

Safety Data Sheet



Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product Name	• Carbon Dioxide (gas)
CAS Number	• 124-38-9
Product Code	• MSDS No. 10040
EC Number	• 204-696-9

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

Relevant identified use(s)	• Medical and general analytical or synthetic chemical uses
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1.3 Details of the supplier of the safety data sheet

Manufacturer	• Air Liquide 2700 Post Oak Blvd. Houston, TX 77056 United States www.us.airliquide.com
Telephone (Technical)	• 713-896-2896
Telephone (Technical)	• 800-819-1704

1.4 Emergency telephone number

Manufacturer	• 800-424-9300 - CHEMTREC
Manufacturer	• +1 703-527-3887 - Outside United States

Section 2: Hazards Identification

EU/EEC

According to EU Directive 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]
According to EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

2.1 Classification of the substance or mixture

CLP	• Compressed Gas - H280
DSD/DPD	• Classification criteria not met and currently not classified under Annex I of the Directive

2.2 Label Elements

CLP

WARNING



Hazard statements • H280 - Contains gas under pressure; may explode if heated

Precautionary statements

- Storage/Disposal**
- P403 - Store in a well-ventilated place.
 - Mixtures containing carbon dioxide can increase respiration and heart rate.

DSD/DPD

2.3 Other Hazards

- CLP**
- This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces. According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.
- DSD/DPD**
- This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces. This product is not considered dangerous under the European Directive 67/548/EEC
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United States (US)

According to OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture

- OSHA HCS 2012**
- Compressed Gas - H280
Simple Asphyxiant

2.2 Label elements

OSHA HCS 2012

WARNING



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

Precautionary statements

- Storage/Disposal**
- P403 - Store in a well-ventilated place.
- HCS 2012 Other Information**
- Mixtures containing carbon dioxide can increase respiration and heart rate.

2.3 Other hazards

- OSHA HCS 2012**
- Contact with gas or liquefied gas will cause burns, severe injury and/or frostbite. Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.
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Canada

According to WHMIS

2.1 Classification of the substance or mixture

- WHMIS**
- Compressed Gas - A

2.2 Label elements

WHMIS



- Compressed Gas - A

2.3 Other hazards

WHMIS

- This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces. Contact with gas or liquefied gas will cause burns, severe injury and/or frostbite. In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Section 3 - Composition/Information on Ingredients

3.1 Substances

Hazardous Components					
Chemical Name	Identifiers	%(weight)	LD50/LC50	Classifications According to Regulation/Directive	Comments
Carbon dioxide	CAS:124-38-9 EC Number:204-696-9	> 99%	Inhalation-Rat LC50 • 470000 ppm 30 Minute(s)	EU DSD/DPD: R20 EU CLP: Compressed Gas OSHA HCS 2012: Compressed Gas	NDA

3.2 Mixtures

- Material does not meet the criteria of a mixture.

See Section 11 for Toxicological Information.

Section 4 - First Aid Measures

4.1 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.

4.2 Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

4.3 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.

4.4 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 MSDS to physician or other health professional with victim(s).

Section 5 - Firefighting Measures

5.1 Extinguishing media

Suitable Extinguishing Media ● Use extinguishing agent suitable for type of surrounding fire.

Unsuitable Extinguishing Media ● No data available

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards ● Containers may explode when heated. Ruptured cylinders may rocket.

Hazardous Combustion Products ● No data available

5.3 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). Move containers from fire area if you can do it without risk.
FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
FIRE INVOLVING TANKS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
FIRE INVOLVING TANKS: Cool containers with flooding quantities of water until well after fire is out.
FIRE INVOLVING TANKS: Do not direct water at source of leak or safety devices; icing may occur.
FIRE INVOLVING TANKS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
FIRE INVOLVING TANKS: ALWAYS stay away from tanks engulfed in fire.

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions ● Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Do not touch or 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)

6.2 Environmental precautions

- No special environmental precautions necessary.

6.3 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.

Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
If possible, turn leaking containers so that gas escapes rather than liquid.
Isolate area until gas has dispersed.
Ventilate the area.

