

# SAFETY DATA SHEET

Classified in accordance with Health Canada Hazardous Products Regulations (SOR/2015-17)

## 1. Identification

**Product identifier:** Hydrogen Gas - Joffre**Other means of identification****Common name(s),** H<sub>2</sub>, Hydrogen Gas**synonym(s):****SDS number:** NOVA-0019**Recommended use and restriction on use****Recommended use:** Fuel gas, petrochemical feedstock and purified hydrogen applications.**Restrictions on use:** All uses other than the identified.**Manufacturer/Importer/Supplier/Distributor Information****Manufacturer**

Company Name: NOVA Chemicals  
Address: P.O. Box 2518, Station M  
Calgary, Alberta, Canada T2P 5C6  
Telephone: Product Information: 1-412-490-4063  
SDS Information Email: [msdsemail@novachem.com](mailto:msdsemail@novachem.com)

**Emergency telephone number:**

1-800-561-6682, 1-403-314-8767 (NOVA Chemicals) (24 hours)

## 2. Hazard(s) identification

**Hazard Classification According to Hazardous Products Regulations****Physical Hazards**

|                      |                |
|----------------------|----------------|
| Flammable gas        | Category 1     |
| Gases under pressure | Compressed gas |
| Simple asphyxiant    | Category 1     |

**Label Elements****Hazard Symbol:****Signal Word:** Danger**Hazard Statement:** Extremely flammable gas.  
Contains gas under pressure; may explode if heated.  
May displace oxygen and cause rapid suffocation.**Precautionary Statements:****Prevention:** Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Use only outdoors or in a well-ventilated area.

- Response:** Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leakage, eliminate all ignition sources.
- Storage:** Protect from sunlight. Store in a well-ventilated place.
- Disposal:** Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

**Other hazards which do not result in GHS classification:** Contact with pressurized gas may cause irritation and/or frostbite.

### 3. Composition/information on ingredients

#### Mixtures

| Chemical Identity | Common name and synonyms | CAS number | Content in percent (%)* |
|-------------------|--------------------------|------------|-------------------------|
| Hydrogen          | Hydrogen gas             | 1333-74-0  | >=99.6%                 |
| Methane           | Methyl hydride           | 74-82-8    | 0.4%                    |

\* All concentrations are percent by weight.

**Additional Information:** This product is considered hazardous by the Hazardous Products Regulations, 2015.

### 4. First-aid measures

- Inhalation:** IF INHALED: Remove person to fresh air and keep comfortable for breathing. Seek medical attention.
- Ingestion:** Ingestion of this product is not a likely route of exposure. Do NOT induce vomiting. Seek medical attention.
- Skin Contact:** Contact with pressurized gas may cause irritation and/or frostbite. Seek medical attention immediately in the event of frostbite. IF ON SKIN: Wash with plenty of soap and water. Seek medical attention.
- Eye contact:** Contact with pressurized gas may cause irritation and/or frostbite. Seek medical attention immediately in the event of frostbite. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical attention.

#### Most important symptoms/effects, acute and delayed

**Symptoms:** Frostbite or burns, at high concentration - suffocation.

#### Indication of immediate medical attention and special treatment needed

**Treatment:** For more detailed medical emergency support information, call 1-800-561-6682 or 1-403-314-8767 (24 hours, NOVA Chemicals Emergency Response). Treat unconsciousness, frostbite, nausea, hypotension, seizures and cardiac arrhythmias in the conventional manner. Sympathomimetics or catecholamines should be avoided or used with caution (lowest effective dose) because of possible cardiac sensitization. Administer oxygen by mask if there is respiratory distress.

**5. Fire-fighting measures**

**General Fire Hazards:** Extremely flammable gas. Hydrogen gas has an extremely wide flammability range. Hydrogen burns with an invisible to pale blue flame that is often very difficult to see. Gas may travel considerable distance to a source of ignition and flash back. **DO NOT ATTEMPT TO EXTINGUISH A GAS FIRE UNLESS LEAK SOURCE CAN BE ISOLATED AND SHUT OFF.** Be aware of possibility of reignition. Gas may form explosive mixture with air. Consider need for immediate emergency isolation and evacuation. If a pipeline or a storage vessel is involved in a fire, **ISOLATE** for 1600 metres (1 mile) in all directions. Keep containers away from source of heat or fire. Contains gas under pressure; may explode if heated.

**Suitable (and unsuitable) extinguishing media**

**Suitable extinguishing media:** Use dry chemical, foam, carbon dioxide (CO<sub>2</sub>), water spray or fog to extinguish. Use water to cool fire-exposed containers and to protect personnel.

