

4574

Material Safety Data Sheet

	PRODUCT NAME Carbon Dioxide, Refrigerated Liquid	
	TELEPHONE (800) 523-9999 EMERGENCY RESPONSE INFORMATION ON PAGE 2	
THERMICE CORPORATION 650 Grove Road Thorofare, NJ 08086	TRADE NAME AND SYNONYMS See last page.	CAS NUMBER 124-38-9
	CHEMICAL NAME AND SYNONYMS Carbon Dioxide, Carbonic Anhydride	
ISSUE DATE AND REVISIONS APRIL 1, 1988	FORMULA CO ₂	MOLECULAR WEIGHT 44.01 CHEMICAL FAMILY Carbonate

HEALTH HAZARD DATA (SEE NOTE ON LAST PAGE)

TIME WEIGHTED AVERAGE EXPOSURE LIMIT

5,000 Molar PPM. Its STEL is proposed to be changed from 15,000 Molar PPM to 30,000 Molar PPM (ACGIH, 1984-85).

SYMPTOMS OF EXPOSURE

Nervous system control of respiration is dependent on the CO₂ level breathed in air. By reducing the oxygen level in air, CO₂ can cause suffocation. Symptoms of overexposure include headache, dizziness, shortness of breath, muscular weakness, drowsiness and ringing in the ears. High concentrations produce a faint acid taste and can cause paralysis of the breathing control centers of the nervous system: 2% by volume in the atmosphere will cause a 50% increase in breathing rate; 3%, a 100% rate increase; >4% produces labored breathing and is dangerous for even a few (continued on last page)

TOXICOLOGICAL PROPERTIES

Carbon dioxide is the most powerful cerebral vasodilator known. Inhaling large concentrations causes rapid circulatory insufficiency leading to coma and death. Chronic, harmful effects are not known from repeated inhalation of low (3-5 molar %) concentrations.

Rat, inhalation LCLo 657,190 ppm for 15 minutes.

Rat (10 days preg.), inhalation TCLo 60,000 ppm, 24 hours teratogenic effects.

Human, inhalation TCLo 2,000 ppm pulmonary effects.

Frostbite effects are a change in the color of the skin to gray or white possibly followed by blistering.

Listed as Carcinogen	National Toxicology	Yes <input type="checkbox"/>	I.A.R.C.	Yes <input type="checkbox"/>	OSHA	Yes <input type="checkbox"/>
or Potential Carcinogen	Program	No <input checked="" type="checkbox"/>	Monographs	No <input checked="" type="checkbox"/>		No <input checked="" type="checkbox"/>

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVER-EXPOSURE TO CARBON DIOXIDE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

Inhalation: Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen. Assure that vomited material does not obstruct the airway by use of positional drainage. Medical assistance should be sought immediately.

Frostbite: Flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

HAZARDOUS OTHER LIQUIDS, SOLIDS, OR GASES

Forms carbonic acid in the presence of water. See REACTIVITY DATA Section.

PHYSICAL DATA

BOILING POINT Sublimation point = -109.3°F (-78.5°C)	LIQUID DENSITY AT BOILING POINT @ 0°F Liquid Density = 63.65 lb/ft ³ (1020 kg/m ³)
VAPOR PRESSURE @ 70°F (21.1°C) = 844.7 psia (5824 kPa)	GAS DENSITY AT 70°F 1 atm @ 70°F (21.1°C) = .1144 lb/ft ³ (1.832 kg/m ³)
SOLUBILITY IN WATER @68°F (20°C) Bunsen Coefficient = .8704	FREEZING POINT -69.83°F (-56.57°C) @ 75.1 psia (518 kPa)
APPEARANCE AND ODOR Colorless, odorless gas.	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) N/A	AUTO IGNITION TEMPERATURE N/A	FLAMMABLE LIMITS % BY VOLUME N/A
EXTINGUISHING MEDIA Nonflammable, inert gas.	ELECTRICAL CLASSIFICATION Nonhazardous.	
SPECIAL FIRE FIGHTING PROCEDURES Extinguishing media: Use water spray to cool fire-exposed containers to prevent rupture. This material is non-combustible. It can be used as a fire extinguishing agent primarily for its smothering effect (reduction of oxygen concentration to the point where the immediate atmosphere cannot support combustion).		
UNUSUAL FIRE AND EXPLOSION HAZARDS It is not effective for use on fires involving chemicals that have their own oxygen supply (i.e., cellulose nitrate); or on fires involving reactive metals (such as, potassium, sodium, magnesium, aluminum, titanium, and zirconium), or their hydrides as these materials can decompose carbon dioxide.		

REACTIVITY DATA

STABILITY Unstable		CONDITIONS TO AVOID CO ₂ is stable under ordinary conditions of use and storage. It does not polymerize. It does cause violent
Stable	X	polymerization of acrylaldehyde or ethyleneimine. It decomposes to CO and O ₂ when heated above (continued on last page)
INCOMPATIBILITY (Materials to avoid) An explosion can occur when CO ₂ contacts mixtures of sodium peroxide with aluminum or magnesium. Reactive metals (continued on last page)		
HAZARDOUS DECOMPOSITION PRODUCTS Carbon monoxide.		
HAZARDOUS POLYMERIZATION May Occur		CONDITIONS TO AVOID
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Evacuate area of major spill or release of CO₂. Notify safety personnel. Provide ventilation. Clean-up personnel need special training and protection against contact with very cold materials or excessive inhalation of gaseous CO₂.

