



DAKOTA GASIFICATION COMPANY

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SAFETY DATA SHEET



RESPONSIBLE CARE®
OUR COMMITMENT TO SUSTAINABILITY

Section 1: Identification

Product identifier

Product Name • Carbon Dioxide

Synonyms • Carbonic Acid Gas; Carbonic Anhydride

Relevant identified uses of the substance or mixture and uses advised against

Recommended use • Tertiary oil recovery efforts

Details of the supplier of the safety data sheet

Manufacturer • Dakota Gasification
420 County Road 26
Beulah, ND 58523-9400
United States
www.dakotagas.com

Telephone (General) • 701-873-2100

Emergency telephone number

Manufacturer • (701) 873-6600

Manufacturer • 800-424-9300 - CHEMTREC

Section 2: Hazard Identification

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012 • Compressed Gas - H280
Simple Asphyxiant

Label elements

OSHA HCS 2012

WARNING



Hazard statements • Contains gas under pressure; may explode if heated - H280
May displace oxygen and cause rapid suffocation.

Precautionary statements

Storage/Disposal • Protect from sunlight. Store in a well-ventilated place. - P410+P403

Other hazards

OSHA HCS 2012

- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to WHMIS

Classification of the substance or mixture

- WHMIS** • Compressed Gas - A
Very Toxic - D1A
Other Toxic Effects - D2B

Label elements

WHMIS



- Compressed Gas - A
Very Toxic - D1A
Other Toxic Effects - D2B

Other hazards

- WHMIS** • This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces.
In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Section 3 - Composition/Information on Ingredients

Substances

- Material does not meet the criteria of a substance.

Mixtures

Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments
Carbon dioxide	CAS:124-38-9	94% TO 97%	Inhalation-Rat LC50 • 470000 ppm 30 Minute(s)	OSHA HCS 2012: Press. Gas - Comp.; Simp. Asphyx.	NDA
Hydrogen sulfide	CAS:7783-06-4	0.8% TO 2%	Inhalation-Rat LC50 • 700 mg/m ³ 4 Hour(s)	OSHA HCS 2012: Flam. Gas 1; Press. Gas - Comp.; Eye Irrit. 2; STOT SE 3: Resp. Irrit.; Acute Tox. 2 (inhl)	NDA

Section 4: First-Aid Measures

Description of first aid measures

- Inhalation** • IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.
- Skin** • If frostbite has occurred, seek medical attention immediately; do NOT rub the affected area(s) or flush them with water. In order to prevent further tissue damage, do NOT attempt to remove frozen clothing from frostbitten areas. If frostbite has not occurred, immediately and thoroughly wash contaminated skin with soap and water.
- Eye** • If eye tissue is frozen, seek medical attention immediately; if tissue is not frozen, immediately and thoroughly flush the eyes with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation, pain, swelling, lacrimation or photophobia persist, get medical attention as soon as possible.
- Ingestion** • If frostbite has occurred, seek medical attention immediately; do NOT rub the affected area(s) or flush them with water. Never give anything by mouth to an unconscious person. Do NOT induce vomiting.

Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

Indication of any immediate medical attention and special treatment needed

- Notes to Physician** • All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Other information

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO GASES WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn. Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the SDS to physician or other health professional with victim(s).

Section 5: Fire-Fighting Measures

Extinguishing media

- Suitable Extinguishing Media** • Use extinguishing agent suitable for type of surrounding fire.

- Unsuitable Extinguishing Media** • No data available

Special hazards arising from the substance or mixture

- Unusual Fire and Explosion Hazards** • Material is non-combustible and is not expected to pose a fire or explosion hazard.

- Hazardous Combustion Products** • No data available

Advice for firefighters

- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

Always wear thermal protective clothing when handling refrigerated/cryogenic liquids.
Wear positive pressure self-contained breathing apparatus (SCBA).

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Do not walk through spilled material. Ventilate the area before entry.