**Unsuitable extinguishing media:** Do not use water jet as an extinguisher, as this will spread the fire.

**Specific hazards arising from the chemical:** None known.

**Special protective equipment and precautions for firefighters**

**Special fire fighting procedures:** **DO NOT ATTEMPT TO EXTINGUISH A GAS FIRE UNLESS LEAK SOURCE CAN BE ISOLATED AND SHUT OFF.** Hydrogen burns with an invisible to pale blue flame that is often very difficult to see. Keep upwind. Keep unauthorized personnel away. Move containers from fire area if you can do so without risk. Fight fire from maximum distance or use unmanned holders or monitor nozzles. Immediately withdraw in case of fire and container venting or heat discolouration of a container. Let uncontrolled fires burn off. Avoid inhaling any smoke and combustion materials. Remove and isolate contaminated clothing and shoes. Cool containers with flooding quantities of water until well after the fire is out. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Reference Emergency Response Guidebook No. 115 for additional details and instructions.

**Special protective equipment for firefighters:** Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

**6. Accidental release measures**

**Personal precautions, protective equipment and emergency procedures:** Isolate area. Keep unauthorized personnel away. Alert stand-by emergency and fire fighting personnel. Monitor surrounding area for buildup of flammable concentrations in air.

**Methods and material for containment and cleaning up:** Wear appropriate personal protective equipment. Do not touch or walk through spilled material. In case of leakage, eliminate all ignition sources. Keep upwind. Keep out of low areas. Stop leak if safe to do so. Released gas will rapidly dissipate upwards into the atmosphere. All equipment used when handling the product must be grounded. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Keep area isolated until any detectable flammable gas has been fully dispersed. Check oxygen and flammable gas levels prior to entering confined spaces or buildings. Check for gas pockets under roofs or at high ends of equipment.

Small Spills: Isolate spill or leak area for 50 to 100 metres (164 to 330 feet).

Large Spills: Consider initial downwind evacuation for at least 800 metres (1/2 mile). Evacuate personnel to upwind of the spill area, and position at a safe distance. Use water spray to reduce gas or divert gas cloud drift.

## 7. Handling and storage

|  |   |
|--|---|
| <b>Precautions for safe handling:</b>                                | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. For additional information on equipment bonding and grounding, refer to the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity". Take special precautions when cold cutting or breaking into lines, or when cleaning and disposing of empty containers. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection. |
| <b>Conditions for safe storage, including any incompatibilities:</b> | Protect from sunlight. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Only allow access to authorized persons. Store and handle in properly designed pressure vessels and equipment. Store and use away from heat, sparks, open flame, or any other ignition source. Have appropriate extinguishing capability in storage area (e.g. sprinkler system, portable fire extinguishers) and flammable gas detectors. Storage pressure vessels should be above ground and diked. Store away from incompatible materials. Store according to applicable regulations and standards for flammable materials. Keep cylinders secure while in storage or in transportation.  |

## 8. Exposure controls/personal protection

### Control Parameters

#### Occupational Exposure Limits

In the ACGIH TLVs® and BEIs® book, hydrogen (CAS# 1333-74-0) and methane (CAS# 74-82-8) have been identified as "Simple asphyxiant" and "Explosion hazard". Please refer to the ACGIH TLVs® and BEIs® book, latest edition, for additional information.

#### Appropriate Engineering Controls

Engineering methods to reduce hazardous exposure are preferred controls. Methods include mechanical ventilation (dilution and local exhaust) process or personal enclosure, remote and automated operation, control of process conditions, leak detection and repair systems, and other process modifications. Ensure all exhaust ventilation systems are discharged to outdoors, away from air intakes and ignition sources. Supply sufficient replacement air to make up for air removed by exhaust systems. Administrative (procedure) controls and use of personal protective equipment may also be required.

### Individual protection measures, such as personal protective equipment

|                             |   |
|-----------------------------|---|
| <b>General information:</b> | Personal protective equipment (PPE) should not be considered a long-term solution to exposure control. Employer programs to properly select, fit, maintain and train employees to use equipment must accompany PPE. Consult a competent industrial hygiene resource, the PPE manufacturer's recommendation, and/or applicable regulations to determine hazard potential and ensure adequate protection. |
| <b>Eye/face protection:</b> | Safety glasses. Chemical goggles under a full-face shield are recommended when handling hydrogen under pressure.  |

**Skin Protection****Hand Protection:** Wear protective gloves. Wear cold insulating gloves.**Skin and Body Protection:**

Wear appropriate clothing to prevent any possibility of skin contact. Wear work clothes with long sleeves and pants. Fire resistant (i.e., Nomex) or natural fibre clothing (i.e., cotton or wool) is recommended. Synthetic clothing can generate static electricity and is not recommended where a flammable vapour release may occur. Wear chemical-resistant safety footwear with good traction to prevent slipping. Static Dissipative (SD) rated footwear is also recommended.

