Carbon Dioxide, Solid

1 PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: Carbon Dioxide, Solid
Common Name: Dry Ice, Solid
SDS Number: 27
Revision Date: 10/21/2015
Version: 2.0
CAS Number: 124-38-9
Chemical Formula: CO2
Product Use: Industrial Use, Medical and Food Applications
Supplier Details: Roberts Oxygen Company, Inc.
P.O. Box 5507
Rockville, MD 20855

Emergency: Chemtrec: 24 hr/day 7 days/wk (800) 424-9300: for spills, leaks, fire, exposure or accidents involving this product
Phone: Customer Service: (301) 948-8100, Mon through Fri from 7:30 am to 5:00 pm ET
Web: www.robertsoxygen.com

2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS):

no GHS classifications indicated

GHS Label elements, including precautionary statements

GHS Signal Word: NONE

no GHS pictograms indicated for this product

GHS Hazard Statements:

CGA-HG01 - MAY CAUSE FROSTBITE.
CGA-HG03 - MAY INCREASE RESPIRATION AND HEART RATE.
OSHA-H01 - MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION.

GHS Precautionary Statements:

P282 - Wear cold insulating gloves/face shield/eye protection.
OSHA-PG01 - DO NOT REMOVE THIS PRODUCT LABEL (or equivalent wording).
CGA-PG27 - Read and follow the Safety Data Sheet (SDS) before use.

Hazards not otherwise classified (HNOC) or not covered by GHS

Refrigerated solidified gas. CONTACT WITH PRODUCT MAY CAUSE COLD BURNS OR FROSTBITE.
Dry ice sublimes to carbon dioxide vapor at -109°F (-78°C). VAPOR MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION.

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients:

Cas#	%	Chemical Name
124-38-9	100%	Carbon dioxide, solid or Dry ice

4 FIRST AID MEASURES

Inhalation: Remove to fresh air and keep comfortable for breathing. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. Get medical attention immediately. Simple asphyxiant. May cause suffocation by displacing the oxygen in the air. Exposure to oxygen-deficient atmosphere (<19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness and death. Exposure to atmospheres containing 8-10% or less oxygen will bring about unconsciousness without warning and so quickly that the individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death. Depending on concentration and duration of exposure to carbon dioxide may cause increased respirations, headache, mild narcotic effects, increased blood pressure and pulse, and asphyxiation. Symptoms of overexposure become more apparent when atmospheric oxygen is decreased to 15-17%. Contact with liquid may cause cold burns/frostbite

Skin Contact: For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.

Eye Contact: Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an opthalmologist immediately. Get immediate medical attention.

Ingestion: Ingestion is not considered a potential route of exposure.

Symptoms and Effects, Acute and Delayed:
Simple asphyxiant. May cause suffocation by displacing the oxygen in the air. Exposure to oxygen-deficient atmosphere (<19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness and death. Exposure to atmospheres containing 8-10% or less oxygen will bring about unconsciousness without warning and so quickly that the individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death. Depending on concentration and duration of exposure to carbon dioxide may cause increased respirations, headache, mild narcotic effects, increased blood pressure and pulse, and asphyxiation. Symptoms of overexposure become more apparent when atmospheric oxygen is decreased to 15-17%. Contact with liquid may cause cold burns/frostbite.

5 FIRE FIGHTING MEASURES

Flammability:	N/a
Flash Point:	N/a
Flash Point Method:	N/a
Burning Rate:	N/a
Autoignition Temp:	N/a
LEL:	N/a

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 GLOVES OR DRY ICE TONGS OR A DRY SHOVEL OR SCOOP. Move packages away from fire area if safe to do so. Self-contained breathing apparatus may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L-Fire Protection.

6 ACCIDENTAL RELEASE MEASURES

Use protective clothing. Wear cold-insulating gloves/face shield/eye protection. Chemical asphyxiant. Exposure to low concentrations for extended periods may result in dizziness or unconsciousness, and may lead to death. Wear self-contained breathing apparatus when entering area unless atmosphere is proven to be safe. NEVER HANDLE SOLID CARBON DIOXIDE WITH YOUR BARE HANDS. USE GLOVES OR DRY ICE TONGS OR A DRY SHOVEL OR SCOOP.