Emergency Procedures • Stop leak if you can do it without risk. Keep unauthorized personnel away. Keep out of low areas. Stay upwind. Do not direct water at spill or source of leak. **LARGE SPILL:** Consider initial downwind evacuation for at least 500 meters (1/3 mile)

Environmental precautions

- Prevent entry into waterways, sewers, basements or confined areas.

Methods and material for containment and cleaning up

Containment/Clean-up Measures • Stop leak if you can do it without risk.
Do not direct water at spill or source of leak.
Isolate area until gas has dispersed.
Ventilate the area.
Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
Allow substance to evaporate.

Section 7 - Handling and Storage

Precautions for safe handling

Handling • Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly ventilated area; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to olfactory fatigue or oxygen deficiency.

Conditions for safe storage, including any incompatibilities

Storage • This product is not handled by personnel nor is it stored.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines				
	Result	ACGIH	NIOSH	OSHA
Hydrogen sulfide (7783-06-4)	Ceilings	Not established	10 ppm Ceiling (10 min); 15 mg/m ³ Ceiling (10 min)	20 ppm Ceiling
	STELs	5 ppm STEL	Not established	Not established
	TWAs	1 ppm TWA	Not established	Not established
Carbon dioxide (124-38-9)	TWAs	5000 ppm TWA	5000 ppm TWA; 9000 mg/m ³ TWA	5000 ppm TWA; 9000 mg/m ³ TWA
	STELs	30000 ppm STEL	30000 ppm STEL; 54000 mg/m ³ STEL	Not established

Exposure controls

Engineering Measures/Controls • Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not

been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

- Respiratory** • In case of insufficient ventilation, wear suitable respiratory equipment.
- Eye/Face** • Wear safety glasses.
- Skin/Body** • Wear appropriate gloves.
- Environmental Exposure Controls** • Follow best practice for site management and disposal of waste. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene STEL = Short Term Exposure Limits are based on 15-minute exposures
 NIOSH = National Institute of Occupational Safety and Health TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures
 OSHA = Occupational Safety and Health Administration

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Gas	Appearance/Description	Colorless gas with an acidic, irritating, sharp odor; the presence of hydrogen sulfide may give gas a rotten egg type odor.
Color	Colorless	Odor	Pure carbon dioxide may have an acidic, irritating, sharp odor. The presence of hydrogen sulfide may give gas a rotten egg type odor.
Odor Threshold	0.1 ppm (Hydrogen sulfide)		
General Properties			
Boiling Point	-109 F(-78.3333 C) (sublimes)	Melting Point	-70.6 F(-57 C) @4000 mmHg
Decomposition Temperature	No data available	pH	2 to 3.7
Specific Gravity/Relative Density	1.522 Water=1 @ 21 C(69.8 F)	Water Solubility	No data available
Viscosity	No data available		
Volatility			
Vapor Pressure	No data available	Vapor Density	1.5 Air=1
Evaporation Rate	No data available		
Flammability			
Flash Point	Not relevant	UEL	Not relevant
LEL	Not relevant	Autoignition	No data available
Flammability (solid, gas)	Nonflammable Gas.		
Environmental			
Octanol/Water Partition coefficient	No data available		

Section 10: Stability and Reactivity

Reactivity

- No dangerous reaction known under conditions of normal use.

Chemical stability

- Stable under normal temperatures and pressures.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- No data available

Incompatible materials

- Violent reaction with ammonia and amines. Contact with chemically active metals such as sodium or potassium may cause fire. Dry carbon dioxide can be handled with most common structural materials. Moist carbon dioxide is corrosive by its formation of carbonic acid. For these applications, 316, 309 and 310 stainless steels may be used as well as Hastelloy A, B, and C and Monel. Ferrous nickel alloys are slightly corroded.

Hazardous decomposition products

- Temperatures above 1700C may cause decomposition and the release of oxygen and highly toxic carbon monoxide.