**Respiratory Protection:** Air supplied breathing apparatus must be used when oxygen concentrations are low.**Hygiene measures:** Use effective control measures and PPE to maintain worker exposure to concentrations that are below these limits. Ensure that eyewash stations and safety showers are in close proximity to work locations.**9. Physical and chemical properties****Appearance**

|  |   |
|--|---|
| <b>Physical state:</b>                                       | Gas   |
| <b>Form:</b>   | Compressed gas                                |
| <b>Colour:</b>   | Colourless                                    |
| <b>Odour:</b>  | Odourless                                     |
| <b>Odour Threshold:</b>                                      | No data available.                            |
| <b>pH:</b>   | not applicable                                |
| <b>Melting point/freezing point:</b>                         | -259 °C (-434 °F)                             |
| <b>Initial boiling point and boiling range:</b>              | -252.8 °C (-423.0 °F)                         |
| <b>Flash Point:</b>  | < -50 °C (< -58 °F)                           |
| <b>Evaporation rate:</b>                                     | not applicable                                |
| <b>Flammability (solid, gas):</b>                            | Extremely flammable.                          |
| <b>Upper/lower limit on flammability or explosive limits</b> |   |
| <b>Flammability limit - upper (%):</b>                       | 74.5 %(V)                                     |
| <b>Flammability limit - lower(%):</b>                        | 4 %(V)  |
| <b>Vapour pressure:</b>                                      | not applicable                                |
| <b>Vapour density:</b>                                       | 0.07 (15 °C (59 °F)) 101.3 kPa                |
| <b>Density:</b>  | not applicable                                |
| <b>Relative density:</b>                                     | not applicable                                |
| <b>Solubility(ies)</b>                                       |   |
| <b>Solubility in water:</b>                                  | Slightly soluble                              |
| <b>Solubility (other):</b>                                   | Slightly soluble in ethanol and diethyl ether |
| <b>Partition coefficient (n-octanol/water):</b>              | 0.45 (estimated) Log P(oct)                   |
| <b>Auto-ignition temperature:</b>                            | 570 °C (1058 °F)                              |
| <b>Decomposition temperature:</b>                            | not applicable                                |
| <b>Viscosity:</b>  | not applicable                                |

**10. Stability and reactivity**

|                                 |  |
|---------------------------------|--|
| <b>Reactivity:</b>              | May react explosively with halogen compounds, finely divided platinum, lithium, chlorine trifluoride, nitrogen trifluoride, oxygen difluoride. |
| <b>Chemical Stability:</b>      | Material is stable under normal conditions.  |
| <b>Possibility of Hazardous</b> | May react explosively with halogen compounds, finely divided platinum,   |

|  |   |
|--|---|
| <b>Reactions:</b>                        | lithium, chlorine trifluoride, nitrogen trifluoride, oxygen difluoride.   |
| <b>Conditions to Avoid:</b>              | Keep away from heat, sparks and open flame.   |
| <b>Incompatible Materials:</b>           | Strong oxidizing agents. Carefully select and test equipment, gaskets and hoses periodically to ensure integrity and compatibility. |
| <b>Hazardous Decomposition Products:</b> | None known.   |

## 11. Toxicological information

### Information on likely routes of exposure

|                      |  |
|----------------------|--|
| <b>Inhalation:</b>   | Product is not acutely toxic. A very high concentration of hydrogen may displace oxygen and cause rapid suffocation. |
| <b>Ingestion:</b>    | Ingestion of this product is not a likely route of exposure.   |
| <b>Skin Contact:</b> | Hydrogen gas is not irritating to the skin. The compressed form will cause freezing burns (frostbite).               |
| <b>Eye contact:</b>  | Hydrogen gas is not irritating to the eyes. The compressed form will cause freezing burns (frostbite).               |

### Symptoms related to the physical, chemical and toxicological characteristics

|                      |   |
|----------------------|---|
| <b>Inhalation:</b>   | At high concentration, suffocation.               |
| <b>Ingestion:</b>    | No adverse effects due to ingestion are expected. |
| <b>Skin Contact:</b> | Frostbite or burns.                               |
| <b>Eye contact:</b>  | Frostbite or burns.                               |

### Information on toxicological effects

#### Acute toxicity (list all possible routes of exposure)

|                   |  |
|-------------------|--|
| <b>Oral</b>       |  |
| <b>Product:</b>   | Not classified for acute toxicity based on available data. |
| <b>Dermal</b>     |  |
| <b>Product:</b>   | Not classified for acute toxicity based on available data. |
| <b>Inhalation</b> |  |
| <b>Product:</b>   | Not classified for acute toxicity based on available data. |

#### Repeated dose toxicity

**Product:** No data available.

#### Skin Corrosion/Irritation

**Product:** No data available.

#### Components:

Methane Frostbite hazard - rapidly expanding gas or liquid may cause frostbite.

