Safety Data Sheet

Section 1: Identification

Product identifier

Product Name • **Carbon Dioxide (Solid)**

Synonyms • Dry ice

CAS Number • 124-38-9

Product Code • MSDS No. 10041

Relevant identified uses of the substance or mixture and uses advised against

Recommended use • For refrigeration of perishable foods while in transit; as a cooling agent in many industrial processes; as a coolant in vacuum cold traps and laboratories, hospitals and airplanes; to produce theatrical smoke or fog; and, for general analytical/synthetic chemical uses

Details of the supplier of the safety data sheet

Manufacturer • Air Liquide

2700 Post Oak Blvd.
Houston, TX 77056
United States
www.us.airliquide.com

Telephone (Technical) • 713-896-2896

Telephone (Technical) • 800-819-1704

Emergency telephone number

Manufacturer • 800-424-9300 - CHEMTREC

Manufacturer • +1 703-527-3887 - Outside United States

Section 2: Hazard Identification

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012 • Simple Asphyxiant

Label elements

OSHA HCS 2012

WARNING

Hazard statements • May displace oxygen and cause rapid suffocation.

Other hazards

OSHA HCS 2012 • Solid can cause burns similar to frostbite. Inhalation of carbon dioxide can increase respiration and heart rate. Under United States Regulations (29 CFR 1910.1200 -

Hazard Communication Standard), this product is considered hazardous.

Canada

According to WHMIS

Classification of the substance or mixture

WHMIS

- Not classified

Label elements

WHMIS

- Not required

Other hazards

WHMIS

- Solid can cause burns similar to frostbite.
  This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces.
  Inhalation of carbon dioxide can increase respiration and heart rate.
  In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Section 3 - Composition/Information on Ingredients

Substances

Hazardous Components					
Chemical Name	**Identifiers**	**%(weight)**	**LD50/LC50**	**Classifications According to Regulation/Directive**	**Comments**
Carbon dioxide	**CAS:**124-38-9 **EINECS:**204-696-9	> 99%	Inhalation-Rat LC50 • 470000 ppm 30 Minute(s)	**OSHA HCS 2012:** Self Classified - Simple Asphyxiant	NDA

Mixtures

- Material does not meet the criteria of a mixture.

Section 4: First-Aid Measures

Description of first aid measures

Inhalation

- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.

Skin

- Remove contaminated clothing and rinse affected skin with lukewarm water. Do not rinse with hot water. Provide medical prompt attention, frozen tissue is painless and appear waxy, with a possible yellow color. Frozen tissue will become swollen, painful and prone to infection when thawed.

Eye

- If eye tissue is frozen, seek medical attention immediately; if tissue is not frozen, immediately and thoroughly flush the eyes with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation, pain, swelling,

lacrimation or photophobia persist, get medical attention as soon as possible.

Ingestion

- If potentially dangerous quantities of this material have been swallowed, call a physician immediately. Do not induce vomiting unless directed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

Indication of any immediate medical attention and special treatment needed

Notes to Physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred. A potential health hazard associated with this gas is anoxia.

Other information

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO GASES WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn. Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

Section 5: Fire-Fighting Measures

Extinguishing media

Suitable Extinguishing Media

- Use extinguishing agent suitable for type of surrounding fire.

Unsuitable Extinguishing Media

- No data available

Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards

- Substance itself does not pose fire or explosion hazard, but can produce toxic decomposition products under fire conditions.

Hazardous Combustion Products

- No data available

Advice for firefighters

- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
  Wear positive pressure self-contained breathing apparatus (SCBA).
  Move containers from fire area if you can do it without risk.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions

- Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Test for sufficient oxygen, especially in confined spaces and low-lying areas, before allowing reentry. Ventilate the area before entry. Do not touch or walk through spilled material. Use protective clothing to prevent possible cold burns or frostbite.

Emergency Procedures

- Evacuate area. Keep unauthorized personnel away.

Environmental precautions

- Try to stop release. Prevent from entering sewers, basements and workpits, or any

place where its accumulation can be dangerous.

Methods and material for containment and cleaning up

Containment/Clean-up Measures

- Ventilate the area.
  Use gloves and dry ice tongs or a dry shovel or scoop to pick up pieces and move them outdoors.

