# SAFETY DATA SHEET

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

## 1. Identification

**Product identifier:** Ethylene

**Other means of identification**

**Common name(s), synonym(s):** Ethylene, Ethene

**SDS number:** NOVA-0017

**Recommended use and restriction on use**

**Recommended use:** Feedstock for chemical and polymer synthesis.

**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<br>Calgary, Alberta, Canada T2P 5C6 |
| Telephone: | Product Information: 1-412-490-4063 |
| SDS Information Email: | 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 |
| Simple asphyxiant | Category 1 |
| Gases under pressure | Liquefied gas |

**Health Hazards**

| | |
|---|---|
| Specific Target Organ Toxicity - Single Exposure | Category 3 |

**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.
May cause drowsiness or dizziness.

**Precautionary Statements:**

**Prevention:** Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Avoid breathing dust/fume/gas/mist/vapours/spray. Use only outdoors or in a well-ventilated area.

**Response:** IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTRE/doctor if you feel unwell. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leakage, eliminate all ignition sources.

**Storage:** Store in a well-ventilated place. Keep container tightly closed. Store locked up. Protect from sunlight.

**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 liquefied gas may cause irritation and/or frostbite.

## 3. Composition/information on ingredients

**Mixtures**

| Chemical Identity | Common name and synonyms | CAS number | Content in percent (%)* |
|---|---|---|---|
| Ethene | Ethylene | 74-85-1 | >99.9% |

* 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. Call a POISON CENTRE/doctor if you feel unwell.

**Ingestion:** Ingestion of this product is not a likely route of exposure. Do NOT induce vomiting. Seek medical attention.

**Skin Contact:** Contact with liquefied 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. Thaw frosted parts with lukewarm water. Do not rub affected area. Remove non-adhering contaminated clothing. Do not remove adherent material or clothing.

**Eye contact:** IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a doctor or poison control centre immediately.

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

**Symptoms:** Frostbite, headache, dizziness, nausea, confusion, loss of appetite, loss of consciousness, heartbeat irregularities, possible cardiac sensitization.

**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 liquefied gas. May form an explosive vapour cloud with potential to detonate. Vapours 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. Vapours may form explosive mixture with air. When pressure in a container needs to be controlled consider setting up emergency flaring. Consider need for immediate emergency isolation and evacuation for at least 800 metres (1/2 mile). 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. Containers may explode when heated and rocket away.

**Suitable (and unsuitable) extinguishing media**

**Suitable extinguishing media:** Dry chemical, foam, carbon dioxide, and water fog. Foam cover may help suppress evolution of flammable gas. 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. Adding water directly to pooled liquid will heat liquid and increase evolution of extremely flammable gas.

**Specific hazards arising from the chemical:** Upon combustion, this product emits carbon monoxide, carbon dioxide, low molecular weight hydrocarbons.

**Special protective equipment and precautions for firefighters**

**Special fire fighting procedures:** 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. 116P 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. 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.

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

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 vapours or divert vapour cloud drift. A vapour-suppressing foam may be used to reduce vapours. Accumulations of gas may persist in low areas. Isolate area until gas has dispersed.

## 7. Handling and storage

**Precautions for safe handling:**

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. Use explosion-proof [electrical/ventilating/lighting] equipment. Use non-sparking tools. Take action to prevent static discharges. These alone may be insufficient to remove static electricity. 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". Avoid breathing dust/fume/gas/mist/vapours/spray. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation, use respiratory protection. Where possible, collect and flare vents. Check for accumulation of liquids when breaking into pipelines. Liquid ethylene must first be drained and/or flared then the system depressured before opening pipes/equipment containing ethylene. If liquid ethylene is present when breaking flanges, the liquid will boil into a vapour cloud and will create severe cold temperatures (see Section 9). If used in refrigeration, check that drains are not plugged and valves are working and not plugged by ice formed from the vapourizing liquid.

**Conditions for safe storage, including any incompatibilities:**

This product can be stored as a flammable gas or liquid depending on the temperature and pressure. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Protect from sunlight. 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

| Chemical Identity | type | Exposure Limit Values | | Source |
|---|---|---|---|---|
| Ethene | TWA | 200 ppm | 229 mg/m3 | Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended |
| Ethene | TWA | 200 ppm | | Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) |

| | | | | |
|---|---|---|---|---|
| Ethene | TWA | 200 ppm | | Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended |
| Ethene | TWA | 200 ppm | | US. ACGIH Threshold Limit Values, as amended |

**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**

**General information:**

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.

