

according to Regulation (EC) No. 1907/2006 as amended by (EC) No. 2015/830; US OSHA HCS 2015; and Canadian WHMIS 2015.

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product Name: Hydrogen, compressed
Synonyms: Dihydrogen, parahydrogen, refrigerant gas R702, water gas.
CAS Number: 1333-74-0
EC (EINECS) #: 231-147-0
EC Annex 1 #: 001-001-00-9
REACH Registration No. na

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

Relevant identified uses: Industrial use. Use as directed.

1.3 Details of the Supplier of the Safety Data Sheet:

Company Name: Gas Innovations **Phone Number:**
18005 E. Hwy 225 +1 (281)471-2200
La Porte, TX 77571 USA
Web site address: www.gasinnovations.com
Information: Infotrac (outside of United States) +1 (352)323-3500
Preparer Name: Crystal Maira

1.4 Emergency telephone number:

Emergency Contact: 3E (within United States) +1 (866)303-2640

SECTION 2. HAZARDS IDENTIFICATION**2.1 Classification of the Substance or Mixture:**

Flammable Gases, Category 1
Gas Under Pressure, Compressed gas
Simple Asphyxiant

2.2 Label Elements:

GHS Signal Word: **Danger**

Hazard-determining components of labelling:

GHS Hazard Phrases:

H220 - Extremely flammable gas.
H280 - Containers gas under pressure; may explode if heated.
HUS1 - May displace oxygen and cause rapid suffocation.
CGA-HG04 - May form explosive mixtures with air.
CGA-HG08 - Burns with invisible flame.

GHS Precautionary Phrases:

P202 - Do not handle until all safety precautions have been read and understood.
P210 - Keep away from heat/sparks/open flames/hot surfaces/other ignition sources. - No smoking.
P271 - Use only outdoors or in a well-ventilated area.
Use a back flow preventive device in the piping.
Use only with equipment rated for cylinder pressure.
Close valve after each use and when empty.
Protect from sunlight when ambient temperature exceeds 52°C (125°F).
Do not open valve until connected to equipment prepared for use.

GHS Response Phrases:

P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

P381 - Eliminate all ignition sources if safe to do so.

GHS Storage and Disposal Phrases:

P403 - Store in well-ventilated place.

UFI:**OSHA Regulatory Status:** This material is classified as hazardous under OSHA regulations.**2.3 Adverse Human Health** No data available.**Effects and Symptoms:****Additional Hazards** Unknown Acute Toxicity (GHS-US): No data available.**Information****SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS**

CAS #	Hazardous Components (Chemical Name)/ REACH Registration No.	Concentration	EC No./ EC Index No.	GHS Classification
1333-74-0	Hydrogen, compressed na	99.5 -100.0 %	215-605-7 001-001-00-9	Comp. Gas: H280 Flam. Gas 1: H220

SECTION 4. FIRST AID MEASURES**4.1 Description of First Aid****Measures:****In Case of Inhalation:** Remove victim to fresh air and keep at rest in a position comfortable for breathing. If breathing is difficult, trained personnel should give oxygen. If breathing has stopped, give artificial respiration. Call a physician.**In Case of Skin****Contact:**

Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid possibility of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly prior to reuse.

In Case of Eye**Contact:**

Immediately flush eyes with plenty of water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately. Get immediate medical advice/attention.

In Case of Ingestion: Not a likely route of exposure.**Note for the Doctor:** Treat symptomatically and supportively. Show this safety data sheet to the doctor in attendance.**SECTION 5. FIRE FIGHTING MEASURES****5.1 Suitable Extinguishing Media:** Water spray or fog, dry chemical powder, carbon dioxide. Use water spray or fog to knock down fire fumes if possible.**5.2 Flammable Properties and Hazards:** Compressed gas: asphyxiant. Suffocation hazard by lack of oxygen.

EXTREMELY FLAMMABLE. The hydrogen flame is nearly invisible. Hydrogen has a low ignition energy; escaping hydrogen gas may ignite spontaneously. A fireball forms if the gas cloud ignites immediately after release. Hydrogen forms explosive mixtures with air and oxidizing agents.

Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas containers to rupture. Cool endangered containers with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.

Hazardous Combustion Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Products:

Flash Pt: NA
Explosive Limits: LEL: 4% UEL: 77%
Autoignition Pt: 566.00 C (1050.8 F)

- 5.3 Fire Fighting Instructions:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH approved (or equivalent), and full protective gear. If venting or leaking gas catches fire, do not extinguish flames. Flammable vapors may spread from leak, creating an explosive reignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering an area, especially a confined area, check the atmosphere with an appropriate device.

Evacuate all personnel from the danger area. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

SECTION 6. ACCIDENTAL RELEASE MEASURES

- 6.1 Protective Precautions, Protective Equipment and Emergency Procedures:** Use proper personal protective equipment as indicated in Section 8. See Section 13, Disposal Considerations, for additional information.
- 6.2 Environmental Precautions:** Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents and containers in accordance with local, regional, national, and international regulations. Contact supplier for any special requirements.
- 6.3 Methods and Material For Containment and Cleaning Up:** DANGER: EXTREMELY FLAMMABLE GAS. Forms explosive mixtures with air and oxidizing agents. See section 5. Evacuate personnel to a safe area. Appropriate self-contained breathing apparatus may be required. Approach suspected leak area with caution. Remove all sources of ignition. if safe to do so. Reduce gas with fog or fine water spray. Stop flow of product if safe to do so. Ventilate area or move container to a well-ventilated area. Flammable gas may spread from leak. Before entering the area, especially a confined area, check the atmosphere with an appropriate device.

SECTION 7. HANDLING AND STORAGE

- 7.1 Precautions To Be Taken in Handling:** Keep away from heat, sparks, and open flame. Keep away from ignition sources. NO SMOKING IN AREAS OF USE. NO SMOKING IN STORAGE AREAS. Use non-sparking tools. Use explosion-proof equipment.

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never

apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents.

For other precautions in using this product, see section 16.

7.2 Precautions To Be Taken in Storing:

Store only where temperature will not exceed 125°F (52°C). Post "No Smoking or Open Flames" signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g., NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods.

Other Precautions:

Handle in accordance with good industrial hygiene and safety practices. When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

Keep out of reach of children.

General Occupational Hygiene:

Eating, drinking, and smoking should be prohibited in areas where this material is handled, stored, and processed.

Workers should wash hands and face before eating, drinking, and smoking. Remove contaminated clothing and protective equipment before entering eating areas.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Exposure Parameters:

CAS #	Chemical Name	Jurisdiction	Recommended Exposure Limits	Notations
1333-74-0	Hydrogen, compressed	ACGIH TLV	TWA: Simple asphyxiant	

Derived No-Effect Levels / Predicted No Effect Concentrations:

Recommended Exposure Limits: Not established.

8.2 Exposure Controls:

8.2.1 Engineering Controls (Ventilation etc.): Use an explosion-proof local exhaust system. Local exhaust and general ventilation must be adequate to meet exposure standards. MECHANICAL (GENERAL): Inadequate - Use only in a closed system. Use explosion proof equipment and lighting.

8.2.2 Personal protection equipment:

Eye Protection: Wear safety glasses with side shields.

Protective Gloves: Wear working gloves when handling gas containers.

Other Protective Clothing: Consider the use of flame resistant anti-static safety clothing. Wear safety shoes when handling containers.

Respiratory Equipment (Specify Type): An air-supplied respirator must be used while working with this product in confined spaces. The respiratory protection used must conform with OSHA rules as specified in 29 CFR 1910.134. Select per OSHA 29 CFR 1910.134 and ANSI Z88.2.

Work/Hygienic/Maintenance Practices: Handle in accordance with good industrial hygiene and safety practice.

8.2.3 Environmental Exposure Controls: Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents and containers in accordance with local, regional, national,

and international regulations. Contact supplier for any special requirements.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on Basic Physical and Chemical Properties

Physical States: [X] Gas [] Liquid [] Solid

Appearance and Odor: Appearance: Colorless gas.
Odor: No apparent odor.

