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**MATERIAL  
SAFETY  
DATA SHEET**  
No. 15

## **SECTION 1. PRODUCT INFORMATION**

NAME : Carbon Dioxide

TRADE NAME AND SYNONYMS: Carbon Dioxide (D.O.T.); Carbonic Anhydride

APPEARANCE AND ODOR : Colorless, odorless gas

CHEMICAL NAME AND SYNONYMS : Carbon Dioxide

CAS # : 124-38-9

DOT I.D. No : UN 1013

DOT HAZARD CLASS : Division 2.2

CHEMICAL FORMULA : CO<sub>2</sub>

CHEMICAL FAMILY : Carbonate

ISSUE DATE AND REVISIONS : Revised March 2006

## **SECTION 2. HEALTH HAZARD DATA**

EMERGENCY OVERVIEW : Carbon Dioxide is a non-flammable gas which is 1½ times heavier than air. When discharged from a high pressure cylinder without regulation it emerges as an aerosol of fine particles of solid material ("dry ice").

Inhalation: Low (3-5 Molar%) concentrations cause increased respiration and headache. Moderate (8-15 Molar%) concentrations cause headache, nausea and vomiting which may lead to unconsciousness if not moved to open air or given Oxygen. High concentrations cause rapid circulatory insufficiency leading to coma and death.

TIME WEIGHTED AVERAGE EXPOSURE LIMIT : Carbon Dioxide has a TWA of 5,000 Molar PPM and an STEL of 30,000 Molar PPM (ACGIH 2005). OSHA 2005 lists a PEL (8 hr. TWA) of 5,000 Molar PPM for Carbon Dioxide

TOXICOLOGICAL PROPERTIES : Carbon Dioxide is the most powerful cerebral vasodilator known. Inhaling high 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.

Carbon Dioxide is not listed in the IARC, NTP or by OSHA as a carcinogen or potential carcinogen. Persons in ill health where such illness would be aggravated by exposure to Carbon Dioxide should not be allowed to work with or handle this product.

RECOMMENDED FIRST AID TREATMENT : PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE 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 assisted respiration and supplemental Oxygen. Further treatment should be symptomatic and supportive.

### **SECTION 3. FIRE AND EXPLOSION HAZARD DATA**

FLASH POINT (METHOD USED) : N/A

AUTO IGNITION TEMPERATURE : N/A

FLAMMABLE LIMITS (% BY VOLUME) LEL = N/A UEL = NA

EXTINGUISHING MEDIA : Nonflammable gas

SPECIAL FIRE FIGHTING PROCEDURES : N/A

UNUSUAL FIRE AND EXPLOSION HAZARDS : If cylinders are involved in a fire, safely relocate or keep cool with water spray.

### **SECTION 4. SPILL OR LEAK PROCEDURES**

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED : Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact the closest supplier location or call the emergency telephone number listed herein.

WASTE DISPOSAL METHOD : Do not attempt to dispose of waste or unused quantities. Return in the shipping container *properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place* to your supplier. For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed herein.

### **SECTION 5. HAZARDOUS MIXTURE PRECAUTIONS**

Forms Carbonic acid in the presence of water

### **SECTION 6. REACTIVITY DATA**

STABILITY : Stable

CONDITIONS TO AVOID : None

INCOMPATIBILITY (MATERIALS TO AVOID) : None

HAZARDOUS DECOMPOSITION PRODUCTS : Carbon Monoxide

HAZARDOUS POLYMERIZATION POTENTIAL : Will not occur

CONDITIONS TO AVOID : None



## **SECTION 7. SPECIAL PRECAUTIONS\***

SPECIAL LABELING INFORMATION : DOT Shipping Name: Carbon Dioxide  
DOT Shipping Label : Nonflammable Gas  
DOT Hazard Class: Division 2.2  
I.D. No.: UN 1013

SPECIAL HANDLING RECOMMENDATIONS : Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinders to lower pressure (<1,500 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

For additional handling recommendations, consult Compressed Gas Association's Pamphlets P-1, G-6, G-6.1 and G-6.2.

SPECIAL STORAGE RECOMMENDATIONS : Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in – first out" inventory system to prevent full cylinders being stored for excessive periods of time.

For additional storage recommendations, consult Compressed Gas Association's Pamphlets P-1, G-6, G-6.1 and G-6.2.

SPECIAL PACKAGING RECOMMENDATIONS : 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, and C and Monel®. Ferrous nickel alloys are slightly corroded.

\*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 will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.

## **SECTION 8. SPECIAL PROTECTION INFORMATION**

RESPIRATORY PROTECTION : 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 the accumulation above the TWA

SPECIAL : N/A

MECHANICAL : N/A

OTHER : N/A

PROTECTIVE GLOVES : Any material

EYE PROTECTION : Safety goggles or glasses

OTHER PROTECTIVE EQUIPMENT : Safety shoes

**SECTION 9. PHYSICAL DATA**

BOILING POINT: Sublimation Point = -109.3°F (-78.5°C)

LIQUID DENSITY AT BOILING POINT: Solid Density = 97.5 lb/ft<sup>3</sup> (1562 kg/m<sup>3</sup>)

VAPOR PRESSURE: @ 70°F (21.1°C) = 856 psia (5900 kPa)

GAS DENSITY AT 70° F, 1atm: 0.114 lb/ft<sup>3</sup> (1.83 kg/m<sup>3</sup>)

SOLUBILITY IN WATER: Very soluble

FREEZING POINT: -69.8°F (-56.6°C) @ 75.1 psia (518 kPa)

EVAPORATION RATE: N/A (Gas)

SPECIFIC GRAVITY (Air =1): @ 70°F (21.1°C) = 1.52

**SECTION 10. ADDITIONAL 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).

Always secure cylinders in an upright position before transporting them. NEVER transport cylinders in trunks of vehicles, enclosed vans, truck cabs or in passenger compartments. Transport cylinders secured in open flatbed or in open pick-up type vehicles.

Reporting under SARA, Title III, Section 313 not required.

NFPA 704 No. for Gaseous Carbon Dioxide = 2 (Health) 0 (Flammability) 0 (Instability) None (Special)

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