

Carbon Dioxide Material Safety Data Sheet

ISSUE DATE	01 March 2016	TRADE NAME AND SYNONYMS Carbon Dioxide (Gas) Dry Ice (Solid Only)	CHEMICAL NAME AND SYNONYMS Carbon Dioxide , Carbonic Anhydride, Carbonic Acid Gas
REVISIONS	V1-02.2016	FORMULA CO ₂ MW : 44.01	CHEMICAL FAMILY Nonmetallic Oxides CAS #124-38-9

HEALTH HAZARD DATA

EXPOSURE LIMITS

OSHA TWA : 10,000 ppm. ACGIH TWA = 5,000 ppm ; OSHA / ACGIH STEL = 30,000 ppm
Carbon Dioxide is not listed by IARC , NTP , or OSHA as a carcinogen.

SYMPTOMS IF INGESTED , CONTACTED WITH SKIN , OR VAPOR INHALED

Carbon Dioxide does not support life but may produce immediately hazardous atmospheres. At a concentration in excess of 1.5% , carbon dioxide may produce hyperventilation , headaches , visual disturbances , tremor , loss of consciousness and death. Symptoms of exposure in the concentration ranges of 1.5 - 5% may be highly variable , but typical symptoms of carbon dioxide intoxication include the following:

CO ₂ Concentration	Symptoms
3 - 6%	Headaches , dyspnea , perspiration
6 - 10%	Headaches , dyspnea , perspiration , tremors , visual disturbance , unconsciousness
Over 10%	Unconsciousness

If the concentration of carbon dioxide exceeds 10% unconsciousness can occur without warning , preventing self-rescue. At much higher concentrations , carbon dioxide displaces the oxygen in air below levels necessary to support life.

TOXICOLOGICAL PROPERTIES

Carbon Dioxide is a minor but important constituent of the atmosphere , averaging about 0.03% or 300 ppm by volume. At higher concentrations it affects the respiratory rate. Additional symptoms are described above.

RECOMMENDED FIRST AND TREATMENT

Persons suffering from the toxic effect of carbon dioxide should be moved to area with normal atmosphere , SELF-CONTAINED BREATHING APPARATUS MAY BE NECESSARY TO PREVENT TOXIC EXPOSURE OR ASPHYXIATION OF RESCUE WORKERS. Assisted respiration and supplement oxygen should be given if the victims is not breathing. Frozen tissues should be flooded or soaked with tepid water (105 -115F;41-46C). DO NOT USE HOT WATER. Cryogenic burns which result in blistering or deeper tissue freezing should be seen promptly by a physician.

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used) N/A	AUTO IGNITION TEMP N/A	FLAMMABLE LIMITS N/A	LEL N/A	UEL N/A
EXTINGUISHING MEDIA Carbon Dioxide is an extinguishing agent for Class B & C fire.		ELECTRICAL CLASSIFICATION GROUP N/A		
SPECIAL FIRE FIGHTING PROCEDURES N/A				
UNUSUAL FIRE AND EXPLOSION HAZARDS N/A				

PHYSICAL DATA

BOILING POINT (°F) @ 1 atm - 109.3F (-78.5 C)		FREEZING POINT (°F) @ 76 psia - 69.9F (-56.6C)		
VAPOR PRESSURE (psia) @ 68F (20C) 831 psia (56.5 atm)		SOLUBILITY IN WATER @ 68F (20C) , 1 atm 87.8% by volume		
VAPOR DENSITY (lb/cu ft) @ 68F (20 C) , 1 atm 0.115	SPECIFIC GRAVITY (AIR = 1) @ 68F (20C) , 1 atm 1.53	LIQUID DENSITY (lb/uc ft) @ -35F (-37C) , 11 atm 68.74	SPECIFIC GRAVITY (H2O=1) solid @ -110F (-79C) , 1 atm 1.56	
APPEARANCE AND ODOR Carbon Dioxide is colorless and odorless as gas or liquid. It is stored in containers under its own vapor pressure. If the pressure is suddenly relieved , the liquid rapidly cools as it evaporates and sublims , forming dry ice at -109.3F (-78.5C)				