6.4 Reference to other sections

- No data available

Section 7 - Handling and Storage

7.1 Precautions for safe handling

Handling

- Use only with adequate ventilation. Ventilate closed spaces before entering. 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. Cylinders should be firmly secured to prevent falling or being knocked-over. Do not attempt to repair, adjust, or in any other way modify cylinders. If there is a malfunction or another type of operational problem, contact nearest distributor immediately. Empty containers retain product residue and can be hazardous. Do not cut, weld, puncture or incinerate container.

7.2 Conditions for safe storage, including any incompatibilities

Storage

- Store in a cool, dry, well-ventilated place. Do not allow area where cylinders are stored to exceed 52C (125F). Protect cylinders against physical damage. Cylinders should be firmly secured to prevent falling or being knocked-over.

7.3 Specific end use(s)

- No data available

Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits/Guidelines						
	Result	ACGIH	Canada Ontario	Canada Quebec	NIOSH	OSHA
Carbon dioxide (124-38-9)	STELs	30000 ppm STEL	30000 ppm STEL	30000 ppm STEV; 54000 mg/m3 STEV	30000 ppm STEL; 54000 mg/m3 STEL	Not established
	TWAs	5000 ppm TWA	5000 ppm TWA	5000 ppm TWAEV; 9000 mg/m3 TWAEV	5000 ppm TWA; 9000 mg/m3 TWA	5000 ppm TWA; 9000 mg/m3 TWA

8.2 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

Pictograms

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Respiratory

- Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face

- Wear safety glasses.

Skin/Body

- Wear leather gloves when handling cylinders.

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

STEL = Short Term Exposure Limits are based on 15-minute exposures
 STEV = Short Term Exposure Value
 TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

ACGIH = American Conference of Governmental Industrial Hygiene
 NIOSH = National Institute of Occupational Safety and Health
 OSHA = Occupational Safety and Health Administration

Section 9 - Physical and Chemical Properties**9.1 Information on Physical and Chemical Properties**

Material Description			
Physical Form	Gas	Appearance/Description	Colorless gas with no odor.
Color	Colorless	Odor	Odorless
Taste	Data lacking	Particulate Type	Not relevant
Particulate Size	Not relevant	Aerosol Type	Not relevant
Odor Threshold	Not relevant	Physical and Chemical Properties	Data lacking
General Properties			
Boiling Point	-78.4 C(-109.12 F)	Melting Point	Data lacking
Decomposition Temperature	Data lacking	Heat of Decomposition	Data lacking
pH	Not relevant	Specific Gravity/Relative Density	1.56 Water=1
Density	Data lacking	Bulk Density	Data lacking
Water Solubility	Slightly Soluble 1.45 g/L @ 20 C(68 F)	Solvent Solubility	Data lacking
Viscosity	Not relevant	Explosive Properties	Not explosive.
Oxidizing Properties:	Not an oxidizing gas.		
Volatility			
Vapor Pressure	816 psig @ 20 C(68 F)	Vapor Density	1.53 Air=1
Evaporation Rate	Data lacking	VOC (Wt.)	Data lacking
VOC (Vol.)	Data lacking	Volatiles (Wt.)	Data lacking
Volatiles (Vol.)	Data lacking		
Flammability			
Flash Point	Not relevant	UEL	Not relevant
LEL	Not relevant	Autoignition	Not relevant
Self-Accelerating Decomposition Temperature (SADT)	Not relevant	Heat of Combustion (ΔH_c)	Not relevant
Burning Time	Not relevant	Flame Duration	Not relevant
Flame Height	Not relevant	Flame Extension	Not relevant
Ignition Distance	Not relevant	Flammability (solid, gas)	Not flammable.
Environmental			
Half-Life	Data lacking	Octanol/Water Partition coefficient	Data lacking

Coefficient of water/oil distribution	Data lacking	Bioaccumulation Factor	Data lacking
Bioconcentration Factor	Data lacking	Biochemical Oxygen Demand BOD/BOD5	Data lacking
Chemical Oxygen Demand	Data lacking	Persistence	Data lacking
Degradation	Data lacking		

9.2 Other Information

- No data available

Section 10: Stability and Reactivity

10.1 Reactivity

- No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

- Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

- Hazardous polymerization will not occur.

10.4 Conditions to avoid

- Excess heat.

