

SAFETY DATA SHEET

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

1. Identification

Product identifier: Carbon Dioxide Gas**Other means of identification****Common name(s),** CO₂, Carbonic acid anhydride, carbonic acid gas, acid gas**synonym(s):****SDS number:** NOVA-0026**Recommended use and restriction on use****Recommended use:** Petrochemical industry, enhanced oil recovery, fire suppressant.**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**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**

Gases under pressure

Compressed gas

Simple asphyxiant

Category 1

Health HazardsSpecific Target Organ Toxicity -
Single Exposure

Category 3

Environmental HazardsAcute hazards to the aquatic
environment

Category 3

Label Elements**Hazard Symbol:****Signal Word:**

Warning

Hazard Statement:	Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation. May cause drowsiness or dizziness. Harmful to aquatic life.
Precautionary Statements:	
Prevention:	Keep container tightly closed. Avoid breathing dust/fume/gas/mist/vapours/spray. Use only outdoors or in a well-ventilated area. Avoid release to the environment.
Response:	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTRE/doctor if you feel unwell.
Storage:	Protect from sunlight. Store in a well-ventilated place. Keep container tightly closed. Store locked up.
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:	Contains hydrogen sulphide. At 100 ppm is immediately dangerous to life or health (IDLH) (US. NIOSH).

3. Composition/information on ingredients

Mixtures

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
Carbon dioxide	Carbonic acid gas	124-38-9	93 - 98%
Ethane	Methylmethane	74-84-0	1 - 2%
Propane	Dimethylmethane	74-98-6	0.1 - 1%
n-Butane	Butane	106-97-8	0.1 - 1%
Hydrogen sulphide	Dihydrogen sulfide	7783-06-4	<=0.07%

* 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:	IF ON SKIN: Wash with plenty of soap and water. Seek medical attention.
Eye contact:	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: Headache, dizziness, nausea, vomiting, loss of coordination, loss of consciousness, heartbeat irregularities, loss of smell.

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, 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. There is no proven antidote for hydrogen sulphide poisoning. Administer oxygen by mask if there is respiratory distress.

5. Fire-fighting measures

General Fire Hazards: This product is not flammable. Product does not burn.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: In case of fire in the surroundings: use appropriate extinguishing media.

Unsuitable extinguishing media: not applicable

Specific hazards arising from the chemical: Product can accumulate in low or confined areas creating a hazardous low oxygen atmosphere, and possible exposures to toxic hydrogen sulphide gas. If exposed to high heat, pressurized pipelines and vessels may rupture due to thermal expansion of gas. This product will produce carbon monoxide, and trace sulphur oxides / sulphur dioxide when heated to temperatures above 1649 °C (3002 °F).

Special protective equipment and precautions for firefighters

Special fire fighting procedures: None. Reference Emergency Response Guidebook No. 120 for additional details and instructions.

Special protective equipment for firefighters: Firefighters should wear personal protective equipment suitable for the fire conditions and the materials burning.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Isolate area. Keep unauthorized personnel away.

Methods and material for containment and cleaning up: Wear appropriate personal protective equipment. Do not touch or walk through spilled material. Keep out of low areas. Stop leak if safe to do so. Provide adequate ventilation. Isolate area until gas has dispersed. All equipment used when handling the product must be grounded. Check oxygen, carbon dioxide and hydrogen sulphide levels prior to approaching the gas release site or prior to entering nearby confined spaces or buildings.

7. Handling and storage

Precautions for safe handling: Keep away from heat. 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". Avoid breathing gas/vapours. Use only outdoors or in a well-ventilated area. Post hydrogen sulphide and other warning signs. Check air levels of

oxygen and hydrogen sulphide prior to entering confined spaces or buildings. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities:

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. Store away from incompatible materials. Store according to applicable regulations and standards for compressed 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, ethane (CAS# 74-84-0), propane (CAS# 74-98-6) and n-butane (CAS # 106-97-8) have been identified as being an "Explosion hazard". Ethane (CAS# 74-84-0) and propane (CAS# 74-98-6) have also been identified as a "Simple asphyxiant". Please refer to the ACGIH TLVs® and BEIs® book, latest edition, for additional information.

Chemical Identity	type	Exposure Limit Values		Source
Carbon dioxide	TWA	5,000 ppm	9,000 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
	STEL	30,000 ppm	54,000 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
Carbon dioxide	TWA	5,000 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
	STEL	15,000 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
Carbon dioxide	STEL	30,000 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
	TWA	5,000 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Carbon dioxide	STEL	30,000 ppm	54,000 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
	TWA	5,000 ppm	9,000 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
Carbon dioxide	STEL	30,000 ppm		US. ACGIH Threshold Limit Values, as amended
	TWA	5,000 ppm		US. ACGIH Threshold Limit Values, as amended
Carbon dioxide	STEL	30,000 ppm	54,000 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Carbon dioxide	REL	5,000 ppm	9,000 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Carbon dioxide	IDLH	40,000 ppm		US. NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended
Ethane	TWA	1,000 ppm		Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
Propane	TWA	1,000 ppm		Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
Propane	TWA	1,000 ppm	1,800 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
Propane	REL	1,000 ppm	1,800 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended

Propane	IDLH	2,100 ppm		US. NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended
n-Butane	TWA	1,000 ppm		Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
n-Butane	TWA	800 ppm	1,900 mg/m ³	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
n-Butane	STEL	1,000 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
n-Butane	STEL	1,000 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
n-Butane	REL	800 ppm	1,900 mg/m ³	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
n-Butane	STEL	1,000 ppm		US. ACGIH Threshold Limit Values, as amended
n-Butane	IDLH	1,600 ppm		US. NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended
Hydrogen sulphide	TWA	10 ppm	14 mg/m ³	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
	CEILING	15 ppm	21 mg/m ³	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
Hydrogen sulphide	CEILING	10 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
Hydrogen sulphide	STEL	15 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
	TWA	10 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Hydrogen sulphide	STEL	15 ppm	21 mg/m ³	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
	TWA	10 ppm	14 mg/m ³	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
Hydrogen sulphide	STEL	5 ppm		US. ACGIH Threshold Limit Values, as amended
	TWA	1 ppm		US. ACGIH Threshold Limit Values, as amended
Hydrogen sulphide	Ceil_Time	10 ppm	15 mg/m ³	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Hydrogen sulphide	IDLH	100 ppm		US. NIOSH. Immediately Dangerous to Life or Health (IDLH) 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 when handling carbon dioxide under pressure.

Skin Protection

Hand Protection: Chemical resistant gloves.

Skin and Body Protection:

Wear appropriate clothing to prevent any possibility of skin contact. Wear work clothes with long sleeves and pants.

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:

Compressed gas

Colour:

Colourless

Odour:

Odourless, If H₂S is present, gas would have an unpleasant, "rotten egg" smell.

Odour Threshold:

0.001 - 0.13 ppm (if H₂S present) (detection) (loss of ability to smell H₂S begins at 50 ppm; sense of smell deadened above 100 ppm H₂S)

pH:

3.7 (forms carbonic acid in saturated aqueous solution)

Melting point/freezing point:

-78 °C (-108 °F) (sublimation)

Initial boiling point and boiling range:

not applicable

Flash Point:

not applicable

Evaporation rate:

not applicable

Flammability (solid, gas):

This product is not flammable.

Upper/lower limit on flammability or explosive limits

Flammability limit - upper (%):

not applicable

Flammability limit - lower(%):

not applicable

Vapour pressure:

3,485 kPa (0 °C (32 °F))

Vapour density:

1.52 (15 °C (59 °F)) (Air=1)

Density:

not applicable

Relative density:

0.76 (20 °C (68 °F))

Solubility(ies)

Solubility in water:

Slightly soluble

Solubility (other):

No data available.

Partition coefficient (n-octanol/water):

0.83 (experimental) Log P(oct)

Auto-ignition temperature:

not applicable

Decomposition temperature:

> 1,649 °C (> 3,000 °F)

Viscosity:

not applicable

10. Stability and reactivity

Reactivity:

No data available.

Chemical Stability:

Material is stable under normal conditions.

Possibility of Hazardous Reactions:

No data available.

Conditions to Avoid:	Keep away from heat.
Incompatible Materials:	Hydrogen sulphide is a strong reducing agent and is highly reactive. It can rapidly corrode metals and should not be in contact with metal oxides and strong oxidants. Carefully select and test equipment, gaskets and hoses periodically to ensure integrity and compatibility.
Hazardous Decomposition Products:	Upon decomposition, this product will produce carbon monoxide, and trace sulphur oxides/sulphur dioxide.

11. Toxicological information

Information on likely routes of exposure

Inhalation:	Product is not acutely toxic. A high concentration of CO ₂ can displace oxygen in the air and can be acutely toxic. Excessive inhalation of product causes headache, dizziness, nausea, loss of coordination and may trigger heartbeat irregularities.
Ingestion:	Ingestion of this product is not a likely route of exposure.
Skin Contact:	Carbon dioxide gas is not a skin irritant.
Eye contact:	Carbon dioxide gas may cause mild eye irritation.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation:	Headache, dizziness, nausea, confusion, loss of smell.
Ingestion:	No adverse effects due to ingestion are expected.
Skin Contact:	Not irritating.
Eye contact:	May cause mild eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral Product:	Not classified for acute toxicity based on available data.
Dermal Product:	Not classified for acute toxicity based on available data.
Inhalation Product:	Not classified for acute toxicity based on available data.

Repeated dose toxicity Product:	No data available.
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Skin Corrosion/Irritation Product:	Not irritating
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Serious Eye Damage/Eye Irritation Product:	Mildly Irritating
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Respiratory or Skin Sensitization Product:	No data available.
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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:** May cause drowsiness or dizziness.**Specific Target Organ Toxicity - Repeated Exposure****Product:** No data available.**Aspiration Hazard****Product:** Not classified.**Other effects:** No data available.**12. Ecological information****Ecotoxicity:****Acute hazards to the aquatic environment:****Fish****Product:** Harmful to aquatic life.**Aquatic Invertebrates****Product:** Harmful to aquatic life.**Toxicity to aquatic plants****Product:** Harmful to aquatic life.**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: Will not bio-accumulate.

Partition Coefficient n-octanol / water (log K_{ow})
Product: 0.83 (experimental) 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 1013
UN Proper Shipping Name:	CARBON DIOXIDE, mixture
Class	2.2
Packing Group	–
Label(s)	2.2
Subsidiary risk label	–
Special precautions for user:	Emergency Response Guidebook No. 120.

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

Chemical Identity
Carbon dioxide

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 Not regulated

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

NPRI PT5

Propane
n-Butane**Greenhouse Gases****Chemical Identity**

Carbon dioxide

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:** 02/14/2020**Revision Information:** 02/14/2020: 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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