

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Dry Ice	Trade Name: Dry Ice
Product Use: Many	
Chemical Name: Carbon dioxide	Synonym: None.
Chemical Formula: CO ₂	Chemical Family: Not applicable.
Telephone: Emergencies: * 1-800-363-0042	Supplier /Manufacture: Praxair Canada Inc. 1 City Centre Drive Suite 1200 Mississauga, ON L5B 1M2 Phone: 905-803-1600 Fax: 905-803-1682

**Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier or Praxair sales representative.*

2. Hazards Identification

Emergency Overview

CAUTION! Frozen carbon dioxide – extremely cold solid. Can cause severe frostbite. Vaporizes at normal temperatures without forming a liquid. Vapor can cause rapid suffocation. Vapor can increase respiration and heart rate. Vapor may cause nervous system damage. Vapor may cause dizziness and drowsiness. Self-contained breathing apparatus may be required by rescue workers. Odour: None to slightly pungent.

ROUTES OF EXPOSURE: Inhalation. Skin contact. Eye contact.

THRESHOLD LIMIT VALUE: TLV-TWA Data from 2007 Guide to Occupational Exposure Values (ACGIH). TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION: Asphyxiant. Effects are due to lack of oxygen. High concentrations may cause headaches, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. Lack of oxygen can kill.

SKIN CONTACT: Causes severe frostbite.

SKIN ABSORPTION: No harm expected.

SWALLOWING: Causes severe burns.

EYE CONTACT: Vapour may cause a stinging sensation; liquid may cause frostbite.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE:

None.

OTHER EFFECTS OF OVEREXPOSURE:

Damage to retinal ganglion cells and central nervous system may occur.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:

Repeated or prolonged exposure is not known to aggravate medical condition.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION:

None.

CARCINOGENICITY:

Not listed as carcinogen by OSHA, NTP or IARC.

3. Composition and Information on Ingredients

COMPONENTS	CAS NUMBER	CONCENTRATION % by Mole
Carbon dioxide	124-38-9	100

4. First Aid Measures**INHALATION:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. Keep person warm and at rest.

SKIN CONTACT:

For exposure to liquid, immediately warm frostbite area with warm water not to exceed 40 C. In case of massive exposure, remove contaminated clothing while showering with warm water. Call a physician.

SWALLOWING:

Ingestion may cause severe burns on contact. Keep out of reach of children.

EYE CONTACT:

For contact with the liquid, immediately flush eyes thoroughly with warm water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN:

Not applicable.

5. Fire Fighting Measures

FLAMMABLE : No. **IF YES, UNDER WHAT CONDITIONS?** Not applicable.

EXTINGUISHING MEDIA:

This material cannot catch fire. Use media appropriate for surrounding fire.

PRODUCTS OF COMBUSTION:

Not applicable.

PROTECTION OF FIREFIGHTERS:

None.

SPECIFIC PHYSICAL AND CHEMICAL HAZARDS:

None.

SENSITIVITY TO IMPACT:

Avoid impact against container.

SENSITIVITY TO STATIC DISCHARGE:

Not applicable.

PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS:

Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

FLAMMABLE LIMITS IN AIR, % by volume:

LOWER: Not applicable.

UPPER: Not applicable.

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:**Personal Precautions:**

CAUTION! Do not walk on spilled material. Evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Test for sufficient oxygen, especially in confined spaces, before allowing reentry.

Environmental Precautions:

Not applicable.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN HANDLING:

Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. 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. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. For other precautions, see section 16.

For additional information on storage and handling, refer to Compressed Gas Association (CGA) pamphlet P-1, *Safe Handling of Compressed Gases in Containers*, available from the CGA. Refer to section 16 for the address and phone number along with a list of other available publications.

PRECAUTIONS TO BE TAKEN IN STORAGE:

Do not store in tight containers or confined spaces.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:

Frozen carbon dioxide ---extremely cold solid. Contact can cause frostbite. Use piping and equipment adequately designed to withstand pressures to be encountered. Avoid materials incompatible with cryogenic use, some metals such as carbon steel may fracture easily at low temperature. **Vapour can cause rapid suffocation due to oxygen deficiency.** Carbon dioxide gas is heavier than air. It tends to accumulate near the floor of an enclosed space, displacing air and pushing it upward. In still air, this process may also occur in low-lying, below-grade areas outdoors. The effect is to create an oxygen-deficient atmosphere near the floor or ground. Ventilate space before entry. Verify sufficient oxygen concentration.

RECOMMENDED PUBLICATIONS:

Additional information on storage, handling, and use of this product is provided in **NFPA 55: Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders**, published by the National Fire Protection Association.

See also Praxair publication P-14-153, *Guidelines for Handling Gas Cylinders and Containers*. Obtain from your local supplier.

8. Exposure Controls/Personal Protection

INGREDIENTS	CAS NUMBER	LD ₅₀ (Species & Routes)	LC ₅₀ (Rat, 4 hrs.)	Exposure Limits
Carbon dioxide	124-38-9	Not applicable.	Not available.	5000 ppm

THRESHOLD LIMIT VALUE: TLV-TWA Data from 2007 Guide to Occupational Exposure Values (ACGIH). TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH):

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST: Use a local exhaust system, if necessary, to maintain the concentration of carbon dioxide below the TLV in the worker's breathing zone.

MECHANICAL (General): Under certain conditions, general exhaust ventilation may be acceptable to keep carbon dioxide below the exposure limit.

SPECIAL: Not applicable.