**Eye/face protection:**

Safety glasses. Chemical goggles under a full-face shield are recommended if contact with liquefied gas is possible.

**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 or if airborne concentrations exceed OEL.

**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**

| | |
|---|---|
| **Physical state:** | Gas |
| **Form:** | Liquefied gas |
| **Colour:** | Colourless |
| **Odour:** | Sweet odour, Faint |
| **Odour Threshold:** | 270 - 420 ppm (detectable) |
| **pH:** | not applicable |
| **Melting point/freezing point:** | -169 °C (-272 °F) |
| **Initial boiling point and boiling range:** | -103.8 °C (-154.8 °F) |
| **Flash Point:** | -136 °C (-213 °F) |
| **Evaporation rate:** | Immediate at 20 °C (68 °F). |
| **Flammability (solid, gas):** | Extremely flammable. |

**Upper/lower limit on flammability or explosive limits**

| | |
|---|---|
| **Flammability limit - upper (%):** | 28.6 - 36 %(V) |
| **Flammability limit - lower(%):** | 2.3 - 3.02 %(V) |
| **Vapour pressure:** | 609 psia (0 °C (32 °F)) 735 psia (10 °C (50 °F)) (critical point) |
| **Vapour density:** | 0.974 (0 °C (32 °F)) 14 psia (Air=1) |
| **Density:** | 568 kg/m3 |
| **Relative density:** | 0.568 (-103.8 °C (-154.8 °F)) |
| **Solubility(ies)** | |
| **Solubility in water:** | 0.131 g/l (20 °C (68 °F)) |
| **Solubility (other):** | No data available. |
| **Partition coefficient (n-octanol/water):** | 1.13 |
| **Auto-ignition temperature:** | 425 °C (797 °F) |
| **Decomposition temperature:** | No data available. |
| **Viscosity:** | not applicable |

**Other information**

| | |
|---|---|
| **Minimum ignition energy:** | 0.07 mJ |
| **Molecular weight:** | 28.05 g/mol (C2H4) |

## 10. Stability and reactivity

| | |
|---|---|
| **Reactivity:** | This product is moderately reactive and may polymerize, decompose or become self-reactive under certain conditions of high temperatures, high pressures or contamination. Rapid pressurization can lead to exothermic decomposition of the product; pressure shocks should be avoided. |
| **Chemical Stability:** | Stable under normal storage conditions. |
| **Possibility of Hazardous Reactions:** | Hazardous polymerization can occur at elevated temperatures and pressures in the presence of a catalyst. May polymerize explosively when heated or involved in a fire. Liquefied gas may explode on contact with hot water (45 °C to 75 °C) (113 °F to 167 °F). |
| **Conditions to Avoid:** | Keep away from heat, sparks and open flame. |
| **Incompatible Materials:** | Acids, oxidizing agents, chlorine, halogens, organic peroxides, ozone and nitrogen dioxide. Product can react with water to form hydrates. **Caution:** Evaluate the compatibility of the molecular sieve with the vendor if it is to be in ethylene service. There is a risk of runaway polymerization under certain conditions. Many materials become brittle after contact with liquefied gases and may fail without warning. Carefully select and test equipment, gaskets and hoses periodically to ensure integrity and compatibility. |
| **Hazardous Decomposition Products:** | Upon decomposition, this product emits carbon monoxide, carbon dioxide, low molecular weight hydrocarbons. |

## 11. Toxicological information

**Information on likely routes of exposure**

| | |
|---|---|
| **Inhalation:** | Product is not acutely toxic. May cause drowsiness or dizziness. |
| **Ingestion:** | Ingestion of this product is not a likely route of exposure. |
| **Skin Contact:** | Ethylene gas is not irritating to the skin. The liquefied form will cause freezing burns (frostbite). |

**Eye contact:** Ethylene gas is not irritating to the eyes. The liquefied form will cause freezing burns (frostbite).

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

**Inhalation:** Headache, dizziness, nausea, confusion.

**Ingestion:** No adverse effects due to ingestion are expected.

**Skin Contact:** Frostbite.

**Eye contact:** Frostbite.

**Information on toxicological effects**

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

**Oral**
**Product:** Not relevant, due to the form of the product.

**Dermal**
**Product:** Not relevant, due to the form of the product.

**Inhalation**
**Product:** LC 50 (Rat, 4 h): > 57000 ppm

**Repeated dose toxicity**
**Product:** Ethylene has low chronic toxicity and no risk to human health has been identified from occupational exposure below the OEL. In rodents, exposure to ethylene produces nasal lesions but no similar lesions are observed in lungs. It is not known whether the effects seen in rodents are relevant to humans.

