# Carbon Dioxide, Solid or Dry Ice

## Safety Data Sheet P-4575


**Issue date:** 01/01/1997  
**Revision date:** 05/23/2022  
**Supersedes:** 02/04/2021  
**Version:** 2.1

### SECTION 1: Product and company identification

1. **Product identifier**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product form</td>
<td>Substance</td>
</tr>
<tr>
<td>Trade name</td>
<td>Dry Ice, UltraIce</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>124-38-9</td>
</tr>
<tr>
<td>Formula</td>
<td>CO₂</td>
</tr>
<tr>
<td>Other means of identification</td>
<td>Dry ice (nuggets, pellets, or blocks), carbonice, carbonic anhydride</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of the substance/mixture</td>
<td>Industrial use; Use as directed.</td>
</tr>
</tbody>
</table>

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

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

1.4. **Emergency telephone number**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
</table>
| 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**

<table>
<thead>
<tr>
<th>GHS US classification</th>
</tr>
</thead>
</table>

2.2. **Label elements**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
</table>
| Hazard statements (GHS US) | MAY CAUSE FROSTBITE.  
MAY CAUSE CRYOGENIC BURNS OR INJURY  
MAY INCREASE RESPIRATION AND HEART RATE.  
VAPOR MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION |
| Precautionary statements (GHS US) | Do not handle until all safety precautions have been read and understood  
Use and store only outdoors or in a well-ventilated place.  
Do not handle with bare hands  
Contact with skin may cause frostbite; flesh may stick to material.  
Use protective gloves  
Dry ice sublimes to carbon dioxide vapor at -109°F (-78°C). VAPOR MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION  
Do not put in closed containers  
Do not enter confined areas where used or stored until areas are adequateley ventilated |

2.3. **Other hazards**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
</table>
| Other hazards which do not result in classification | Refrigerated solidified gas. CONTACT WITH PRODUCT MAY CAUSE COLD BURNS OR FROSTBITE.  
Dry ice sublimes to carbon dioxide vapor at -109°F (-78°C). VAPOR MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION. |

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No data available</td>
</tr>
</tbody>
</table>
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SECTION 3: Composition/Information on ingredients

3.1. Substances

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide, Solid or Dry Ice (Main constituent)</td>
<td>(CAS-No.) 124-38-9</td>
<td>100</td>
</tr>
</tbody>
</table>

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. If breathing is difficult, trained personnel should give oxygen. Call a physician.

First-aid measures after skin contact: MAY CAUSE FROSTBITE. For exposure to liquid, cold vapor, or solid carbon dioxide (dry ice), immediately warm frostbite area with warm water not to exceed 41°C (105°F). 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: 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. Get immediate medical attention.

First-aid measures after ingestion: Rinse mouth out with water. Give water to drink if victim completely conscious/alert. Never give anything by mouth to an unconscious person. Do not induce vomiting. Get immediate medical attention.

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

No additional information available

5.2. Special hazards arising from the substance or mixture

Reactivity: None.

5.3. Advice for firefighters

Firefighting instructions: Evacuate all personnel from danger area. Do not discharge sprays onto solid carbon dioxide. Solid carbon dioxide will freeze water rapidly. NEVER HANDLE SOLID CARBON DIOXIDE WITH YOUR BARE HANDS. USE GLOVES OR DRY ICE TONGS OR A DRY SHOVEL OR SCOOP. Move packages away from fire area if safe to do so. Self-contained breathing apparatus may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures: Use protective clothing. Wear cold-insulating gloves/face shield/eye protection. Chemical asphyxiant. Exposure to low concentrations for extended periods may result in dizziness or unconsciousness, and may lead to death. Wear self-contained breathing apparatus when entering area unless atmosphere is proven to be safe. NEVER HANDLE SOLID CARBON DIOXIDE WITH YOUR BARE HANDS. USE GLOVES OR DRY ICE TONGS OR A DRY SHOVEL OR SCOOP.

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

Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with container supplier/owner instructions.

6.3. Methods and material for containment and cleaning up

No additional information available

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 materials incompatible with cryogenic use; some metals such as carbon steel may fracture easily at low temperature. Vapor can cause rapid suffocation due to oxygen deficiency. Never allow any unprotected part of your body to touch solid carbon dioxide or to touch uninsulated pipes or vessels containing solid or liquid carbon dioxide or cold carbon dioxide gas. Not only can you suffer frostbite, your skin may stick fast to the cold surfaces. Use tongs or insulated gloves when handling solid carbon dioxide or objects in contact cold carbon dioxide in any form. Wear protective clothing and equipment as prescribed in section 8. For other precautions in using carbon dioxide, see section 16.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store and use with adequate ventilation. Do not store in tight containers or confined spaces. Storage areas should be clean and dry. Solid carbon dioxide is generally delivered to customers in 50-lb (22.7-kg), 1/2-cubic ft (0.0142 cubic meter) blocks (approximate dimensions), wrapped in kraft paper. Small pellets or nuggets are also produced. The product should be stored in insulated containers that open from the top. Lids should fit loosely so the carbon dioxide vapor given off as the solid sublimes can escape into the atmosphere. Carbon dioxide gas is about 1 1/2 times as heavy as air and will accumulate in low-lying areas, so ventilation must be adequate at floor or below grade level.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>5000 ppm</td>
<td></td>
<td>9000 mg/m³</td>
<td>5000 ppm</td>
<td>40000 ppm</td>
</tr>
<tr>
<td>ACGIH</td>
<td></td>
<td>30000 ppm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.2. Exposure controls

