** *Section 1 - IDENTIFICATION* * *

Manufacturer Information  
MATHESON TRI-GAS, INC.  
150 Allen Road, Suite 302  
Basking Ridge, NJ 07920  
General Information: 1-800-416-2505  
Emergency #: 1-800-424-9300 (CHEMTREC)  
Outside the US: 703-527-3887 (Call collect)

Product Identifier: Hydrogen UHP

Trade Names/Synonyms  
Hydrogen, compressed; Hydrogen (H2); Dihydrogen

Chemical Family  
inorganic, gas

Product Use  
industrial

Restrictions on Use  
None known.

** *Section 2 - HAZARDS IDENTIFICATION* * *

GHS Classification  
Flammable gas, Category 1  
Gas under pressure, Compressed gas  
Acute Toxicity (Inhalation), Category 4

GHS LABEL ELEMENTS  
Symbol(s)

Signal Word  
DANGER

Hazard Statement(s)  
Extremely flammable gas  
Contains gas under pressure; may explode if heated  
Harmful if inhaled

Precautionary Statement(s)  
Prevention  
Keep away from heat, sparks, open flame, and hot surfaces - No smoking. Avoid breathing gas. Use only outdoors or in a well-ventilated area.

Response  
Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.
Storage

Store in a well-ventilated place. Protect from sunlight.

Other Hazards which do not Result in Classification

May cause asphyxia. May cause frostbite upon sudden release of compressed gas.

** *Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS* **

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Component</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1333-74-0</td>
<td>Hydrogen</td>
<td>100</td>
</tr>
</tbody>
</table>

** *Section 4 - FIRST AID MEASURES* **

Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin

Wash exposed skin with soap and water. If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

Eyes

Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Ingestion

If a large amount is swallowed, get medical attention.

Note to Physicians

For inhalation, consider oxygen.

Symptoms: Immediate

frostbite, suffocation

Symptoms: Delayed

No information on significant adverse effects.

** *Section 5 - FIRE FIGHTING MEASURES* **

See Section 9 for Flammability Properties

Specific Hazards Arising from the Chemical

Severe fire hazard. Severe explosion hazard. Vapor/air mixtures are explosive. Pressurized containers may rupture or explode if exposed to sufficient heat. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion. Burns with invisible flame.

Extinguishing Media

- carbon dioxide, regular dry chemical
- Large fires: Flood with fine water spray.

Unsuitable Extinguishing Media

None known.

Protective Equipment and Precautions for Firefighters

Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.
Fire Fighting Measures
Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately. For smaller tanks or cylinders, extinguish and isolate from other flammables. Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Evacuate if fire gets out of control or containers are directly exposed to fire. Evacuation radius: 500 meters (1/3 mile). Consider downwind evacuation if material is leaking. Stop flow of gas.

** **Section 6 - ACCIDENTAL RELEASE MEASURES** **

Personal Precautions
Wear personal protective clothing and equipment, see Section 8.

Environmental Precautions
Avoid release to the environment.

Methods for Containment
Keep unnecessary people away, isolate hazard area and deny entry. Remove sources of ignition. Ventilate closed spaces before entering.

Cleanup Methods
Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Stop leak if possible without personal risk. Reduce vapors with water spray.

** **Section 7 - HANDLING AND STORAGE** **

Handling Procedures
Wash thoroughly after handling.

Storage Procedures

Incompatibilities combustible materials, halo carbons, halogens, metal oxides, metal salts, metals, oxidizing materials

** **Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION** **

Component Exposure Limits
Hydrogen (1333-74-0)
ACGIH: Simple asphyxiant (See Appendix F: Minimal Oxygen Content)

Component Biological Limit Values
There are no biological limit values for any of this product's components.

Engineering Controls
Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.
PERSONAL PROTECTIVE EQUIPMENT

Eyes/Face
For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Protective Clothing
For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.

Glove Recommendations
For the gas: Protective gloves are not required, but recommended. For the liquid: Wear insulated gloves.

Respiratory Protection
Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use.