Critical temperature: -239.9C

pH: NP

Melting Point: -259.20 C (-434.6 F)

Boiling Point: -252.90 C (-423.2 F)

Flash Pt: NA

Evaporation Rate: NA

Saturated Vapor Concentration: NA

Flammability (solid, gas): EXTREMELY FLAMMABLE. Forms explosive mixtures in air and with oxidizing agents. Burns with invisible flame.

Explosive Limits: LEL: 4% UEL: 77%

Vapor Pressure (vs. Air or mm Hg): NP

Vapor Density (vs. Air = 1): 0.07

Specific Gravity (Water = 1): NA

Density: 0.0056 - (1 atm) LB/CF at 0.0 C (32.0 F)

Bulk density: NA

Solubility in Water: 1.6 MG/L

Octanol/Water Partition Coefficient: No data.

Autoignition Pt: 566.00 C (1050.8 F)

Decomposition Temperature: No data.

Viscosity: NP

Explosive Properties: Not applicable.

Oxidizing Properties: None.

9.2 Other Information

Percent Volatile: N.A.

Particle Size: NA

Heat Value: NA

Corrosion Rate: NA

Molecular Formula & Weight: H2 2.016

SECTION 10. STABILITY AND REACTIVITY

- 10.1 Reactivity:** None under recommended storage and handling conditions (see section 7).
- 10.2 Stability:** Unstable [] Stable [X]
- 10.3 Conditions To Avoid - Hazardous Reactions:** Can form explosive mixture with air. May react violently with oxidants.
- Possibility of Hazardous Reactions:** Will occur [X] Will not occur []
- 10.4 Conditions To Avoid - Instability:** Stable under normal conditions. Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- 10.5 Incompatibility - Materials To Avoid:** Oxidizing materials, Lithium, Halogens.
- 10.6 Hazardous Decomposition or Byproducts:** 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, LC50, Inhalation, Rat, > 15000 ppm, 1 H.
Reproductive toxicity: Not classified.
Specific target organ toxicity - single exposure: Not classified.
Specific target organ toxicity - repeated exposure: Not classified.
Aspiration hazard: Not classified.
Germ cell mutagenicity: Not classified.
- Irritation or Corrosion:** Skin corrosion/irritation: Not classified.
Serious eye damage/eye irritation: Not classified.
- Symptoms related to Toxicological Characteristics:** Not classified.
- Chronic Toxicological Effects:** Not classified.
- Carcinogenicity:** NTP? No IARC Monographs? No OSHA Regulated? No

CAS #	Hazardous Components (Chemical Name)	NTP	IARC	ACGIH	OSHA
1333-74-0	Hydrogen, compressed	n.a.	n.a.	n.a.	n.a.

SECTION 12. ECOLOGICAL INFORMATION

- 12.1 Toxicity:** No ecological damage caused by this product.
- 12.2 Persistence and Degradability:** No ecological damage caused by this product.
- 12.3 Bioaccumulative Potential:** No bioaccumulation expected.
- 12.4 Mobility in Soil:** No data available.
- 12.5 Results of PBT and vPvB assessment:** No ecological damage caused by this product.
- 12.6 Other adverse effects:** No ecological damage caused by this product.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste Disposal Method: Dispose of contents and containers in accordance with local, regional, national, and international regulations. Contact supplier for any special requirements.

SECTION 14. TRANSPORT INFORMATION**14.1 LAND TRANSPORT (US DOT):**

DOT Proper Shipping Name: Hydrogen, compressed.

DOT Special Provisions (49CFR 172.102): N89 - When steel UN pressure receptacles are used, only those bearing the "H" mark are authorized.

DOT Hazard Class: 2.1 FLAMMABLE GAS

UN/NA Number: UN1049

Precautionary Label: ERG Number: 115 (UN1049)

**14.1 LAND TRANSPORT (Canadian TDG):**

TDG Shipping Name:

UN Number: 1049

Hazard Class: 2.1 - FLAMMABLE GAS **TDG Classification:**

14.1 LAND TRANSPORT (European ADR/RID):

ADR/RID Shipping Name:

UN Number: 1049

Hazard Class: 2.1 - FLAMMABLE GAS

14.2 MARINE TRANSPORT (IMDG/IMO):

IMDG/IMO Shipping Name: Hydrogen, compressed.