Inhalation of ethylene by Sprague Dawley rats, in concentrations of 0, 300, 1000, 3000 and 10,000 ppm, 6 hours/day, 5 days/week for 14 weeks, did not cause any toxic effects.

**Skin Corrosion/Irritation**
**Product:** Not likely, due to the form of the product.

**Serious Eye Damage/Eye Irritation**
**Product:** No data available.

**Respiratory or Skin Sensitization**
**Product:** No data available.

**Carcinogenicity**
**Product:** All tests on ethylene for genotoxicity and carcinogenicity were negative indicating that ethylene should not be considered a risk for cancer in humans.

**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:** May cause drowsiness or dizziness.

**Specific Target Organ Toxicity - Repeated Exposure**
**Product:** Not classified.

**Aspiration Hazard**
**Product:** Not classified.

**Other effects:** Narcotic effect.

## 12. Ecological information

**Ecotoxicity:**

**Acute hazards to the aquatic environment:**

**Fish**
**Product:** LC 50 (Various, 4 d): 50 - 119.5 mg/l QSAR
Ethene is not considered harmful to aquatic life.

**Aquatic Invertebrates**
**Product:** EC 50 (Daphnia magna, 48 h): 53 - 152.9 mg/l QSAR
Ethene is not considered harmful to aquatic life.

**Toxicity to aquatic plants**
**Product:** EC 50 (Green algae (Selenastrum capricornutum), 72 h): 40 mg/l
Ethene is not considered harmful to aquatic life.

**Chronic hazards to the aquatic environment:**

**Fish**
**Product:** NOEC (Fathead minnow, 28 d): 13 mg/l QSAR
Ethene is not considered harmful to aquatic life.

**Aquatic Invertebrates**
**Product:** NOEC (16 d): 37.4 mg/l
Ethene is not considered harmful to aquatic life.

**Toxicity to aquatic plants**
**Product:** NOEC (72 h): 13.9 mg/l (growth inhibition)
Ethene is not considered harmful to aquatic life.

**Persistence and Degradability**

**Biodegradation**
**Product:** The lifetime of ethylene in the atmosphere ranges from 0.4 to 4 days, with an average of 1.5 days, and is strongly dependent on the amount of sunlight.

**BOD/COD Ratio**
**Product:** No data available.

**Bioaccumulative Potential**

**Bioconcentration Factor (BCF)**

**Product:** Bioconcentration potential is low.

**Partition Coefficient n-octanol / water (log Kow)**

**Product:** 1.13

**Mobility in Soil:** Low potential.

**Other Adverse Effects:** Several species of flowers (orchids, carnations, etc.), and vegetables such as tomatoes, potatoes, peppers, beans and peas are sensitive to ethylene exposure.

## 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 1962 |
| UN Proper Shipping Name: | ETHYLENE |
| Class | 2.1 |
| Packing Group | – |
| Label(s) | 2.1 |
| Subsidiary risk label | – |
| Special precautions for user: | Emergency Response Guidebook No. 116P, latest revision. |

## 15. Regulatory information

**Canada Federal Regulations**

**List of Toxic Substances (CEPA, Schedule 1)**

Not regulated

**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 Ethene

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

NPRI PT5 Ethene

**Greenhouse Gases**

Not regulated

**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:** 01/15/2020

**Revision Information:** 01/15/2020: 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 properties, hazards, spill response, transportation equipment maintenance, inspection and repair procedures, please refer to, "Handling and Transportation Guide for Ethylene, Refrigerated Liquid (Cryogenic Ethylene)", published April 2004, by the Cryogenic Ethylene Transportation Safety Panel and the American Chemistry Council.

This Guide is posted on the American Chemistry Council's website, www.americanchemistry.com, type in "Handling and Transportation Guide for Ethylene" in the "Search" field.

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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