OTHER: Not applicable.

PERSONAL PROTECTION:

RESPIRATORY PROTECTION: Use respirable fume respirator or air supplied respirator when working in confined space or where local exhaust or ventilation does not keep exposure below TLV. Select in accordance with the provincial regulations or guidelines. Selection should also be based on the current CSA standards Z94.4, "Selection, care and use of respirators". Respirators should be approved by NIOSH and MSHA.

SKIN PROTECTION: Loose-fitting cryogenic gloves.

EYE PROTECTION: Wear safety glasses when handling cylinders.

Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Protective clothing where needed. Cuffless trousers should be worn outside the shoes. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines.

9. Physical and Chemical Properties

Product Name: Dry Ice

MSDS# E-4575-F

Date: 10/15/2007

PHYSICAL STATE: Solid.	FREEZING POINT: Not applicable.	pH: Not applicable.
BOILING POINT: Sublimation: -78.5 C	VAPOUR PRESSURE: 5775.2 kPa (@ 20°C)	MOLECULAR WEIGHT: 44.01 g/mole
SPECIFIC GRAVITY: Not applicable. LIQUID (Water = 1)	SOLUBILITY IN WATER: Slight.	
SPECIFIC GRAVITY: 1.52 g/ml @ 0 C VAPOUR (air = 1)	EVAPORATION RATE: >1 compared to (Butyl Acetate = 1) (Butyl Acetate=1):	COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable.
VAPOUR DENSITY: 0.00198 g/ml @ 0 C	% VOLATILES BY VOLUME: 100% (v/v).	ODOUR THRESHOLD: Odourless.
APPEARANCE & ODOUR: Colourless. Odourless gas		

10. Stability and Reactivity

STABILITY:	The product is stable.
CONDITIONS OF CHEMICAL INSTABILITY:	Not applicable.
INCOMPATIBILITY (materials to avoid):	Alkali metals, alkaline earth metals, metal acetylides, chromium, titanium above 550 C, uranium above 750 C.
HAZARDOUS DECOMPOSITION PRODUCTS:	In the presence of an electrical discharge, carbon dioxide is decomposed to form carbon monoxide and oxygen.
HAZARDOUS POLYMERIZATION:	Will not occur.
CONDITIONS TO AVOID:	None.
CONDITIONS OF REACTIVITY:	However, in the presence of moisture, carbonic acid will form which may corrode some metals.

11. Toxicological Information

ACUTE DOSE EFFECTS: See section 2.

STUDY RESULTS:

Carbon dioxide is an asphyxiant. It initially stimulates respiration and then causes respiratory depression. High concentrations result in narcosis. Symptoms in humans are as follows:

EFFECTS:

Breathing rate increases slightly.

CO₂

CONCENTRATION:

1%

Breathing rate increases to 50% above normal level. Prolonged exposure can cause headache, tiredness.

2%

Breathing increases to twice normal rate and become labored. Weak narcotic effect. Impaired hearing, headache, increased blood pressure and pulse rate.

3%

Breathing increases to approximately four times normal rate, symptoms of intoxication become evident, and slight choking may be felt.

4 - 5%

Characteristic sharp odor noticeable. Very labored breathing, headache, visual impairment, and ringing in the ears. Judgment may be impaired, followed within minutes by loss of consciousness.

5 - 10%

50 - 100%

Unconsciousness occurs more rapidly above 10% level. Prolonged exposure to high concentrations may eventually result in death from asphyxiation.

12. Ecological Information

No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals. The components of this mixture are not listed as marine pollutants by TDG Regulations.

13. Disposal Considerations

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

14. Transport Information

TDG/IMO SHIPPING NAME: Carbon dioxide, solid or Dry Ice

HAZARD CLASS:	TDG Class 9: Miscellaneous Products	IDENTIFICATION #:	UN1845	PRODUCT RQ:	25 Kg
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SHIPPING LABEL(s): Miscellaneous materials

PLACARD (When Required): Miscellaneous materials

SPECIAL SHIPPING INFORMATION:

Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of vehicle can present serious safety hazards.

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, provincial, and local regulations. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS (Canada): Not a WHMIS controlled material.
No products were found.

International Regulations:

EINECS: Not available.

DSCL (EEC): This product is not classified according to the EU regulations.

International Lists: No products were found.

16. Other Information

MIXTURES:

When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to 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 make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

HAZARD RATING SYSTEM:

HMIS RATINGS:

HEALTH 3

FLAMMABILITY 0

PHYSICAL HAZARD 0

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: Not applicable.

PIN-INDEXED YOKE: Not applicable.

ULTRA-HIGH-INTEGRITY CONNECTION: Not applicable.

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlets V-1 and V-7 listed below.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, Fax (703) 961-1831, website: www.cganet.com.

- AV-1 Safe Handling and Storage of Compressed Gas
- G-6 Carbon Dioxide
- G-6.1 Standard for Low Pressure Carbon Dioxide Systems at Customer Sites
- G-6.2 Commodity Specification for Carbon Dioxide
- G-6.9 Dry Ice
- P-14 Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres
- SB-2 Oxygen-Deficient Atmosphere
- Handbook of Compressed Gases, Fourth Edition

Praxair asks users of this product to study this MSDS and become aware of 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 MSDS 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.

PREPARATION INFORMATION:

DATE: 10/15/2007
DEPARTMENT: Safety and Environmental Services
TELEPHONE: 905-803-1600

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

Praxair Canada Inc. requests the users of this product to study this Material Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

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