

This product safety summary is intended to provide a general overview of the chemical substance in the context of ICCA global product strategy. It is not intended to provide emergency response, medical or treatment information, nor to provide an overview of all safety and health information. This summary is not intended to replace the Safety Data Sheet. For detailed guidance on the use or regulatory status of this substance, please consult the Safety Data Sheet.

**A. CHEMICAL PRODUCT IDENTIFICATION:**

|                   |                    |
|-------------------|--------------------|
| Product Name      | Hydrogen           |
| Synonyms          | Hydrogen           |
| IUPAC Name        | Molecular hydrogen |
| CAS NO            | 1333-74-0          |
| E C No            | 215-605-7          |
| Molecular Formula | H <sub>2</sub>     |

**B. USES AND APPLICATIONS:**

- ✓ Outside of combustion for heat and CHP it has an application as fuel for hydrogen fuel cells (which will be described in Uses of Hydrogen: Part 2) which may be used, for example, in trains, cars, buses, submarines, bikes and laptops. Hydrogen is used to make other chemicals and in oxyhydrogen welding and cutting.
- ✓ Huge quantities of hydrogen are consumed in the catalytic hydrogenation of unsaturated vegetable oils to obtain solid fat. Hydrogenation is used in the manufacture of organic chemical products. Huge quantities of hydrogen are used as rocket fuels, in combination with oxygen or fluor, and as a rocket propellant propelled by nuclear energy.

**C. PHYSICAL / CHEMICAL PROPERTIES:**

| Properties                    | Value         |
|-------------------------------|---------------|
| Physical state and appearance | Colorless Gas |
| Odor                          | Odorless      |
| Molecular Weigh               | 2 g/mole      |
| Color:                        | Colorless     |

|                       |                                       |
|-----------------------|---------------------------------------|
| Boiling Point         | -253°C / -423.4°F                     |
| Melting Point / Range | -259°C / -434.2°F                     |
| Flash Point           | No information available              |
| Specific Gravity      | 0.07                                  |
| Critical Temperature  | -240°C/-400°F                         |
| Relative Density      | 0.07                                  |
| Vapor Pressure        | Not applicable                        |
| Vapor Density         | Not applicable                        |
| Volatility            | No information available              |
| Odor Threshold        | No information available              |
| Partition Coefficient | Not applicable for inorganic products |
| Water Solubility      | 1.62 mg/l                             |
| Flammability          | Extremely flammable gas               |

#### **D. HEALTH EFFECTS:**

| Effect Assessment  | Value   |
|--|---|
| <b>Acute Toxicity</b><br><b>Oral / Inhalation / Dermal</b>                   | ORAL LD50: Not classified<br>DERMAL LD50: Not classified<br>INHALATION LC50: Not classified<br><br>Based on available information, According to GHS product is not classified as Acutely Toxic. |
| <b>Irritation / Corrosion</b><br><b>Skin / Eye/ Respiratory tract</b>        | No known effects from this product.   |
| <b>Sensitisation</b>   | No known effects from this product.   |
| <b>Toxicity after repeated exposure</b><br><b>Oral / Inhalation / Dermal</b> | No known effects from this product.   |
| <b>Genotoxicity / Mutagenicity</b>   | No known effects from this product.   |
| <b>Carcinogenicity</b>   | No known effects from this product.   |
| <b>Toxicity for reproduction</b>   | Hydrogen is not expected to cause adverse No known effects from this product.   |

**E. ENVIRONMENTAL EFFECTS:**

- ✓ Emissions of hydrogen lead to increased burdens of methane and ozone and hence to an increase in global warming. Therefore, hydrogen can be considered as an indirect greenhouse gas with the potential to increase global warming.

| Effect Assessment | Value  |
|-------------------|--|
| Aquatic Toxicity  | Toxicity to Fish LC50: Not classified<br>Toxicity to aquatic Invertebrate EC50: Not classified<br>Toxicity to Algae EC10: Not classified<br><br>Based on available information, According to GHS product is not classified for Aquatic Toxicity. |

| Fate and behaviour      | Value              |
|-------------------------|--------------------|
| Degradation/Persistence | No data available. |
| Bio-accumulation        | No data available. |
| PBT/vPvB conclusion     | No data available. |

\*: Persistent, Bio accumulative and Toxic (PBT)

\*\* : very Persistent and very Bio accumulative (vPvB)

**F. EXPOSURE :**

| Human health |  |
|--------------|--|
| Consumers    | Fuels and related products<br>Water treatment products   |
| Workers      | Hydrogen is a simple asphyxiate. Contact with liquid hydrogen will cause frostbite or severe burns of the skin. Hydrogen-rich water has been tested for treating oxidative stress-induced disorders because of its reactive oxygen species scavenging abilities. Hydrogen therapy may be an effective and specific innovative treatment for exercise-induced oxidative stress and sports injury, with potential for the improvement of exercise performance. |

| Environment  |
|--|
| The impact on air quality; potential migration in air, soil or water; effects on animal, aquatic and plant life; and conformance with environmental and public health regulations. |