Section 7 - Handling and Storage

Precautions for safe handling

Handling

- Avoid contact with eyes, skin and clothing. Carbon dioxide is generally delivered as blocks or pellets and should be placed in isolated containers with an upward opening so that sublimation vapors of CO2 may be released. Dry ice should always be manipulated with pliers (blocks) or with appropriate tools. Use only with adequate ventilation. Ventilate closed spaces before entering. Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly ventilated area; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to olfactory fatigue or oxygen deficiency.

Conditions for safe storage, including any incompatibilities

Storage

- Store in a cool, dry, well-ventilated place.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines						
	Result	**ACGIH**	**Canada Ontario**	**Canada Quebec**	**NIOSH**	**OSHA**
Carbon Dioxide (Solid) (124-38-9)	STELs	30000 ppm STEL	30000 ppm STEL	30000 ppm STEV; 54000 mg/m3 STEV	30000 ppm STEL; 54000 mg/m3 STEL	Not established
	TWAs	5000 ppm TWA	5000 ppm TWA	5000 ppm TWAEV; 9000 mg/m3 TWAEV	5000 ppm TWA; 9000 mg/m3 TWA	5000 ppm TWA; 9000 mg/m3 TWA

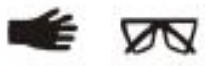
Exposure controls

Engineering Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Pictograms

- 

Respiratory

- Follow the OSHA respirator regulations found in 29 CFR 1910.134. Use a NIOSH/MSHA approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face

- Wear safety glasses.

Skin/Body

- Wear leather gloves when handling containers of this solid.

Environmental Exposure Controls

- Follow best practice for site management and disposal of waste. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Key to abbreviations

MSHA = Mine Safety and Health Administration

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

STEL = Short Term Exposure Limits are based on 15-minute exposures
STEV = Short Term Exposure Value
TWAEV = Time-Weighted Average Exposure Value
ACGIH = American Conference of Governmental Industrial Hygiene
NIOSH = National Institute of Occupational Safety and Health
OSHA = Occupational Safety and Health Administration

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Solid	**Appearance/Description**	White solid with no odor.
Color	White	**Odor**	Odorless
Taste	Data lacking	**Particulate Type**	Not relevant
Particulate Size	Not relevant	**Aerosol Type**	Not relevant
Odor Threshold	Not relevant	**Physical and Chemical Properties**	Data lacking
General Properties			
Boiling Point	Data lacking	**Melting Point**	-109.3 F(-78.5 C) Sublimation temperature
Decomposition Temperature	Data lacking	**Heat of Decomposition**	Data lacking
pH	Not relevant	**Specific Gravity/Relative Density**	Data lacking
Density	Data lacking	**Bulk Density**	Data lacking
Water Solubility	Partially Soluble In cold water	**Solvent Solubility**	Data lacking
Viscosity	Not relevant	**Explosive Properties**	Not explosive.
Oxidizing Properties:	Not an oxidizing gas.		
Volatility			
Vapor Pressure	Data lacking	**Vapor Density**	1.53 Air=1
Evaporation Rate	Data lacking	**VOC (Wt.)**	Data lacking
VOC (Vol.)	Data lacking	**Volatiles (Wt.)**	Data lacking
Volatiles (Vol.)	Data lacking		
Flammability			
Flash Point	Not relevant	**UEL**	Not relevant
LEL	Not relevant	**Autoignition**	Not relevant
Self-Accelerating Decomposition Temperature (SADT)	Not relevant	**Heat of Combustion (ΔHc)**	Not relevant
Burning Time	Not relevant	**Flame Duration**	Not relevant
Flame Height	Not relevant	**Flame Extension**	Not relevant
Ignition Distance	Not relevant	**Flammability (solid, gas)**	Not flammable.
Environmental			
Half-Life	Data lacking	**Octanol/Water Partition coefficient**	Data lacking
Coefficient of water/oil distribution	Data lacking	**Bioaccumulation Factor**	Data lacking

Bioconcentration Factor	Data lacking	**Biochemical Oxygen Demand BOD/BOD5**	Data lacking
Chemical Oxygen Demand	Data lacking	**Persistence**	Data lacking
Degradation	Data lacking		

Section 10: Stability and Reactivity

Reactivity

- No dangerous reaction known under conditions of normal use.

Chemical stability

- Stable under normal temperatures and pressures.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- Excess heat.