Section 11 - Toxicological Information

Information on toxicological effects

Components		
Carbon dioxide (94% TO 97%)	124-38-9	Acute Toxicity: Inhalation-Rat LC50 • 470000 ppm 30 Minute(s); Inhalation-Human TClO • 7 pph; <i>Behavioral: Irritability; Brain and Coverings: Other degenerative changes; Nutritional and Gross Metabolic: Changes in Chemistry or Temperature: Body temperature decrease;</i> Reproductive: Inhalation-Rat TClO • 6 pph 24 Hour(s)(10D preg); <i>Reproductive Effects: Specific Developmental Abnormalities: Musculoskeletal system; Reproductive Effects: Specific Developmental Abnormalities: Cardiovascular (circulatory) system; Reproductive Effects: Specific Developmental Abnormalities: Respiratory system</i>
Hydrogen sulfide (0.8% TO 2%)	7783-06-4	Acute Toxicity: Inhalation-Rat LC50 • 444 ppm; <i>Lungs, Thorax, or Respiration: Other changes; Gastrointestinal: Hypermotility, diarrhea; Kidney, Ureter, and Bladder: Urine volume increased;</i> Inhalation-Human LCLo • 1500 mg/m ³ ; <i>Sense Organs and Special Senses: Olfaction: Change in olfactory nerve; Behavioral: General anesthetic; Lungs, Thorax, or Respiration: Acute pulmonary edema;</i> Irritation: Eye-Human • 0.000125 ppm 5 Hour(s); Reproductive: Inhalation-Rat TClO • 10 mg/m ³ (48D pre/1-22D preg); <i>Reproductive Effects: Effects on Fertility: Pre-implantation mortality; Reproductive Effects: Effects on Fertility: Post-implantation mortality; Reproductive Effects: Specific Developmental Abnormalities: Urogenital system</i>

GHS Properties	Classification
Acute toxicity	OSHA HCS 2012•Data lacking
Aspiration Hazard	OSHA HCS 2012•Data lacking
Carcinogenicity	OSHA HCS 2012•Data lacking
Germ Cell Mutagenicity	OSHA HCS 2012•Data lacking
Skin corrosion/Irritation	OSHA HCS 2012•Data lacking
Skin sensitization	OSHA HCS 2012•Data lacking
STOT-RE	OSHA HCS 2012•Data lacking
STOT-SE	OSHA HCS 2012•Data lacking
Toxicity for Reproduction	OSHA HCS 2012•Data lacking
Respiratory sensitization	OSHA HCS 2012•Data lacking
Serious eye damage/Irritation	OSHA HCS 2012•Data lacking

Route(s) of • Inhalation, Skin, Eye

entry/exposure

Potential Health Effects

Inhalation

**Acute
(Immediate)**

- If this material is released in a small, poorly ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with decreased levels of oxygen: increase in breathing and pulse rate, emotional upset, abnormal fatigue, nausea, vomiting, collapse, loss of consciousness, convulsive movements, respiratory collapse and death.

**Chronic
(Delayed)**

- No data available

Skin

**Acute
(Immediate)**

- Contact with rapidly expanding gas may cause burns or frostbite.

**Chronic
(Delayed)**

- No data available

Eye

**Acute
(Immediate)**

- Contact with rapidly expanding gas may cause burns or frostbite.

**Chronic
(Delayed)**

- No data available

Ingestion

**Acute
(Immediate)**

- Ingestion is not anticipated to be a likely route of exposure to this product.

**Chronic
(Delayed)**

- No data available

Key to abbreviations

LC = Lethal Concentration

TC = Toxic Concentration

Section 12 - Ecological Information

Toxicity

- Non-mandatory section - information about this substance not complied for this reason.

Persistence and degradability

- Non-mandatory section - information about this substance not complied for this reason.

Bioaccumulative potential

- Non-mandatory section - information about this substance not complied for this reason.

Mobility in Soil

- Non-mandatory section - information about this substance not complied for this reason.

