



# Carbon dioxide

## Safety Data Sheet P-4574

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.  
Issue date: 01/01/1980      Revision date: 12/14/2021      Supersedes: 05/14/2021      Version: 2.2

### SECTION: 1. Product and company identification

#### 1.1. Product identifier

Product form : Substance  
Trade name : Carbon dioxide  
Chemical name : Carbon dioxide  
CAS-No. : 124-38-9  
Formula : CO<sub>2</sub>  
Other means of identification : Medipure® Carbon Dioxide, Extendapak® EX-2, Refrigerant gas R744, carbonic anhydride, carbonic acid gas

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

Use of the substance/mixture : Industrial use; Use as directed.  
Food applications.

#### 1.3. Details of the supplier of the safety data sheet

Linde Inc.  
10 Riverview Drive  
Danbury, CT 06810-6268, USA  
www.lindeus.com

Linde Inc. 1-844-44LINDE (1-844-445-4633)

#### 1.4. Emergency telephone number

Emergency number : Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7days/week  
— Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887  
(collect calls accepted, Contract 17729)

### SECTION 2: Hazard identification

#### 2.1. Classification of the substance or mixture

##### GHS US classification

Simple asphyxiant SIAS  
Press. Gas (Liq.) H280

#### 2.2. Label elements

##### GHS US labeling

Hazard pictograms (GHS US) :



GHS04

Signal word (GHS US) : Warning  
Hazard statements (GHS US) : H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED  
CGA-HG01 - MAY CAUSE FROSTBITE.  
CGA-HG03 - MAY INCREASE RESPIRATION AND HEART RATE.  
Precautionary statements (GHS US) : P202 - Do not handle until all safety precautions have been read and understood.  
P261 - Avoid breathing gas  
P262 - Do not get in eyes, on skin, or on clothing.  
P271+P403 - Use and store only outdoors or in a well-ventilated place.  
P280 - Wear protective gloves/protective clothing/eye protection/face protection.  
P304, P340, P313 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. Get medical advice/attention.  
P302, P336, P315 - IF ON SKIN: Thaw frosted parts with lukewarm water. Do not rub affected



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area.. Get immediate medical advice/attention.  
CGA-PG05 - Use a back flow preventive device in the piping.  
CGA-PG10 - Use only with equipment rated for cylinder pressure.  
CGA-PG12 - Do not open valve until connected to equipment prepared for use.  
CGA-PG06 - Close valve after each use and when empty.  
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F).  
CGA-PG11 - Never put cylinders into unventilated areas of passenger vehicles.

### 2.3. Other hazards

Other hazards which do not result in classification

: Asphyxiant in high concentrations.

Contact with liquid may cause cold burns/frostbite.

**WARNING: Concentration levels of carbon dioxide above about 1 percent are dangerous.** Linde recommends continuous monitoring with alarms to indicate unsafe conditions before and during potential personnel exposure. Use appropriate monitoring devices to ensure a safe oxygen level (minimum of 19.5 percent) and a safe carbon dioxide level.

### 2.4. Unknown acute toxicity (GHS US)

No data available

## SECTION 3: Composition/Information on ingredients

### 3.1. Substances

Name	Product identifier	%
Carbon dioxide (Main constituent)	(CAS-No.) 124-38-9	100

### 3.2. Mixtures

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

- First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. . If not breathing, give artificial respiration, with supplemental oxygen given by qualified personnel. If breathing is difficult, qualified personnel should give oxygen. Call a physician.
- First-aid measures after skin contact : The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.
- First-aid measures after eye contact : The liquid may cause frostbite. Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.
- First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

### 4.2. Most important symptoms and effects, both acute and delayed

No additional information available

### 4.3. Indication of any immediate medical attention and special treatment needed

None.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

### 5.2. Special hazards arising from the substance or mixture

- Explosion hazard : Heat of fire can build pressure in container and cause it to rupture. Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.) No part of the container should be subjected to a temperature higher than 125°F (52°C).
- Reactivity : No reactivity hazard other than the effects described in sub-sections below.



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### 5.3. Advice for firefighters

Firefighting instructions

: **WARNING! Liquid and gas under pressure.**

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

Other information

: Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT [U.S.] or TC [Canada].)

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

General measures

: **WARNING! Liquid and gas under pressure.. Rapid release of gaseous carbon dioxide through a pressure relief device (PRD) or valve can result in the formation of dry ice, which is very cold and can cause frostbite..**

#### 6.1.1. For non-emergency personnel

No additional information available

#### 6.1.2. For emergency responders

No additional information available

### 6.2. Environmental precautions

Try to stop release.

### 6.3. Methods and material for containment and cleaning up

For containment

: Prevent waste from contaminating the surrounding environment. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, provincial, and local regulations. If necessary, call your local supplier for assistance.

### 6.4. Reference to other sections

See also sections 8 and 13.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling

: Avoid breathing gas

Do not get in eyes, on skin, or on clothing.

This gas is heavier than air and in an enclosed space tends to accumulate near the floor, displacing air and pushing it upward. This creates an oxygen-deficient atmosphere near the floor. Ventilate space before entry. Verify sufficient oxygen concentration.