7 HANDLING AND STORAGE

Handling Precautions:

Avoid materials incompatible with cryogenic use; some metals such as carbon steel may fracture easily at low temperature. Vapor can cause rapid suffocation due to oxygen deficiency. Never allow any unprotected part of your body to touch solid carbon dioxide or to touch uninsulated pipes or vessels containing solid or liquid carbon dioxide or cold carbon dioxide gas. Not only can you suffer frostbite, your skin may stick fast to the cold surfaces. Use tongs or insulated gloves when handling solid carbon dioxide or objects in contact cold carbon dioxide in any form.

For additional storage recommendations, consult Compressed Gas Association's Pamphlet P-1.

Storage Requirements:

Storage Conditions:
Store and use with adequate ventilation. Do not store in tight containers or confined spaces. Storage areas should be clean and dry. Solid carbon dioxide is generally delivered to customers in 50-lb (22.7-kg), ½-cubic ft (0.0142 cubic meter) blocks (approximate dimensions), wrapped in kraft paper. Small pellets or nuggets are also produced. The product should be stored in insulated containers that open from the top. Lids should fit loosely so the carbon dioxide vapor given off as the solid sublimes can escape into the atmosphere. Carbon dioxide gas is about 1½ times as heavy as air and will accumulate in low-lying areas, so ventilation must be adequate at floor or below grade level

For additional storage recommendations, consult Compressed Gas Association's Pamphlets P-1.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls:

Oxygen detectors should be used when asphyxiating gases may be released. Ensure exposure is below occupational exposure limits (where available). Systems under pressure should be regularly checked for leakages. Provide adequate general and local exhaust ventilation. Consider work permit system, e.g., for maintenance activities.

Personal Protective Equipment:

Eye protection: Wear safety glasses with side shields. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Hand protection: Handle gas containers with working gloves. Gloves must be inspected prior to use.

Respiratory Protections: Self-contained breathing apparatus (SCBA) or positive pressure airline masks are to be used in oxygen-deficient atmospheres.

Skin and body protection: Wear hand, head, and body protection to help prevent injury from process-associated hazards. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace and user process and may include arm protectors, hats, and shoulder protection worn over substantial clothing.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Other: Wear leather safety gloves and safety shoes when handling cylinders.

Carbon Dioixde, (124-38-9) Exposure Limits:
OSHA (TWA): 5000 ppm
ACGIH (TWA): 5000 ppm
NIOSH (TWA): 5000 ppm

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Opaque, While Solid		
Physical State:	Solid	**Odor:**	No odor
Odor Threshold:	Not applicable	**Molecular Formula:**	CO_2
Particle Size:	Not applicable	**Solubility:**	Water: 0.145 mg/l
Spec Grav./Density:	1562kg/m³	**Softening Point:**	Not applicable
Viscosity:	0.015 Centipoise	**Percent Volatile:**	Not applicable
Sat. Vap. Conc.:	Not applicable	**Heat Value:**	Not applicable
Boiling Point:	-78.5 °C	**Freezing/Melting Pt.:**	No data available
Flammability:	Non-Flammable	**Flash Point:**	No data available
Partition Coefficient:	Not applicable	**Octanol:**	Not applicable
Vapor Pressure:	Not applicable	**Vapor Density:**	1.522
pH:	3.7	**VOC:**	Not applicable
Evap. Rate:	Not applicable	**Bulk Density:**	Not applicable
Molecular weight:	44 g/mol	**Auto-Ignition Temp:**	Not applicable
Decomp Temp:	Not applicable	**UFL/LFL:**	Not applicable

Triple Point (temp/pressure combination at which CO_2 can exist simultaneously as a solid, liquid or gas) -69.83°F

Temperature of solid: -109.25°F

10 STABILITY AND REACTIVITY

Stability:	No reactivity
Conditions to Avoid:	Due to the presence of carbon dioxide, carbonic acid is formed in the presence of moisture.
Materials to Avoid:	Alkali metals, Alkaline earth metals, Acetylide forming metals, Chromium, Titanium > 1022°F (550°C), Uranium (U) > 1382°F (750°C), Magnesium > 1427°F (775°C).
Hazardous Decomposition:	Electrical discharges and high temperatures decompose carbon dioxide into carbon monoxide and oxygen
Hazardous Polymerization:	None