Appropriate engineering controls: Oxygen detectors should be used when asphyxiating gases may be released. Ensure exposure is below occupational exposure limits (where available). Systems under pressure should be regularly checked for leakages. Provide adequate general and local exhaust ventilation. Consider work permit system e.g. for maintenance activities.

Hand protection: Cold-insulating gloves.

Eye protection: Wear safety glasses with side shields.

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).
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Thermal hazard protection: Wear cold insulating gloves.
Environmental exposure controls: None necessary.
Other information: Wear safety shoes while handling containers.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

- Physical state: Solid
- Appearance: Opaque. White crystalline solid.
- Molecular mass: 44 g/mol
- Color: White.
- Odor: No odor warning properties.
- 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: -78.5 °C
- Freezing point: No data available
- Boiling point: -78.4 °C
- Flash point: Not applicable.
- Critical temperature: 30 °C
- Auto-ignition temperature: Not applicable.
- Decomposition temperature: No data available
- Flammability (solid, gas): No data available
- Vapor pressure: 5730 kPa
- Critical pressure: 7375 kPa
- Relative vapor density at 20 °C: No data available
- Relative density: 0.82
- Density: 1562 kg/m³
- Relative gas density: 1.52
- 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: Not applicable.

9.2. Other information

- Sublimation point: -78.5 °C Expansion ratio for solid to gas at sublimation point is 1 to 554.
- 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

None.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

None.
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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.

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 sensilization: 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, Solid or Dry Ice (124-38-9)
Persistence and degradability: No ecological damage caused by this product.

12.3. Bioaccumulative potential
Carbon Dioxide, Solid or Dry Ice (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, Solid or Dry Ice (124-38-9)
Mobility in soil: No data available.
Ecology - soil: No ecological damage caused by this product.

12.5. Other adverse effects
Other adverse effects: Can cause frost damage to vegetation.
Effect on ozone layer: None.
Global warming potential [CO2=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
Product/Packaging disposal recommendations: Dispose of contents/container in accordance with container supplier/owner instructions.

SECTION 14: Transport information

In accordance with DOT
Transport document description (DOT): UN1845 Carbon dioxide, solid, 9
UN-No.(DOT): UN1845
Proper Shipping Name (DOT): Carbon dioxide, solid
Class (DOT): 9 - Class 9 - Miscellaneous hazardous material 49 CFR 173.140
Hazard labels (DOT): 9 - Class 9 (Miscellaneous dangerous materials)

DOT Symbols: A - Material is regulated as a hazardous material only when transported by air, W - Material is regulated as a hazardous material only when transported by water

Additional information
Emergency Response Guide (ERG) Number: 120 (UN1013)
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): 1845
Proper Shipping Name (IMDG): CARBON DIOXIDE, SOLID (DRY ICE)
Class (IMDG): 9 - Miscellaneous dangerous substances and articles

Air transport
UN-No. (IATA): 1845
Proper Shipping Name (IATA): Carbon dioxide, solid
Class (IATA): 9 - Miscellaneous Dangerous Substances and Articles

SECTION 15: Regulatory information

15.1. US Federal regulations
Carbon Dioxide, Solid or Dry Ice (124-38-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations
CANADA
Carbon Dioxide, Solid or Dry Ice (124-38-9)
Listed on the Canadian DSL (Domestic Substances List)
15.2. National regulations

**Carbon Dioxide, Solid or Dry Ice (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

<table>
<thead>
<tr>
<th>Carbon Dioxide, Solid or Dry Ice (124-38-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. - California - Proposition 65 - Carcinogens List</td>
</tr>
<tr>
<td>U.S. - California - Proposition 65 - Developmental Toxicity</td>
</tr>
<tr>
<td>U.S. - California - Proposition 65 - Reproductive Toxicity - Female</td>
</tr>
<tr>
<td>U.S. - California - Proposition 65 - Reproductive Toxicity - Male</td>
</tr>
<tr>
<td>State or local regulations</td>
</tr>
<tr>
<td>State or local regulations</td>
</tr>
<tr>
<td>State or local regulations</td>
</tr>
</tbody>
</table>

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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.

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.

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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: 3 - Materials that, under emergency conditions, can cause serious or permanent 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) - Linde 2022

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 a specific property of the product.