effect
Carcinogenicity :	No known effects
Reproductive toxicity :	No known effects
Specific toxicity for certain target organs : - single exposure	No effect known
Specific toxicity for certain target organs : - repeated exposure	No effect known
Hazard by inhalation:	Not applicable to gases and gas mixtures

12. Environmental information

12.1. Toxicity

This product is not harmful to the environment.

12.2. Persistence and degradability

This product is not harmful to the environment.

12.3. Bioaccumulative potential

This product is assumed to be biodegradable, so its persistence in aquatic environments is expected to be low

12.4. Soil movement

Due to its high volatility, this product is unlikely to pollute soil or water.

12.5. Results of PBT and vPvB assessments

Not classiifed as PBT or vPvB

12.6. Other harmful effects

Other harmful effects :	No known effects with this product.
Effect on the ozone layer :	None
Global warming potential [CO2=1] :	6
Effect on global warming:	Effect on global warming: Contains greenhouse gas(es). May contribute to the greenhouse effect when discharged in large quantities.

13. Waste disposal considerations

13.1. Waste management methods

Contact supplier if instructions are required.

Do not ventilate in areas where there is a risk of forming an explosive mixture with air.

Discharged gas must be burnt in a burner fitted with a flame arrestor.

Do not discharge gas into any area where its accumulation could be hazardous.

For further recommendations on how to dispose gas, refer to EIGA Code of Practice Doc 30 "Disposal of gases", downloadable from http://www.eiga.org.

List of hazardous waste : 16 05 04: Pressurised gases (including halons) containing dangerous substances.

14. Information relating to the transportation

	ADR	RID	IMGD	IATA
14.1. Number ONU :	UN 1049			
14.2. United Nations Expedition Name	HYDROGENE COMPRIME		HYDROGEN, COMPRESSED	
14.3. Transport hazard class(es) Class : Label : Danger number (ADR) / Emergency number (IMDG) Restriction tunnel code :	2 2.1 23 (B/D) 	2 2.1 - -	2.1 2.1 F-D, S-U -	
14.4. Packing Group :	-	-	-	-
14.5. Hazards for the environment :	Not applicable			
14.6. Special precautions to be taken : :	P200			Passenger and cargo aircraft: forbidden Cargo aircraft only: 200

14.7. Transportation in bulk in accordance with Annex II of the Marpol Convention and the IBC Code

Not applicable.

Transportation safety procedures: Ensure that the operator of the vehicle is aware of the potential hazards of the load and the measures to be taken in case of an accident or other emergency

15. Regulatory information

15.1. Safety, health and environmental regulations/legislation specific to the product or substance

EU Regulations

Restrictions d'emploi :	Aucune
Directive Seveso 2012/18/UE (Seveso III) :	Listé
Use restrictions: None	
Seveso Directive 2012/18/EU (Seveso III):	Listed

National regulations

Ensuring that all national and local regulations are complied with.

Consult the technical guide on the INERIS website (http://www.ineris.fr/aida): "application de la classification des substances et mélanges dangereuses à la nomenclature des installations classées".

15.2. Chemical safety assessment

No Chemical Risk Assessment (CSA) is required for this product.

16. Other informations

Notice of changes :

Safety data sheet revised in accordance with Commission Regulation (EU) 2015/830.

Abbreviations and acronyms:

ADR :	European Agreement concerning the International Carriage of Dangerous Goods by Road.
SCBA:	Self-Contained Breathing Apparatus.
ATEX:	Atmospheres EXplosives
CLP:	Classification Labelling Packaging - Regulation (EC) No. 1272/2008 on classification, labelling and packaging.
CSA:	Chemical Safety Assessment.
EIGA:	European Industrial Gases Association.
EN:	European Norm.
IATA:	International Air Transport Association.
IMDG Code :	International Maritime Dangerous Goods Code.
INRS: I	nstitut National de Recherche et de Sécurité (French National Research and Safety Institute).
CAS No.:	numerical identifier assigned by the Chemical Abstract Service (USA).
PBT:	Persistent, Bioaccumulative and Toxic.
REACH:	Registration, Evaluation, Authorisation and Restriction of Chemicals - Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals.
RID: R	egulation concerning the International Carriage of Dangerous Goods by Rail.
UN: U	nited Nations.
vPvB:	very (very) Persistent and very (very) Bioaccumulative.

Full text of Phrases H and P quoted in sections 2 and 3

Hazard statements: :

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

Safety advice : :

P210	Keep away from heat, hot surfaces, ignition sources and sparks. Do not smoke.
P377	Leaking flammable gas: Do not extinguish if leak cannot be stopped without risk.
P381	In case of a leak, eliminate all sources of ignition.
P403	Store in a well-ventilated place.

Training advice: :

Ensure flammability and pressurised gas hazards are understood.

Additional information :

The above information has been prepared on the basis of the best available information.

It does not claim to be exhaustive and should be regarded as a guide.

Although every care has been taken in the preparation of this document, no liability can be accepted for any damage or accident resulting from its use.