#### Serious Eye Damage/Eye Irritation

**Product:** No data available.

#### Components:

Methane Frostbite hazard - rapidly expanding gas or liquid may cause frostbite.

**Respiratory or Skin Sensitization****Product:** No data available.**Carcinogenicity****Product:** No data available.**IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:**

No carcinogenic components identified

**US. National Toxicology Program (NTP) Report on Carcinogens:**

No carcinogenic components identified

**ACGIH Carcinogen List:**

No carcinogenic components identified

**Germ Cell Mutagenicity****In vitro****Product:** There are no known or reported genetic effects.**In vivo****Product:** There are no known or reported genetic effects.**Reproductive toxicity****Product:** There are no known or reported reproductive effects.**Specific Target Organ Toxicity - Single Exposure****Product:** No data available.**Specific Target Organ Toxicity - Repeated Exposure****Product:** No data available.**Aspiration Hazard****Product:** Not classified.**Other effects:**

A very high concentration of hydrogen may displace oxygen and cause rapid suffocation.

**12. Ecological information****Ecotoxicity:****Acute hazards to the aquatic environment:****Fish****Product:** No data available.**Aquatic Invertebrates****Product:** No data available.**Toxicity to aquatic plants****Product:** No data available.**Chronic hazards to the aquatic environment:****Fish****Product:** No data available.**Aquatic Invertebrates****Product:** No data available.



**Toxicity to aquatic plants****Product:** No data available.**Persistence and Degradability****Biodegradation****Product:** No data available.**BOD/COD Ratio****Product:** No data available.**Bioaccumulative Potential****Bioconcentration Factor (BCF)****Product:** No data available.**Partition Coefficient n-octanol / water (log Kow)****Product:** 0.45 (estimated) Log P(oct)**Mobility in Soil:** not applicable**Other Adverse Effects:** No data available.**13. Disposal considerations****Disposal instructions:** Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal. Waste generator is advised to carefully consider hazardous properties and control measures needed for other materials that may be found in the waste.**Contaminated Packaging:** Check local, federal and provincial environmental regulations prior to disposal.**14. Transport information****TDG**

|                               |  |
|-------------------------------|--|
| UN Number:                    | UN 1049  |
| UN Proper Shipping Name:      | HYDROGEN, COMPRESSED   |
| Class                         | 2.1  |
| Packing Group                 | –  |
| Label(s)                      | 2.1  |
| Subsidiary risk label         | –  |
| Special precautions for user: | Reference Emergency Response Guidebook No. 115, latest revision. |

**15. Regulatory information****Canada Federal Regulations****List of Toxic Substances (CEPA, Schedule 1)****Chemical Identity**

Methane

**Export Control List (CEPA 1999, Schedule 3)**

Not regulated

**National Pollutant Release Inventory (NPRI)****Canada. Canadian Environmental Protection Act (CEPA). National Pollutant Release Inventory (NPRI) (Parts 1-4)**



NPRI

Methane

**Canada. National Pollutant Release Inventory (NPRI) Substances, Part 5, VOCs with Additional Reporting Requirements**

NPRI PT5

Not regulated

**Greenhouse Gases****Chemical Identity**

Methane

**Precursor Control Regulations**

Not regulated

**Canada. Substances Subject to Significant New Activity (SNAc) Reporting Requirements**

Not regulated

**Inventory status**

Canada DSL Inventory List: On or in compliance with the inventory

US TSCA Inventory: On or in compliance with the inventory

**16. Other information, including date of preparation or last revision****Issue Date:** 01/16/2020**Revision Information:** 01/16/2020: SDS Update**Version #:** 7.0

**Abbreviations and acronyms:** ACGIH = American Conference of Governmental Industrial Hygienists; BOD = Biochemical Oxygen Demand; CAS = Chemical Abstracts Service; CEPA = Canadian Environmental Protection Act; COD = Chemical Oxygen Demand; DSL = Domestic Substances List; EC50 = Effective Concentration 50%; EPA = Environmental Protection Agency; GHS = Globally Harmonized System for the Classification and Labelling of Chemicals; IARC = International Agency for Research on Cancer; IDLH = Immediately Dangerous to Life or Health; Kow = Octanol/water partition coefficient; LC50 = Lethal Concentration 50%; LD50 = Lethal Dose 50%; LEL = Lower Explosive Limit; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OEL = Occupational Exposure Limit; OSHA = Occupational Safety and Health Administration; PNOC = Particulates Not Otherwise Classified; PPE = Personal Protective Equipment; REL = Recommended Exposure Limit; SCBA = Self Contained Breathing Apparatus; SDS = Safety Data Sheet; STEL = Short Term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

**Further Information:** For additional information on equipment bonding and grounding, refer to the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity".

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