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**G. RISK MANAGEMENT MEASURES:**

| Effect          | Value  |
|-----------------|--|
| Eyes            | Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Get immediate medical attention.  |
| Skin protection | Adverse effects not expected from this product.  |
| Ingestion       | Immediately flush eyes thoroughly with 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 attention.  |
| Inhalation      | In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped. |

**H. PERSONAL PROTECTIVE EQUIPMENT AND EMERGENCY MEASURES:**

| Effect                           | Value  |
|----------------------------------|--|
| Engineering controls             | Use with adequate ventilation to maintain oxygen levels above 19.5% in the workplace. Local exhaust ventilation is preferred, because it prevents Hydrogen dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of oxygen and the presence of potentially explosive air-gas mixtures. Monitoring devices should be installed near the ceiling. |
| Special risks , Specific hazards | Contains gas under pressure. Extremely flammable gas. Burns with invisible fire. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.  |
| Personnel Protective             | Eye/Face protection<br>Wear safety glasses with side shields. Standard EN 166 - Personal eye-protection.   |



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|           |                        |   |
|-----------|------------------------|---|
| equipment | Skin protection        | Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.   |
|           | Hand protection        | Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risk.  |
|           | Respiratory protection | Maintain oxygen levels above 19.5% in the workplace. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93 and applicable standards of Canadian Provinces. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-face piece pressure/demand SCBA or a full face piece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). |

## **I. ACCIDENTAL RELEASE MEASURES:**


- ✓ Use proper personal protective equipment (pl refer MSDS)
- ✓ Person Precautions: 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.
- ✓ Environmental precautions: Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- ✓ Spill cleanup measures: Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

**J. FIRE FIGHTING MEASURES:**

|                              |  |
|------------------------------|--|
| Suitable Extinguishing Media | Carbon dioxide, dry chemical powder, water spray, fog. |
|------------------------------|--|

**K. CLASSIFICATION AND LABELLING:**

Under GHS substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the eSDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use. Substances registered for REACH are classified according CLP (EC) 1272/2008, implementation of the GHS in the European Union.

|   |  |
|---|--|
| Classification<br>H220<br>H280  | Flammable gases: Category 1<br>Gases under pressure: Compressed gas  |
| Pictogram   |    |
| Signal Word   | Danger   |
| Hazard statements<br>H220<br>H280   | Extremely flammable gas.<br>Contains gas under pressure; may explode if heated.  |
| Precautionary statements<br>P210<br><br>P377<br><br>P381<br>P410+P403<br><br>P501 | Keep away from heat/open flames/hot surfaces – No smoking response.<br>Leaking gas fire; do not extinguish unless leak can be stopped safely.<br>Eliminate all ignition sources if safe to do so.<br>Protect from sunlight. Store in a well-ventilated place.<br>Dispose of content/container to an approved waste disposal plant. |



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**L. BASIC TRANSPORT INFORMATION:**

| DOT / TDG/ IATA/ IMDG/IMO |                      |
|---------------------------|----------------------|
| UN No.                    | UN1049               |
| Proper shipping Name      | HYDROGEN, COMPRESSED |
| Technical name            | HYDROGEN, COMPRESSED |
| Hazard Class              | 2.1                  |
| Packaging Group           | P200                 |
| Environmental Hazard      | No                   |

**M. REGULATORY INFORMATION:**

✓ **International Inventories**

|                |          |
|----------------|----------|
| TSCA           | Complies |
| EINECS/ ELINCS | Complies |
| DSL/NDSL       | Complies |
| PICCS          | Complies |
| ENCS           | Complies |
| IECSC          | Complies |
| AICS           | Complies |
| KECL           | Complies |

**Legend**

**TSCA** - United States Toxic Substances Control Act Section 8(b) Inventory

**DSL/NDSL** - Canadian Domestic Substances List/Non-Domestic Substances List

**EINECS/ELINCS** - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

**PICCS** - Philippines Inventory of Chemicals and Chemical Substances

**ENCS** - Japan Existing and New Chemical Substances

**IECSC** - China Inventory of Existing Chemical Substances

**AICS** - Australian Inventory of Chemical Substances

**KECL** - Korean Existing and Evaluated Chemical Substances



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**N. CONCLUSIONS:**

- ✓ Hydrogen is used for fuel cell. It is also consumed in the catalytic hydrogenation of unsaturated vegetable oils to obtain solid fat.
- ✓ Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Get immediate medical attention.
- ✓ By applying the appropriate Risk Management measures the concentrations to be expected at workplaces and to the general public are below recommended exposure limits

**O. CONTACT INFORMATION:**

|                |   |
|----------------|---|
| Company Name   | GUJARAT FLUOROCHEMICALS LIMITED   |
| Address        | 12/A, GIDC Dahej Industrial Estate,<br>Taluka: Vagra, Bharuch 392 130, Gujarat, India |
| Business Phone | +91 – 2641 – 618031, 248152   |
| Business Fax   | +91 – 2641 – 618012   |
| Web Site       | <a href="http://www.gfl.co.in">www.gfl.co.in</a>                                      |

**P. DISCLAIMER:**

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