REACTIVITY DATA			
STABILITY	UNSTABLE		CONDITIONS TO AVOID None
	STABLE	X	
INCOMPATIBILITY (Materials to avoid) If moisture is present, materials must resist carbonic acid.			HAZARDOUS DECOMPOSITION PRODUCTS None
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID None
	WILL NOT OCCUR	X	
SPILL OR LEAK PROCEDURES			
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Carbon Dioxide in small quantities will vaporize leaving behind carbon dioxide "snow" (a combination of dry ice and water ice where atmospheric moisture is present). Ventilate indoor areas well to avoid hazardous carbon dioxide concentrations. Ventilate well and avoid with cold vapors or dry ice. Carbon Dioxide is a heavy gas and will remain in low spots without assisted ventilation.			
WASTE DISPOSAL METHOD Do not attempt to dispose of residual carbon dioxide in compressed gas cylinders. Return cylinders with residual pressure, the cylinder valve tightly closed, and the valve cap in place. When disposing of bulk quantities of carbon dioxide from refrigerated storage tanks, always dispose of carbon dioxide outside, in a well ventilated location away from work areas, where vapors can disperse. Vent to the atmosphere slowly since rapid depressurization of the container will cause the formation of solid carbon dioxide (dry ice) internally, requiring longer periods to vaporize.			
SPECIAL PROTECTION INFORMATION			
RESPIRATORY PROTECTION (Specify Type) Use self-contained breathing apparatus in oxygen-deficient atmosphere or where carbon dioxide exceeds 1.5%. Caution! Air purifying respirators will not function. Their use may result in asphyxiation.			
VENTILATION Natural or mechanical where gas or vapors are present	LOCAL EXHAUST May be useful at point sources of CO ₂ vapors.	SPECIAL As necessary	
	MECHANICAL (General) Where low lying areas are not naturally ventilated.	OTHER Vents should be situated to avoid higher than normal concentration of carbon dioxide in work areas.	
PROTECTIVE GLOVES Use loose fitting gloves or impermeable material such as leather when working with cold liquid, solid, or vapor			
EYE PROTECTION Safety glasses are recommended when handling high-pressure cylinders and in areas where vapors are discharged.			
OTHER PROTECTIVE EQUIPMENT None			
SPECIAL PRECAUTIONS *			
SPECIAL LABELLING INFORMATION DOT Shipping Name : Carbon Dioxide. DOT Shipping label : Non-flammable Gas. DOT Hazard Class : Non-flammable Gas I.D. number : UN 1013			
SPECIAL HANDLING RECOMMENDATIONS Prevent contact of liquid CO ₂ , cold vapors or carbon dioxide "snow" with exposed skin. Prevent entrapment of liquid in closed systems. Use only in well ventilated areas. Compressed gas cylinders contain gaseous and liquid carbon dioxide at extremely high pressure and should be handled with care. Use a pressure-reducing regulator when connecting to lower pressure piping systems. Secure cylinders when in use. Never use direct flame to heat a compressed gas cylinder. Use a check valve to prevent backflow into storage container. Avoid dragging, rolling, or sliding cylinders, even for a short distance. Use a suitable hand truck.			
SPECIAL STORAGE RECOMMENDATIONS Store liquid containers and cylinders in well-ventilated areas. Keep cylinders away sources of heat. Storage should not be in heavy traffic areas to prevent knocking over or damage from passing or falling objects. Valve caps should remain on cylinders not connected for use. Segregate full and empty cylinders. Storage areas should be free of combustible material. Avoid exposure to areas where salt or other corrosive chemicals are present. Store carbon dioxide cylinders with valve end up.			
OTHER RECOMMENDATIONS OR PRECAUTIONS In applications where temperatures less than -20F (-29C) are expected, avoid the use of carbon steel and other materials which become brittle at low temperatures. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. The atmosphere in areas in which CO ₂ gas may vented and collect should be tested with a portable or continuous monitoring CO ₂ gas analyzer.			