Other adverse effects

- Non-mandatory section - information about this substance not complied for this reason.

Section 13 - Disposal Considerations

Waste treatment methods

Product waste • Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste • Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class(es)	Packing group	Environmental hazards
DOT	UN1956	Compressed gas, n.o.s. (contains Carbon Dioxide, Hydrogen Sulfide)	2.2	NDA	NDA
TDG	UN1956	COMPRESSED GAS, N.O.S. (contains Carbon Dioxide, Hydrogen Sulfide)	2.2	NDA	NDA
IATA/ICAO	UN1956	Compressed gas, n.o.s. (contains Carbon Dioxide, Hydrogen Sulfide)	2.2	NDA	NDA

Special precautions for user • Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code • No data available

Other information

• This product is shipped via pipeline. Typical transportation information does not generally apply since material is usually not carried by rail or truck transport. When this material is shipped the transportation information listed above applies.

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications

• Acute, Pressure(Sudden Release of)

Inventory						
Component	CAS	Canada DSL	Canada NDSL	EU EINECS	EU ELNICS	Korea KECL
Carbon dioxide	124-38-9	Yes	No	Yes	No	Yes
Hydrogen sulfide	7783-06-4	Yes	No	Yes	No	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

•Hydrogen sulfide	7783-06-4	A, B1, D1A, D2B
•Carbon dioxide	124-38-9	A; Uncontrolled product according to WHMIS classification criteria (solid)
Canada - WHMIS - Ingredient Disclosure List		
•Hydrogen sulfide	7783-06-4	1 %
•Carbon dioxide	124-38-9	1 %
Environment		
Canada - CEPA - Priority Substances List		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed
United States		
Labor		
U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals		
•Hydrogen sulfide	7783-06-4	1500 lb TQ
•Carbon dioxide	124-38-9	Not Listed
U.S. - OSHA - Specifically Regulated Chemicals		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed
Environment		
U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed
U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities		
•Hydrogen sulfide	7783-06-4	100 lb final RQ; 45.4 kg final RQ
•Carbon dioxide	124-38-9	Not Listed
U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs		
•Hydrogen sulfide	7783-06-4	100 lb EPCRA RQ
•Carbon dioxide	124-38-9	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs		
•Hydrogen sulfide	7783-06-4	500 lb TPQ
•Carbon dioxide	124-38-9	Not Listed
U.S. - CERCLA/SARA - Section 313 - Emission Reporting		
•Hydrogen sulfide	7783-06-4	1.0 % de minimis concentration
•Carbon dioxide	124-38-9	Not Listed
U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed
Inventory - United States - Section 8(b) Inventory (TSCA) - PMN Number to EPA Accession Number Link		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed
United States - California		
Environment		
U.S. - California - Proposition 65 - Carcinogens List		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed
U.S. - California - Proposition 65 - Developmental Toxicity		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed
U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)		
•Hydrogen sulfide	7783-06-4	Not Listed

•Carbon dioxide	124-38-9	Not Listed
U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Female		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Male		
•Hydrogen sulfide	7783-06-4	Not Listed
•Carbon dioxide	124-38-9	Not Listed

Section 16 - Other Information

- Last Revision Date** • 01/October/2014
- Preparation Date** • 01/October/2014
- Disclaimer/Statement of Liability** • The information contained in this Safety Data Sheet (SDS) is believed to be correct since it was obtained from sources we believe are reliable. However no representation, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications, hazards connected with the use of the material, or the results to be obtained from the use thereof. User assumes all risks and liability of any use, processing or handling of any material, variations in methods, conditions and equipment used to store, handle, or process the material and hazards connected with the use of the material are solely the responsibility of the user and remain at his sole discretion. Compliance with all applicable federal, state, and local laws and regulations remains the responsibility of the user, and the user has the responsibility to provide a safe work place to examine all aspects of its operation and to determine if or where precautions, in addition to those described herein, are required.

Key to abbreviations
NDA = No Data Available