Dry Ice, Carbon Dioxide, Solid

Safety Data Sheet E-4575

according to the Hazardous Products Regulation (February 11, 2015)

Date of issue: 10-15-1979 Revision date: 06-06-2024 Supersedes: 06-07-2023 Version: 1.1

SECTION 1: Identification

1.1. Product identifier

Product form	:	Substance
Substance name	:	Dry Ice, Carbon Dioxide, Solid
CAS No	:	124-38-9
Formula	:	CO2
Other means of identification	:	Dry ice (nuggets, pellets, or blocks), carbonice, carbonic anhydride
Product group	:	Core Products

1.2. Recommended use and restrictions on use

Recommended uses and restrictions	:	Industrial use

1.3. Supplier

Linde Canada inc.
500 — 5015 Spectrum Way
Mississauga - Canada L4W 0E4
T 1-905-803-1600 - F 1-905-803-1682
www.lindecanada.ca

1.4. Emergency telephone number

Emergency number	:	1-800-363-0042 Call emergency number 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier or Linde sales representative.

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS-CA classification

Simple Asphyxiant

2.2. GHS Label elements, including precautionary statements

GHS-CA labelling

Signal word	:	WARNING
Hazard statements	:	MAY CAUSE CRYOGENIC BURNS OR INJURY MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION VAPOUR MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION MAY INCREASE RESPIRATION AND HEART RATE. MAY CAUSE FROSTBITE.
Precautionary statements	:	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. Dry ice sublimes to carbon dioxide vapor at -109°F (-78°C). VAPOUR MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION Do not enter confined areas where used or stored until areas are adequateley ventilated Do not put in closed containers Use a back flow preventive device in the piping. Close valve after each use and when empty. Protect from sunlight when ambient temperature exceeds 52°C (125°F).

2.3. Other hazards

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). VAPOUR MAY

DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION.

2.4. Unknown acute toxicity (GHS CA)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	CAS No.	% (Vol.)	Common Name (synonyms)
Dry Ice, Carbon Dioxide, Solid (Main constituent)	(CAS No) 124-38-9	100	Dry ice / CARBON DIOXIDE

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped. 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 : 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,Adverse effects not expected from this product.

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 : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/injuries : No additional information available

4.3. Immediate medical attention and special treatment, if necessary

Other medical advice or treatment : None.

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

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

5.2. Unsuitable extinguishing media

No additional information available

5.3. Specific hazards arising from the hazardous product

Reactivity : None.

Reactivity in case of fire : None.

5.4. Special protective equipment and precautions for fire-fighters

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 their provincial and local fire code regulations.

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 their provincial and local fire code regulations.

Protection during firefighting	:	Self-contained breathing apparatus.
Special protective equipment for fire fighters	:	Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
Other information	:	Containers are equipped with a pressure relief device. (Exceptions may exist where authorized.).

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.
Personal Precautions, Protective Equipment and Emergency Procedures	:	General measures : Ensure adequate ventilation. Personal Precautions, Protective Equipment and Emergency Procedures : EVACUATE ALL PERSONNEL FROM AFFECTED AREA. Use appropriate protective equipment. If leak is on user's equipment, be certain to purge piping before attempting repairs. If leak is on a container or container valve contact the closest Linde Canada location.

6.2. Methods and materials for containment and cleaning up

For containment	:	Try to stop release if safe to do so.
Methods for cleaning up	:	Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

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. 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.