WASTE DISPOSAL METHOD

Allow gas to bleed off at a moderate rate or solid to sublime to a well ventilated area.

EMERGENCY RESPONSE INFORMATION

IN CASE OF EMERGENCY INVOLVING THIS MATERIAL

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.		
VENTILATION See local exhaust.	LOCAL EXHAUST To prevent accumulation above the TWA.	SPECIAL
	MECHANICAL (Gen.)	OTHER
PROTECTIVE GLOVES Loose fitting, insulated.		
EYE PROTECTION Safety goggles or glasses.		
OTHER PROTECTIVE EQUIPMENT Safety shoes.		

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION Carbon Dioxide, DOT Shipping Name: Refrigerated Liquid DOT Hazard Class: Nonflammable gas DOT Shipping Label: Nonflammable gas I.D. No.: UN 2187	
SPECIAL HANDLING RECOMMENDATIONS See note on last page regarding Spill or Leak Procedures. Also see CGA Pamphlet G-6, Carbon Dioxide and G-6.1, Standard for Low Pressure Carbon Dioxide Systems at consumer sites. Provide general and local exhaust ventilation to meet TLV requirements. Provide approved supplied-air or self-contained respirators for use in non-routine or emergency situations with exposure above the TLV. A full face-piece is required for concentrations >10%. Provide standby person(s) with rescue equipment where work is required at >15% CO ₂ in air. Workers should use gloves and may require additional protective clothing (apron, face shield, etc. which are resistant to low temperatures) to prevent freeze burns and frostbite if more than momentary contact with CO ₂ at low temperature is possible. For additional handling recommendations consult L'Air Liquide's Encyclopedia de Gaz or Compressed Gas Association Pamphlet P-1.	
SPECIAL STORAGE RECOMMENDATIONS See note on last page regarding Spill or Leak Procedures. Also see CGA Pamphlet G-6, Carbon Dioxide and G-6.1, Standard for Low Pressure Carbon Dioxide Systems at Consumer Sites. Do not store cylinders in sub-surface or closed areas. Carbon dioxide is heavier than air and leaking gas could accumulate in low areas and cause suffocation. For additional storage recommendations consult L'Air Liquide's Encyclopedia de Gaz or Compressed Gas Association Pamphlet P-1.	
SPECIAL PACKAGING RECOMMENDATIONS (FOR GASEOUS CARBON DIOXIDE) Dry carbon dioxide can be handled with most common structural materials. Moist carbon dioxide is corrosive by its formation of carbonic acid. For these applications, 316, 309 and 310 stainless steels may be used as well as Hastelloy® A, B & C and Monel®. Ferrous nickel alloys are slightly corroded. At normal temperatures, carbon dioxide is compatible with most plastics and elastomers. Also see CGA Pamphlet G-6.3 Carbon Dioxide Cylinder Filling and Handling Procedures for Beverage Plants.	
OTHER RECOMMENDATIONS OR PRECAUTIONS Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR). See NOTE on last page.	

*Various Government agencies (i.e., Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which may not be contained herein. The customer or user of this product should



ADDITIONAL DATA

TRADE NAME AND SYNONYMS: (Continued)

Carbon Dioxide, Refrigerated Liquid; Bulk Carbon Dioxide.

HEALTH HAZARD DATA: (Continued)

NOTE: Except where specified, the health hazard data and most of the other data in this material safety data sheet are for gaseous carbon dioxide.

SYMPTOMS OF EXPOSURE: (Continued)

minutes of exposure; >12% causes rapid unconsciousness; a few hours exposure at 25% results in death.

SUMMARY: Inhalation: Low concentrations (3-5 molar %) cause increased respiration and headache. Eight to 15 molar % concentrations cause headache, nausea and vomiting which may lead to unconsciousness if not moved to open air or given oxygen. Higher concentrations cause rapid circulatory insufficiency leading to coma and death.

When refrigerated liquid carbon dioxide is vaporized through an orifice, it can form solid particles of carbon dioxide ("snow" or "dry ice" powder). Continuous dermal contact with this cold snow could result in frostbite or cryogenic (freeze) "burns." Contact with the liquid or solid can produce frostbite and freeze burns.

REACTIVITY DATA: (Continued)

CONDITIONS TO AVOID (Continued)

1700°C. This weakly acidic material will react with alkaline materials to form carbonates and bicarbonates.

INCOMPATIBILITY (MATERIALS TO AVOID) (Continued)

(such as alkali metals, magnesium, aluminum, titanium, or zirconium), their hydrides, and materials like diethyl magnesium, moist cesium oxide, or lithium acetylide with ammonia can ignite in a CO₂ atmosphere. Dry ice can form shock sensitive mixtures with sodium, potassium, or sodium-potassium alloy.

NOTE ON OTHER RECOMMENDATIONS OR PRECAUTIONS (Continued)

Carbon dioxide, refrigerated liquid is delivered to a customer into stationary, insulated vessels at the customer's location. These stationary vessels may have mechanical refrigeration coils within the vapor space in order to maintain the pressure in the vessel or the temperature of the liquid in the vessel.

Stationary customer site vessels should be operated in accordance with the manufacturer's and Thermice's instructions. Do not attempt to repair, adjust or in any other way modify the operation of these vessels. If there is a malfunction or other type of operations problem with the vessel, contact the closest Thermice location immediately.