UN Number: 1049

Hazard Class: 2.1 - FLAMMABLE GAS **Packing Group:** 2-Gas

IMDG Classification: 2-Gas

IMDG MFAG Number: 115

IMDG EMS Page:

14.3 AIR TRANSPORT (ICAO/IATA):

ICAO/IATA Shipping Name: Hydrogen, compressed.

UN Number: 1049

Hazard Class: 2.1 - FLAMMABLE GAS **Packing Group:** 2

IATA Classification: 2

Additional Transport Information: Civil Aeronautics Law: Gases under pressure/Gases nonflammable nontoxic under pressure.

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 cylinder 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.

SECTION 15. REGULATORY INFORMATION

EPA SARA (Superfund Amendments and Reauthorization Act of 1986) Lists

CAS #	Hazardous Components (Chemical Name)	S. 302 (EHS)	S. 304 RQ	S. 313 (TRI)
1333-74-0	Hydrogen, compressed	No	No	No
CAS #	Hazardous Components (Chemical Name)	Canadian NPRI	Canadian Toxic	Canadian DSL
1333-74-0	Hydrogen, compressed	No	No	Yes
CAS #	Hazardous Components (Chemical Name)	Other US EPA or State Lists		
1333-74-0	Hydrogen, compressed	CAA HAP,ODC: No; CWA NPDES: No; TSCA: Yes - Inventory; CA PROP.65: No; CA TAC, Title 8: Title 8; MA Oil/HazMat: Yes; MI CMR, Part 5: No; NC TAP: No; NJ EHS: Yes - 1010; NY Part 597: No; PA HSL: Yes - 1; SC TAP: No; WI Air: No		
CAS #	Hazardous Components (Chemical Name)	International Regulatory Lists		
1333-74-0	Hydrogen, compressed	Mexico INSQ: Yes - 1049; Australia ICS: Yes; New Zealand IOC: Yes; China IECSC: Yes; Japan ENCS: No; Japan PDSCL: No; Japan PACS: No; Japan ISHL: No; Korea ECL: Yes - KE-20137; Philippines ICCS: Yes		

Regulatory Information: SARA Section 311/312 Hazard Classes:

Fire hazard

Sudden release of pressure hazard.

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

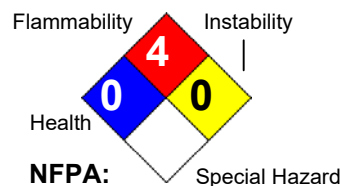
California Proposition 65: This material does not contain any chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm at concentrations that trigger the requirements of California Proposition 65.

SECTION 16. OTHER INFORMATION

Revision Date: 10/12/2020

Hazard Rating System:

HEALTH	0
FLAMMABILITY	4
PHYSICAL	3
PPE	



HMIS:

Additional Information: 10/12/2020 Routine review and updates to section 2,9,11

When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product.

Users of this product are asked to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and

customers of the product hazards and safety information.

NFPA Health Hazard:0 - Materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials

NFPA Fire Hazard: 4 - Will rapidly or completely vaporize at normal pressure and temperature, or is readily dispersed in air and will burn readily.

NFPA Reactivity Hazard: 0 - Material that in themselves are normally stable, even under fire conditions.

HMIS III Ratings:

Health: 0 - Minimal Hazard - No significant risk to health

Flammability: 0 - Severe Hazard

Physical: 3 - Serious Hazard.

**Company Policy or
Disclaimer:**

The information, recommendations, and suggestions herein were compiled from reference material and other sources believed to be reliable. However, the SDS's accuracy or completeness is not guaranteed by Gas Innovations or its affiliates, nor is any responsibility assumed or implied for any loss or damage resulting from inaccuracies or omissions. Since conditions of use are beyond our control, no warranties of merchantability of fitness for a particular purpose are expressed or implied. This SDS is not intended as a license to operate under, or a recommendation to infringe on, any patents. Appropriate warnings and safe handling procedures should be provided to handlers and users.