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.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Dry Ice, Carbon Dioxide, Solid (124-38-9)		
USA - ACGIH	ACGIH OEL TWA [ppm]	5000 ppm
USA - ACGIH	ACGIH OEL STEL [ppm]	30000 ppm
USA - OSHA	OSHA PEL TWA [1]	9000 mg/m³
USA - OSHA	OSHA PEL TWA [2]	5000 ppm
Canada (Quebec)	VECD (OEL STEV)	54000 mg/m³
Canada (Quebec)	VECD (OEL STEV)	30000 ppm
Canada (Quebec)	VEMP (OEL TWAEV)	9000 mg/m³
Canada (Quebec)	VEMP (OEL TWAEV)	5000 ppm
Alberta	OEL STEL	54000 mg/m³
Alberta	OEL STEL	30000 ppm
Alberta	OEL TWA	9000 mg/m³
Alberta	OEL TWA	5000 ppm
British Columbia	OEL STEL	15000 ppm
British Columbia	OEL TWA	5000 ppm
Manitoba	OEL STEL	30000 ppm
Manitoba	OEL TWA	5000 ppm
New Brunswick	OEL STEL	54000 mg/m³
New Brunswick	OEL STEL	30000 ppm
New Brunswick	OEL TWA	9000 mg/m³
New Brunswick	OEL TWA	5000 ppm
New Foundland & Labrador	OEL STEL	30000 ppm
New Foundland & Labrador	OEL TWA	5000 ppm
Nova Scotia	OEL STEL	30000 ppm
Nova Scotia	OEL TWA	5000 ppm
Nunavut	OEL STEL	30000 ppm
Nunavut	OEL TWA	5000 ppm
Northwest Territories	OEL STEL	30000 ppm
Northwest Territories	OEL TWA	5000 ppm
Ontario	OEL STEL	30000 ppm

Dry Ice, Carbon Dioxide, Solid (124-38-9)		
Ontario	OEL TWA	5000 ppm
Prince Edward Island	OEL STEL	30000 ppm
Prince Edward Island	OEL TWA	5000 ppm
Québec	VECD (OEL STEV)	54000 mg/m³
Québec	VECD (OEL STEV)	30000 ppm
Québec	VEMP (OEL TWAEV)	9000 mg/m³
Québec	VEMP (OEL TWAEV)	5000 ppm
Saskatchewan	OEL STEL	30000 ppm
Saskatchewan	OEL TWA	5000 ppm
Yukon	OEL STEL	27000 mg/m³
Yukon	OEL STEL	15000 ppm
Yukon	OEL TWA	9000 mg/m³
Yukon	OEL TWA	5000 ppm

8.2. Appropriate engineering controls

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

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment : Insulated gloves. Gloves. Face shield. Safety glasses.

Hand protection : Wear work gloves when handling containers. Wear heavy rubber gloves where contact with product may occur.

Eye protection : Wear safety glasses with side shields. Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines. Safety eye wear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.

Respiratory protection : **Respiratory protection:** Use air supplied respirator when working in confined space or where local exhaust or ventilation does not keep exposure below OEL (if applicable). Select in accordance with provincial regulations, local bylaws or guidelines. Respirators should also be approved by NIOSH and MSHA. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Thermal hazard protection : Wear cold insulating gloves. Wear cold insulating gloves when transfilling or breaking transfer connections.

Environmental exposure controls : None necessary.

Other information : **Other protection :** Safety shoes for general handling at customer sites. Metatarsal shoes and cuffless trousers for cylinder handling at packaging and filling plants. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines. For working with flammable and oxidizing materials, consider the use of flame resistant anti-static safety clothing.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

(a) Physical state : Solid

(b) Colour : White.

(c) Odour : No odour warning properties.

Odour threshold : No data available

(d) Melting point : -78.5 °C

Freezing point : No data available

(e) Boiling point	:	-78.4 °C
(f) Flammability	:	Non flammable
(g) Flammability (solid, gas)	:	
(h) Flash point	:	Not applicable.
(i) Auto-ignition temperature	:	Not applicable.
(j) Decomposition temperature	:	No data available
(k) pH	:	3.7 (carbonic acid)
(l) Viscosity, kinematic	:	Not applicable.
(m) Solubility	:	Water: 2000 mg/l Completely soluble.
(n) Partition coefficient – n-octanol/water [log Pow/log Kow]	:	0.83
(o) Vapour pressure	:	5730 kPa
(p) Density	:	1562 kg/m³
Relative gas density	:	1.52
(r) Particle characteristics	:	No data available
(s) Molecular mass	:	44 g/mol
(t) Critical temperature	:	30 °C
(u) Critical pressure	:	7375 kPa
(v) Oxidizing properties	:	None.
(w) Relative evaporation rate (butylacetate=1)	:	No data available
Relative evaporation rate (ether=1)	:	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/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

Reactivity	:	None.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	None.
Conditions to avoid	:	None.
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).
Hazardous decomposition products	:	Electrical discharges and high temperatures decompose carbon dioxide into carbon monoxide and oxygen.