**WARNING: Concentration levels of carbon dioxide above about 1 percent are dangerous.** Linde recommends continuous monitoring with alarms to indicate unsafe conditions before and during potential personnel exposure. Use appropriate monitoring devices to ensure a safe oxygen level (minimum of 19.5 percent) and a safe carbon dioxide level.

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g. wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.



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### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in a cool, well-ventilated place. Store and use with adequate ventilation. Store only where temperature will not exceed 125°F (52°C). Firmly secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods.

This gas is heavier than air and in an enclosed space tends to accumulate near the floor, displacing air and pushing it upward. This creates an oxygen-deficient atmosphere near the floor. Ventilate space before entry. Verify sufficient oxygen concentration.

### 7.3. Specific end use(s)

None.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

Carbon dioxide (124-38-9)		
ACGIH	ACGIH OEL TWA [ppm]	5000 ppm
ACGIH	ACGIH OEL STEL [ppm]	30000 ppm
USA OSHA	OSHA PEL TWA [1]	9000 mg/m <sup>3</sup>
USA OSHA	OSHA PEL TWA [2]	5000 ppm
USA IDLH	IDLH [ppm]	40000 ppm
ACGIH	Not established	
USA OSHA	Not established	

### 8.2. Exposure controls

- Appropriate engineering controls : Use a local exhaust system with sufficient flow velocity to maintain an adequate supply of air in the worker's breathing zone. Mechanical (general): General exhaust ventilation may be acceptable if it can maintain an adequate supply of air. **WARNING: Concentration levels of carbon dioxide above about 1 percent are dangerous.** Linde recommends continuous monitoring with alarms to indicate unsafe conditions before and during potential personnel exposure. Use appropriate monitoring devices to ensure a safe oxygen level (minimum of 19.5 percent) and a safe carbon dioxide level.
- Materials for protective clothing : Wear work gloves and metatarsal shoes for cylinder handling. Protective equipment where needed. Select in accordance with OSHA 29 CFR 1910.132, 1910.136, and 1910.138.
- Eye protection : Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.
- Skin and body protection : As needed for welding, wear hand, head, and body protection to help prevent injury from radiation and sparks. (See ANSI Z49.1.) At a minimum, this includes welder's gloves and protective goggles, and may include arm protectors, aprons, hats, and shoulder protection as well as substantial clothing.
- Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).
- Thermal hazard protection : Wear cold insulating gloves when transfilling or breaking transfer connections.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

- Physical state : Gas
- Appearance : Colorless gas.
- Molecular mass : 44 g/mol
- Color : Colorless.



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Odor	: Odorless.
Odor threshold	: No data available
pH	: 3.7 (carbonic acid)
Relative evaporation rate (butyl acetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable.
Melting point	: No data available
Freezing point	: No data available
Boiling point	: -78.5 °C (-109.3°F)
Flash point	: No data available
Critical temperature	: 31 °C (87.7°F)
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Flammability (solid, gas)	: No data available
Vapor pressure	: 57.3 bar (831 psig)
Critical pressure	: 73.7 bar (1069 psig)
Relative vapor density at 20 °C	: 762
Relative density	: 1.22
Relative gas density	: 1.52
Solubility	: Water: 2000 mg/l Completely soluble.
Partition coefficient n-octanol/water (Log Pow)	: 0.83
Partition coefficient n-octanol/water (Log Kow)	: Not applicable.
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: Not applicable.
Oxidizing properties	: None.
Explosion limits	: No data available

### 9.2. Other information

Gas group	: Press. Gas (Liq.)
Additional information	: Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level.

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

None.

### 10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

### 10.5. Incompatible materials

Alkali metals, Alkaline earth metals, Acetylide forming metals, Chromium, Titanium > 1022°F (550°C), Uranium (U) > 1382°F (750°C), Magnesium > 1427°F (775°C).

### 10.6. Hazardous decomposition products

Electrical discharges and high temperatures decompose carbon dioxide into carbon monoxide and oxygen. The welding process may generate hazardous fumes and gases.



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### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

Acute toxicity	: Not classified
Skin corrosion/irritation	: Not classified pH: 3.7 (carbonic acid)
Serious eye damage/irritation	: Not classified pH: 3.7 (carbonic acid)
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
STOT-single exposure	: Not classified
STOT-repeated exposure	: Not classified
Aspiration hazard	: Not classified

### SECTION 12: Ecological information

#### 12.1. Toxicity

Ecology - general : No ecological damage caused by this product.

#### 12.2. Persistence and degradability

##### Carbon dioxide (124-38-9)

Persistence and degradability	No ecological damage caused by this product.
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#### 12.3. Bioaccumulative potential

##### Carbon dioxide (124-38-9)

BCF - Fish [1]	(no bioaccumulation)
Partition coefficient n-octanol/water (Log Pow)	0.83
Partition coefficient n-octanol/water (Log Kow)	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.

#### 12.4. Mobility in soil

##### Carbon dioxide (124-38-9)

Mobility in soil	No data available.
Ecology - soil	No ecological damage caused by this product.