11 TOXICOLOGICAL INFORMATION

Carbon dioxide, solid or Dry ice (124-38-9) [100%]
Information on toxicological effects
Acute toxicity:
Oral LD50: No data available
Inhalation LC50
Dermal LD50
Other information on acute toxicity
Skin corrosion/irritation: No data available
Serious eye damage/eye irritation: No data available
Respiratory or skin sensitization: No data available
Germ cell mutagenicity: No data available
Carcinogenicity: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC, ACGIH, NTP, OSHA.
Reproductive toxicity: No data available
Teratogenicity: No data available
Specific target organ toxicity - single exposure (Globally Harmonized System): No data available
Specific target organ toxicity - repeated exposure (Globally Harmonized System): No data available
Aspiration hazard: No data available
Potential health effects: Inhalation: May be harmful if inhaled. May cause respiratory tract irritation. Ingestion: May be harmful if swallowed. Skin: May cause severe frostbite. May be harmful if absorbed through skin. May cause skin and eye irritation. Aggravated: Acts as a simple asphyxiant by displacing air.
Medical Condition Signs and Symptoms of Exposure: Nausea, Dizziness, Headache, Low to medium concentrations of carbon dioxide can: affect regulation of blood circulation, the acidity of body fluids, respiratory difficulties. At high concentrations: Breathing difficulties, increased pulse rate, change in body acidity, Very high concentrations can cause: Unconsciousness, death.
Synergistic effects: No data available

12 ECOLOGICAL INFORMATION

Carbon dioxide, solid or Dry ice (124-38-9) [100%]
Information on ecological effects
Toxicity: No data available
Persistence and degradability: No data available
Bioaccumulative potential: No data available
Mobility in soil: No data available
PBT and vPvB assessment: No data available
Other adverse effects: No data available

13 DISPOSAL CONSIDERATIONS

Waste treatment methods:
May be vented to atmosphere in a well-ventilated place. Do not discharge into any place where its accumulation could be dangerous.

Waste disposal recommendations:
Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

14 TRANSPORT INFORMATION

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Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting cylinders, ensure there is adequate ventilation. Ensure that cylinders are firmly secured. Ensure cylinder valve is closed and not leaking. Ensure valve outlet cap (where provided) is correctly fitted. Ensure valve protection device (where provided) is correctly fitted.

15 REGULATORY INFORMATION

Component (CAS#) [%] - CODES

Carbon dioxide, solid or Dry ice (124-38-9) [100%] MASS, OSHAWAC, PA, TSCA, TXAIR

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Regulatory CODE Descriptions
-----------------------------------------------------------------
MASS = MA Massachusetts Hazardous Substances List
OSHAWAC = OSHA Workplace Air Contaminants
PA = PA Right-To-Know List of Hazardous Substances
TSCA = Toxic Substances Control Act
TXAIR = TX Air Contaminants with Health Effects Screening Level
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16 OTHER INFORMATION

When two or more chemicals are mixed, additional, unexpected hazards can be created. It is the User's responsibility to obtain and understand the safety information for all mixture components prior to mixing. It may be necessary for the User to consult a trained professional to determine the hazards from mixing chemicals.

The information contained in this Safety Data Sheet is believed reliable, based on technical information and industry experience. Roberts Oxygen Company, Inc. provides no warranties or guarantees pertaining to the information provided in connection with the safety suggestions made. Moreover, it should not be assumed that every acceptable safety procedure, precaution, or device is listed. Abnormal or unusual circumstances may warrant or suggest further requirements or additional precautions. Roberts Oxygen Company, Inc. requests Users to thoroughly review this SDS and become aware of the product hazards and safety information. It is the User's responsibility to determine the conditions for safe use of the product and to confirm the compatibility of any other materials in their use or processes that come in contact with this product.

User acknowledges that the chemicals listed may be hazardous and must be handled accordingly. User further acknowledges its understanding that the chemicals listed may be classified by OSHA as hazardous chemicals, and that there are hazards associated with the possession, transportation and use of the chemical(s), containers, and related equipment and that the User must take proper account of those hazards and deal with them appropriately.

User shall warn all persons who may be exposed to any hazards relating to the chemical(s), containers, and related equipment. User acknowledges that the Seller has supplied the User with all relevant (Material) Safety Data Sheets (SDS) relating to the Products, and that additional copies of the SDS are available on request. OSHA regulations require User to develop and implement a written chemical hazard communications program for its employees regarding all hazardous chemicals.

Further, federal, state and local regulations may exist that are not addressed.