10.5 Incompatible materials

- This material is weakly acidic and will react with alkaline materials to form carbonates and bicarbonates.

10.6 Hazardous decomposition products

- Under normal conditions of storage and use, hazardous decomposition products should not be produced. Carbon dioxide produces toxic carbon monoxide when heated above 1700 deg. C.

Section 11 - Toxicological Information

11.1 Information on toxicological effects

Carbon Dioxide (gas) 124-38-9								
Test Type	Dosage	Route	Species	Duration	Results	Test Class	Target Organs	Comments
Acute Toxicity	= 470000 ppm	Inhalation	Rat	30 Minute(s)	LC50	NDA	NDA	NDA
Reproductive	= 2 pph	Inhalation	Mouse	8 Hour(s)	TCLo	NDA	NDA	NDA
Reproductive	= 13 pph	Inhalation	Rabbit	4 Hour(s)	TCLo	NDA	NDA	NDA
Reproductive	= 6 pph	Inhalation	Rat	24 Hour(s)	TCLo	NDA	NDA	NDA
GHS Properties				Classification				
Acute toxicity				EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met				
Aspiration Hazard				EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met				

Carcinogenicity	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Germ Cell Mutagenicity	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Skin corrosion/Irritation	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Skin sensitization	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
STOT-RE	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
STOT-SE	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Toxicity for Reproduction	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Respiratory sensitization	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Serious eye damage/Irritation	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met

Route(s) of entry/exposure

- Inhalation, Skin and Eye

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)

- Under normal conditions of use, no health effects are expected.

Eye**Acute (Immediate)**

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

Chronic (Delayed)

- Under normal conditions of use, no health effects are expected.

Ingestion**Acute (Immediate)**

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

Chronic (Delayed)

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

Mutagenic Effects

- This substance is not expected to cause mutagenic effects.

Carcinogenic Effects

- The components of this material are not found on the following lists: FEDERAL OSHA Z LIST, NTP and IARC; therefore, they are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

Key to abbreviations

TC = Toxic Concentration

LC = Lethal Concentration

Section 12 - Ecological Information

12.1 Toxicity

- Material data lacking.

12.2 Persistence and degradability

- Material data lacking.

12.3 Bioaccumulative potential

- Material data lacking.

12.4 Mobility in Soil

- Material data lacking.

12.5 Results of PBT and vPvB assessment

- PBT and vPvB assessment has not been conducted for this material.

12.6 Other adverse effects

- Material data lacking.

Section 13 - Disposal Considerations

13.1 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

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	UN1013	Carbon dioxide	2.2	NDA	NDA
TDG	UN1013	CARBON DIOXIDE	2.2	NDA	NDA
IMO/IMDG	UN1013	CARBON DIOXIDE	2.2	NDA	NDA
IATA/ICAO	UN1013	Carbon dioxide	2.2	NDA	NDA

14.6 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.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

- Not relevant.

Section 15 - Regulatory Information

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

SARA Hazard Classifications • Acute, Pressure(Sudden Release of)

State Right To Know				
Component	CAS	MA	NJ	PA
Carbon dioxide	124-38-9	Yes	Yes	Yes

Inventory				
Component	CAS	Canada DSL	Canada NDSL	TSCA
Carbon dioxide	124-38-9	Yes	No	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

- Carbon dioxide 124-38-9 > 99% A; Uncontrolled product according to WHMIS classification criteria (solid)

Canada - WHMIS - Ingredient Disclosure List

- Carbon dioxide 124-38-9 > 99% 1 %

Environment

Canada - CEPA - Priority Substances List

- Carbon dioxide 124-38-9 > 99% Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

- Carbon dioxide 124-38-9 > 99% Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

- Carbon dioxide 124-38-9 > 99% Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

- Carbon dioxide 124-38-9 > 99% Not Listed

United States - Pennsylvania

Labor

U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

- Carbon dioxide 124-38-9 > 99% Not Listed

15.2 Chemical Safety Assessment

- No Chemical Safety Assessment has been carried out.

Section 16 - Other Information

Last Revision Date

- 19/September/2012

Preparation Date

- 19/September/2012

Disclaimer/Statement of Liability

- To the best of Air Liquide's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this gas mixture is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.

Key to abbreviations

NDA = No Data Available