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## 1. CHEMICAL PRODUCT

PRODUCT NAME: CARBON DIOXIDE – Solid (Dry Ice)      SYNONYMS: NONE

## 2. COMPOSITION, INFORMATION ON INGREDIENTS

Ingredient Name	Formula	CAS #	Concentration	Exposure Limits (PPM)			
				ACGIH TLV	OSHA PEL	MAC	Other STEL
CARBON DIOXIDE	CO2	124-38-9	99+%	5,000	5,000	5,000	30,000

Note: NE = NONE ESTABLISHED      S/A = SIMPLE ASPHYXIANT

## 3. HEALTH HAZARD DATA

**Route of Entry-Inhalation:** Yes

**Route of Entry-Skin:** No

**Route of entry-Ingestion:** No

**Health Hazard Acute and Chronic:** Concentration in excess of 1.5% carbon dioxide may cause death. At higher concentrations, displaces oxygen in air below levels necessary to support life.

**Carcinogenicity-NTP:** No **Carcinogenicity-IARC:**

No **Carcinogenicity-OSHA:** No Explanation

**Carcinogenicity:** None

**Signs/Symptoms of Overexposure:** At concentrations >1.5%: Hyperventilation/headaches/ Dyspnea/perspiration. At 6-10%: Headaches/dyspnea/perspiration, tremors, visual disturbances. >10%: Unconsciousness without warning. Cryogenic burns.

## 4. FIRST AID MEASURES

**Emergency/first Aid Procedures:** Inhalation: Remove to fresh air. Assisted respirant and supplemental oxygen should be given if not breathing. Frozen tissues should be flooded/soaked with tepid water. Don't use hot water. Obtain medical attention in all cases.

**Common Name:** Solid Carbon Dioxide/Dry Ice

**Chronic Hazard:** Yes

**Acute Health Hazard-**Severe

**Contact Hazard-**Slight **Fire Hazard**

**Minimal Reactivity Hazard-**None

**Special Hazard Precautions:** Concentration in excess of 1.5% carbon dioxide may cause death. At higher concentrations, displaces oxygen in air below levels necessary to support life.

**Target organs:** Respiratory system, skin

**Protect Eye:** Y

**Protect Skin:** Y

**Protect Respiratory:** Y

## 5. FIRE FIGHTING MEASURES

<b>FLASH POINT</b> (test method):	Not applicable	
<b>AUTOIGNITION TEMPERATURE</b>	Not applicable	
<b>FLAMMABLE LIMITS IN AIR</b> , % by volume	<b>LOWER:</b> Not applicable	<b>UPPER:</b> Not applicable

**EXTINGUISHING MEDIA:** Carbon dioxide cannot catch fire: Use media appropriate for surrounding fire

**SPECIAL FIRE FIGHTING PROCEDURES: WARNING! Frozen carbon dioxide – extremely cold solid. Vapor can cause rapid suffocation.** 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 insulated, loose-fitting gloves and dry ice tongs, or use a dry shovel or scoop. Move packages away from fire area if without risk. Self-contained breathing apparatus may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** None Known

**HAZARDOUS COMBUSTION PRODUCTS:** Not applicable. Thermal decomposition releases carbon monoxide and oxygen

## 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

**Steps if Material released/Spill:** Ventilate indoor areas well to avoid hazardous CO<sub>2</sub> concentrations. Ventilate area well and avoid contact with cold vapors/dry ice. CO<sub>2</sub> is heavy gas and will remain in low spots without

assisted ventilation.

**Special Precautions for Handling of Solid Carbon Dioxide:** Do not handle solid Carbon Dioxide with bare hands. Use heavy gloves, dry ice tongs or plastic scoop or shovel. Handle blocks of dry ice carefully, as injuries can occur if one is accidentally dropped on the feet. Containers of solid Carbon Dioxide should be stored upright and be firmly secured to prevent falling or being knocked over. Containers should be vented, to prevent the build-up of Carbon Dioxide gas. Carbon Dioxide sublimates at  $-78.5^{\circ}\text{C}$  ( $-109.3^{\circ}\text{F}$ ); containers should be thermally insulated and kept at the lowest possible temperature to maintain the solid and avoid generation of Carbon Dioxide gas. Storage containers and equipment used with Carbon Dioxide should not be located in sub-surface or enclosed areas, unless engineered to maintain a concentration of Carbon Dioxide below the TLV (TLV=5000 ppm) in the event of a release. Solid consignment of dry ice in a gas-tight vessel can lead to catastrophic failure of the vessel by over-pressurization. Storage of dry ice should never occur in a gas-tight container.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**ENGINEERING CONTROLS:** Provide adequate general and local exhaust ventilation to maintain concentration below exposure limits.

**EYE / FACE PROTECTION:** Safety glasses. A face shield is also recommended when handling cold liquid, solid or vapor.

**SKIN PROTECTION:** Loose fitting gloves of impermeable material, such as leather, when working with cold liquid, solid or vapor.

**RESPIRATORY PROTECTION:** Use a self-contained breathing apparatus in case of emergency or non-routine use.

**OTHER PROTECTIVE EQUIPMENT:** Safety Gloves when handling Dry Ice.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance and Odor:** colorless, odorless to slightly pungent

**Boiling Point:** -109.4 F

**Melting Point:** -109.3 F

**Vapor Pressure (MM hg/70F):** 831 PSIA

**Solubility in Water:** APPRECIABLE

## 10. STABILITY AND REACTIVITY

**Dry ice sublimates;** if confined in a gas tight container, it will build up a pressure of 850 psig at 70° F. Do not put dry ice in an airtight container or confined space

**Stability:** Yes

**Conditions to Avoid (Stability):** Moisture

**Materials to Avoid:** Carbonic acid/salt/corrosive chemicals

**Hazardous Polymerization Occurrence:** No

## 11. TOXICOLOGICAL INFORMATION

### 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:

### CO2 CONCENTRATION

Breathing rate increases slightly.	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%
Unconsciousness occurs more rapidly above 10% level. Prolonged exposure to high concentrations may eventually result in death from asphyxiation.	50-100%

## 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:** Place outside in a protected area with good ventilation and allow to sublime. Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations. If necessary, call your local supplier for assistance.

## 14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):



## MATERIAL SAFETY DATA SHEET

PROPER SHIPPING NAME: Carbon Dioxide, Solid or Dry Ice  
HAZARD CLASS: 9.2 (nonflammable)  
IDENTIFICATION NUMBER: UN1845  
REPORTABLE QUANTITIES: None  
LABELING: NONFLAMMABLE GAS

SPECIAL PRECAUTIONS: Packages should be transported in a secure position in a well-ventilated vehicle. Product transported in an enclosed, non-ventilated compartment of a 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

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

**Use proper connections; do not use adapters. Do not force fit!!**

#### DISCLAIMER

The information and recommendations in this Material Safety Data Sheet relate only to the specific material mentioned herein and do not relate to use otherwise ie.in combination with any other material or in any process.

The information and recommendations herein are taken from our extensive experiences and the data contained in recognized references and believed by us to be true. Refrigeration group of companies make no warranties either expressed or implied with respect there to and assume no liability in connection with the use of such information and recommendation