SECTION 11: Toxicological information

11.1 Likely routes of exposure : Inhalation

11.2 Symptoms related to the physical, chemical, and toxicological characteristics : No additional information available

11.3 Delayed and immediate effects and chronic effects

Acute toxicity (oral)	:	Not classified
Acute toxicity (dermal)	:	Not classified

Acute toxicity (inhalation)	:	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
Specific target organ toxicity (single exposure)	:	Not classified
Specific target organ toxicity (repeated exposure)	:	Not classified
Aspiration hazard	:	Not classified

11.4 Toxicity

Dry Ice, Carbon Dioxide, Solid (\f)124-38-9	
LC50 inhalation rat (ppm)	No data available

SECTION 12: Ecological information

12.1. Toxicity

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

12.2. Persistence and degradability

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

12.3. Bioaccumulative potential

Dry Ice, Carbon Dioxide, Solid (124-38-9)	
BCF - Fish [1]	(no bioaccumulation)
Log Pow	0.83
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.

12.4. Mobility in soil

Dry Ice, Carbon Dioxide, Solid (124-38-9)	
Mobility in soil	No data available.
Log Pow	0.83
Log Kow	Not applicable.
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 the ozone layer	:	None.
Global warming potential [CO2=1]	:	1
Effect on global warming	:	When discharged in large quantities may contribute to the greenhouse effect.

SECTION 13: Disposal considerations

Product/Packaging disposal recommendations : Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

SECTION 14: Transport information

14.1. Basic shipping description

In accordance with TDG

TDG

UN-No. (TDG)	:	UN1845
TDG Primary Hazard Classes	:	9 - Class 9 - Miscellaneous Products, Substances or Organisms
Proper shipping name	:	CARBON DIOXIDE, SOLID
Explosive Limit and Limited Quantity Index	:	0
Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index	:	200 kg

14.2. Air and sea transport

IMDG

UN-No. (IMDG)	:	1845
Proper Shipping Name (IMDG)	:	CARBON DIOXIDE, SOLID (DRY ICE)
Class (IMDG)	:	9 - Miscellaneous dangerous substances and articles

IATA

UN-No. (IATA)	:	1845
Proper Shipping Name (IATA)	:	Carbon dioxide, solid
Class (IATA)	:	9 - Miscellaneous Dangerous Goods

SECTION 15: Regulatory information

15.1. National regulations

Dry Ice, Carbon Dioxide, Solid (124-38-9)

Listed on the Canadian DSL (Domestic Substances List)

15.2. International regulations

Dry Ice, Carbon Dioxide, Solid (124-38-9)

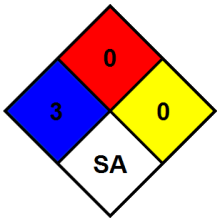
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Listed on INSQ (Mexican National Inventory of Chemical Substances)

SECTION 16: Other information

Date of issue	:	15/10/1979
Revision date	:	06/06/2024
Supersedes	:	07/06/2023

Indication of changes:

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. Linde Canada 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. The opinions expressed herein are those of qualified experts within Linde Canada 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 Canada Inc, it is the user's obligation to determine the conditions of safe use of the product. Linde Canada Inc, SDSs are furnished on sale or delivery by Linde Canada Inc, or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your Linde sales representative, local distributor, or supplier, or download from www.lindecanada.ca.
NFPA health hazard	:	3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.
NFPA fire hazard	:	0 - Materials that will not burn.
NFPA instability	:	0 - Normally stable, even under fire exposure conditions, and are not reactive with water.
NFPA specific hazard	:	SA - This denotes gases which are simple asphyxiants.



HMIS III Rating

Health	:	3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given
Flammability	:	0 Minimal Hazard - Materials that will not burn
Physical	:	0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

SDS Canada (GHS) - Linde NEW

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.