For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

** Section 9 - PHYSICAL AND CHEMICAL PROPERTIES **

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<tr>
<th>Physical State:</th>
<th>Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color:</td>
<td>colorless</td>
</tr>
<tr>
<td>Odor:</td>
<td>odorless</td>
</tr>
<tr>
<td>Taste:</td>
<td>tasteless</td>
</tr>
<tr>
<td>Melting/Freezing Point:</td>
<td>-259 °C</td>
</tr>
<tr>
<td>Flash Point:</td>
<td>flammable</td>
</tr>
<tr>
<td>Evaporation Rate:</td>
<td>Not available</td>
</tr>
<tr>
<td>UEL:</td>
<td>75 %</td>
</tr>
<tr>
<td>Vapor Density (air = 1):</td>
<td>0.07</td>
</tr>
<tr>
<td>Water Solubility:</td>
<td>1.82 % @ 20 °C</td>
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<tr>
<td>Coeff. Water/Oil Dist:</td>
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<tr>
<td>Viscosity:</td>
<td>0.008957 cP @26.8 °C</td>
</tr>
<tr>
<td>Molecular Formula:</td>
<td>H2</td>
</tr>
</tbody>
</table>

Solvent Solubility
Slightly Soluble: alcohol, ether

** Section 10 - STABILITY AND REACTIVITY **

Chemical Stability
Stable at normal temperatures and pressure.

Conditions to Avoid
Avoid heat, flames, sparks and other sources of ignition. Minimize contact with material. Containers may rupture or explode if exposed to heat.

Possibility of Hazardous Reactions
Will not polymerize.
Incompatible Materials
combustible materials, halo carbons, halogens, metal oxides, metal salts, metals, oxidizing materials

Decomposition Products
miscellaneous decomposition products

* * *Section 11 - TOXICOLOGICAL INFORMATION* * *

Acute and Chronic Toxicity

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:

- **Hydrogen (1333-74-0)**
  - Inhalation LC50 Rat >15000 ppm 1 h

RTECS Acute Toxicity (selected)
The components of this material have been reviewed and RTECS publishes no data as of the date on this document.

Immediate Effects
frostbite, suffocation

Delayed Effects
No information on significant adverse effects.

Irritation/Corrosivity Data
No animal testing data available for skin or eyes.

RTECS Irritation
The components of this material have been reviewed and RTECS publishes no data as of the date on this document.

Respiratory Sensitizer
No data available.

Dermal Sensitizer
No data available.

Carcinogenicity
Component Carcinogenicity
None of this product's components are listed by ACGIH, IARC, NTP, OSHA or DFG.

Mutagenic Data
No data available.

RTECS Mutagenic
The components of this material have been reviewed, and RTECS publishes data for one or more components.

Reproductive Effects Data
No data available.

Tumorigenic Data
No data available.

RTECS Tumorigenic
The components of this material have been reviewed, and RTECS publishes data for one or more components.

Specific Target Organ Toxicity - Single Exposure
No data available.

Specific Target Organ Toxicity - Repeated Exposure
No data available.

Aspiration Hazard
Not applicable.
Medical Conditions Aggravated by Exposure
None known.

***Section 12 - ECOLOGICAL INFORMATION***

Component Analysis - Aquatic Toxicity
No LOLO ecotoxicity data are available for this product's components.

Persistence and Degradability
No data available.

Bioaccumulative Potential
No data available.

Mobility in Environmental Media
No data available.

***Section 13 - DISPOSAL CONSIDERATIONS***

Disposal Methods
Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

Component Waste Numbers
The U.S. EPA has not published waste numbers for this product's components.

***Section 14 - TRANSPORT INFORMATION***

US DOT Information
Shipping Name: Hydrogen, compressed
UN/NA #: UN1049  Hazard Class: 2.1
Required Label(s): 2.1

IMDG Information
Shipping Name: Hydrogen, compressed
UN #: UN1049  Hazard Class: 2.1

***Section 15 - REGULATORY INFORMATION***

Component Analysis
U.S. Federal Regulations
None of this product's components are listed under SARA Sections 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), or require an OSHA process safety plan.

SARA 311/312 Hazardous Categories

Acute Health: Yes  Chronic Health: No  Fire: Yes  Pressure: Yes  Reactive: No

U.S. State Regulations
The following components appear on one or more of the following state hazardous substances lists:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>CA</th>
<th>MA</th>
<th>MN</th>
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<tr>
<td>Hydrogen</td>
<td>1333-74-0</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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</table>

Not regulated under California Proposition 65

Component Analysis - Inventory

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
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<th>CA</th>
<th>EU</th>
<th>AU</th>
<th>PH</th>
<th>JP</th>
<th>KR</th>
<th>CN</th>
<th>NZ</th>
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<tbody>
<tr>
<td>Hydrogen</td>
<td>1333-74-0</td>
<td>Yes</td>
<td>DSL</td>
<td>EIN</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
**Section 16 - OTHER INFORMATION**

**NFPA Ratings:** Health: 2  Fire: 4  Reactivity: 0
Hazard Scale: 0 = Minimal  1 = Slight  2 = Moderate  3 = Serious  4 = Severe

**Key / Legend**
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

**Other Information**
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End of Sheet 00244243