#### 12.5. Other adverse effects

Effect on ozone layer	: None.
Global warming potential [CO <sub>2</sub> =1]	: 1
Effect on the global warming	: When discharged in large quantities may contribute to the greenhouse effect.

### SECTION 13: Disposal considerations

#### 13.1. Waste treatment methods

Waste treatment methods	: May be vented to atmosphere in a well ventilated place. Discharge to atmosphere in large quantities should be avoided. Do not discharge into any place where its accumulation could be dangerous. Contact supplier if guidance is required.
Product/Packaging disposal recommendations	: Do not attempt to dispose of residual or unused quantities. Return container to supplier.

### SECTION 14: Transport information

In accordance with DOT	
Transport document description (DOT)	: UN1013 Carbon dioxide, 2.2

EN (English US)

SDS ID: P-4574

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UN-No.(DOT)	: UN1013
Proper Shipping Name (DOT)	: Carbon dioxide
Class (DOT)	: 2.2 - Class 2.2 - Non-flammable compressed gas 49 CFR 173.115
Hazard labels (DOT)	: 2.2 - Non-flammable gas



### Additional information

Emergency Response Guide (ERG) Number	: 120
Other information	: No supplementary information available.
Special transport precautions	: Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers: - Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

### Transport by sea

UN-No. (IMDG)	: 1013
Proper Shipping Name (IMDG)	: CARBON DIOXIDE
Class (IMDG)	: 2 - Gases
Division (IMDG)	: 2.2 - Non-flammable, non-toxic gases
MFAG-No	: 120

### Air transport

UN-No. (IATA)	: 1013
Proper Shipping Name (IATA)	: Carbon dioxide
Class (IATA)	: 2 - Gases
Civil Aeronautics Law	: Gases under pressure/Gases nonflammable nontoxic under pressure

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

#### Carbon dioxide (124-38-9)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

### 15.2. International regulations

#### CANADA

#### Carbon dioxide (124-38-9)

Listed on the Canadian DSL (Domestic Substances List)

### EU-Regulations

#### Carbon dioxide (124-38-9)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)



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### 15.2.2. National regulations

#### Carbon dioxide (124-38-9)

Listed introduction on Australian Industrial Chemicals Introduction Scheme (AICIS Inventory)  
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)  
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory  
Listed on the Japanese ISHL (Industrial Safety and Health Law)  
Listed on KECL/KECI (Korean Existing Chemicals Inventory)  
Listed on NZIoC (New Zealand Inventory of Chemicals)  
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)  
Listed on the Canadian IDL (Ingredient Disclosure List)  
Listed on INSQ (Mexican National Inventory of Chemical Substances)  
Listed on the TCSI (Taiwan Chemical Substance Inventory)

### 15.3. US State regulations

#### Carbon dioxide(124-38-9)

U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List





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### SECTION 16: Other information

#### Other information

: When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product.

Fumes and gases produced during welding and cutting processes can be dangerous to your health and may cause serious lung disease. KEEP YOUR HEAD OUT OF FUMES. DO NOT BREATHE FUMES AND GASES. Use enough ventilation, local exhaust, or both to keep fumes and gases from your breathing zone and the general area. Short-term overexposure to fumes may cause dizziness, nausea, and dryness or irritation of the nose, throat, and eyes; or may cause other similar discomfort. Contaminants in the air may add to the hazard of fumes and gases. One such contaminant, chlorinated hydrocarbon vapors from cleaning and degreasing activities, poses a special risk. DO NOT USE ELECTRIC ARCS IN THE PRESENCE OF CHLORINATED HYDROCARBON VAPORS—HIGHLY TOXIC PHOSGENE MAY BE PRODUCED. Metal coatings such as paint, plating, or galvanizing may generate harmful fumes when heated. Residues from cleaning materials may also be harmful. AVOID ARC OPERATIONS ON PARTS WITH PHOSPHATE RESIDUES (ANTI-RUST, CLEANING PREPARATIONS)—HIGHLY TOXIC PHOSPHINE MAY BE PRODUCED.

The opinions expressed herein are those of qualified experts within Linde Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Linde Inc, it is the user's obligation to determine the conditions of safe use of the product.

Linde SDSs are furnished on sale or delivery by Linde or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your sales representative, local distributor, or supplier, or download from [www.lindeus.com](http://www.lindeus.com). If you have questions regarding Linde SDSs, would like the document number and date of the latest SDS, or would like the names of the Linde suppliers in your area, phone or write the Linde Call Center (Phone: 1-800-772-9247; Address: Linde Call Center, Linde Inc, P.O. Box 44, Tonawanda, NY 14151-0044).

Linde asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

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#### NFPA health hazard

: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

#### NFPA fire hazard

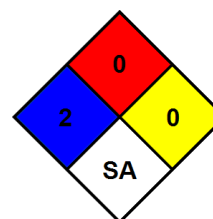
: 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

#### NFPA instability

: 0 - Material that in themselves are normally stable, even under fire conditions.

#### NFPA specific hazard

: SA - This denotes gases which are simple asphyxiants.



SDS US (GHS HazCom 2012) - Praxair OR Linde

*This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.*