Incompatible materials

- No data available

Hazardous decomposition products

- Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11 - Toxicological Information

Information on toxicological effects

Carbon Dioxide (Solid) 124-38-9								
Test Type	**Dosage**	**Route**	**Species**	**Duration**	**Results**	**Test Class**	**Target Organs**	**Comments**
Acute Toxicity	= 470000 ppm	Inhalation	Rat	30 Minute(s)	LC50	NDA	NDA	NDA

GHS Properties	**Classification**
Acute toxicity	**OSHA HCS 2012** • Classification criteria not met
Aspiration Hazard	**OSHA HCS 2012** • Classification criteria not met
Carcinogenicity	**OSHA HCS 2012** • Classification criteria not met
Germ Cell Mutagenicity	**OSHA HCS 2012** • Classification criteria not met
Respiratory sensitization	**OSHA HCS 2012** • Classification criteria not met
Serious eye damage/Irritation	**OSHA HCS 2012** • Classification criteria not met
Skin corrosion/Irritation	**OSHA HCS 2012** • Classification criteria not met
Skin sensitization	**OSHA HCS 2012** • Classification criteria not met
STOT-RE	**OSHA HCS 2012** • Classification criteria not met
STOT-SE	**OSHA HCS 2012** • Classification criteria not met
Toxicity for Reproduction	**OSHA HCS 2012** • Classification criteria not met

Potential Health Effects

Inhalation

Acute (Immediate)
- Inhalation of carbon dioxide can increase respiration and heart rate. If this material is released in a small, poorly ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with decreased levels of oxygen: increase in breathing and pulse rate, emotional upset, abnormal fatigue, nausea, vomiting, collapse, loss of consciousness, convulsive movements, respiratory collapse and death.

Chronic (Delayed)
- No data available

Skin

Acute (Immediate)
- Contact with the solid could result in freezing of the tissues or frostbite.

Chronic (Delayed)
- No data available

Eye

Acute (Immediate)
- Solid can cause burns similar to frostbite.

Chronic (Delayed)
- No data available

Ingestion

Acute (Immediate)
- Ingestion of solid can cause burns similar to frostbite.

Chronic (Delayed)
- No data available

Mutagenic Effects
- No data available.

Carcinogenic Effects
- The components of this material are not found on the following lists: FEDERAL OSHA Z LIST, NTP and IARC; therefore, they are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

Reproductive Effects
- No data available.

Key to abbreviations

LC = Lethal Concentration

Section 12 - Ecological Information

Toxicity

- Material data lacking.

Persistence and degradability

- Material data lacking.

Bioaccumulative potential

- Material data lacking.

Mobility in Soil

- Material data lacking.

Other adverse effects

- Material data lacking.

Section 13 - Disposal Considerations

Waste treatment methods

Product waste
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	UN1845	CARBON DIOXIDE, Solid (Dry ice)	9	III	NDA
TDG	UN1845	CARBON DIOXIDE, Solid (Dry ice)	9.1	III	NDA
IMO/IMDG	UN1845	CARBON DIOXIDE, Solid (Dry ice)	9	III	NDA
IATA/ICAO	UN1845	CARBON DIOXIDE, Solid (Dry ice)	9	III	NDA

Special precautions for user
- No special precautions.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
- Not relevant.

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications
- Acute

State Right To Know				
Component	**CAS**	**MA**	**NJ**	**PA**
Carbon dioxide	124-38-9	Yes	Yes	Yes

Inventory				
Component	**CAS**	**Canada DSL**	**Canada NDSL**	**TSCA**
Carbon dioxide	124-38-9	Yes	No	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

- Carbon dioxide 124-38-9 > 99% A; Uncontrolled product according to WHMIS classification criteria (solid)

Canada - WHMIS - Ingredient Disclosure List

- Carbon dioxide 124-38-9 > 99% 1 %

Environment

Canada - CEPA - Priority Substances List

- Carbon dioxide 124-38-9 > 99% Not Listed

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United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

- Carbon dioxide 124-38-9 > 99% Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

- Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Carbon dioxide 124-38-9 > 99% Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

• Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

• Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

• Carbon dioxide 124-38-9 > 99% Not Listed

United States - Pennsylvania

Labor

U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List

• Carbon dioxide 124-38-9 > 99% Not Listed

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

- Carbon dioxide 124-38-9 > 99% Not Listed

Chemical Safety Assessment

- No Chemical Safety Assessment has been carried out.

Section 16 - Other Information

Last Revision Date
- 12/September/2012

Preparation Date
- 12/September/2012

Disclaimer/Statement of Liability
- To the best of Air Liquide's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this gas mixture is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.

Key to abbreviations

NDA = No Data Available