

Safety Data Sheet



Section 1: Identification

Product identifier

Product Name	• Dry ICE+
Synonyms	• Dry Ice
Product Code	• MSDS No. 30128

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

Recommended use	• Protection against environmental microbial contamination during manufacturing, transportation, distribution and storage.
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Details of the supplier of the safety data sheet

Manufacturer	• Air Liquide 9811 Katy Freeway, Suite 100 Houston, TX 77056 United States www.us.airliquide.com sds@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 Hazards Not Otherwise Classified - Health Hazard - Frostbite
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Label elements

OSHA HCS 2012

WARNING

Hazard statements	• May displace oxygen and cause rapid suffocation.
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Precautionary statements

Prevention	• Do not handle until all safety precautions have been read and understood. - P202 Avoid breathing gas, mists, sprays or vapors. - P261 Do not get in eyes, on skin, or on clothing. - P262 Wear cold insulating gloves, face shield and/or eye protection. - P282
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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**

- No label element(s) 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**

- Material does not meet the criteria of a substance.

Mixtures

Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments
Carbon dioxide	CAS:124-38-9	99.998%	Inhalation-Rat LC50 • 470000 ppm 30 Minute(s)	OSHA HCS 2012: Self Classified: Simple Asphyxiant	Balance
Ozone	CAS:10028-15-6	0.002%	Inhalation-Rat LC50 • 1 mg/m ³ 44 Hour(s)	OSHA HCS 2012: Not Classified	20 ppm

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

- If frostbite has occurred, seek medical attention immediately; do NOT rub the affected area(s) or flush them with water. In order to prevent further tissue damage, do NOT attempt to remove frozen clothing from frostbitten areas. If frostbite has not occurred, immediately and thoroughly wash contaminated skin with soap and water.

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 frostbite has occurred, seek medical attention immediately; do NOT rub the affected area(s) or flush them with water. Never give anything by mouth to an unconscious person. Do NOT induce vomiting.

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.

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 • In case of fire use media as appropriate for surrounding fire.

Unsuitable Extinguishing Media • No data available

Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards • Carbon dioxide does not sustain combustion in any way.

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 • Ventilate the area before entry. Do not walk through spilled material. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Emergency Procedures • Keep unauthorized personnel away. Keep out of low areas. Stay upwind. Do not direct water at spill or source of leak. LARGE SPILL: Consider initial downwind evacuation for at least 500 meters (1/3 mile)

Environmental precautions

- No special environmental precautions necessary.

Methods and material for containment and cleaning up

Containment/Clean-up • Stop leak if you can do it without risk.

Measures

Ventilate the area.
 Allow substance to evaporate.
 Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
 Isolate area until gas has dispersed.

Section 7 - Handling and Storage

Precautions for safe handling**Handling**

- Use only with adequate ventilation. Ventilate closed spaces before entering. Wear appropriate personal protective equipment, avoid direct contact. Avoid breathing gas, mists, sprays or vapors. 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. Do not get in eyes, on skin, or on clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

Conditions for safe storage, including any incompatibilities**Storage**

- 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°C (-109.3°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 overpressurization. Storage of dry ice should never occur in a gas-tight container.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines						
	Result	ACGIH	Canada Ontario	Canada Quebec	NIOSH	OSHA
Ozone (10028-15-6)	STELs	Not established	0.3 ppm STEL; 0.6 mg/m3 STEL	Not established	Not established	Not established
	TWAs	0.05 ppm TWA (heavy work); 0.08 ppm TWA (moderate work); 0.10 ppm TWA (light work); 0.20 ppm TWA (heavy, moderate or light workloads, <=2 hours)	0.1 ppm TWA; 0.2 mg/m3 TWA	Not established	Not established	0.1 ppm TWA; 0.2 mg/m3 TWA
	Ceilings	Not established	Not established	0.1 ppm Ceiling; 0.2 mg/m3 Ceiling	0.1 ppm Ceiling; 0.2 mg/m3 Ceiling	Not established
Carbon dioxide (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 TWA EV; 9000 mg/m3 TWA EV	5000 ppm TWA; 9000 mg/m3 TWA	5000 ppm TWA; 9000 mg/m3 TWA
Exposure Limits/Guidelines(Con't.)						
	Result	OSHA Vacated				
Ozone	STELs	0.3 ppm STEL; 0.6 mg/m3 STEL				

(10028-15-6)	TWAs	0.1 ppm TWA; 0.2 mg/m ³ TWA
Carbon dioxide (124-38-9)	STELs	30000 ppm STEL; 54000 mg/m ³ STEL
	TWAs	10000 ppm TWA; 18000 mg/m ³ 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

Respiratory

- In case of insufficient ventilation, wear suitable respiratory equipment. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face

- Wear safety glasses.

Skin/Body

- Wear leather gloves when handling cylinders. Wear insulating gloves when handling dry ice to prevent physical contact with the dry ice pellets.

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

ACGIH = American Conference of Governmental Industrial Hygiene

NIOSH = National Institute of Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

STEL = Short Term Exposure Limits are based on 15-minute exposures

STEV = Short Term Exposure Value

TWAEV = Time-Weighted Average Exposure Value

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

TWA = exposures

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Solid	Appearance/Description	Opaque white solid with no odor.
Color	Opaque white.	Odor	Irritating/pungent
Odor Threshold	0.05 ppm (ozone)		
General Properties			
Boiling Point	Data lacking	Melting Point	-78.5 F(-61.3889 C) Sublimation temperature
Decomposition Temperature	Data lacking	pH	Not relevant
Specific Gravity/Relative Density	Data lacking	Water Solubility	Partially Soluble In cold water
Viscosity	Not relevant		
Volatility			
Vapor Pressure	Data lacking	Vapor Density	1.014 Air=1
Evaporation Rate	Data lacking		
Flammability			
Flash Point	Not relevant	UEL	Not relevant
LEL	Not relevant	Autoignition	Not relevant

Flammability (solid, gas)	Not flammable.		
Environmental			
Octanol/Water Partition coefficient	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

- No data available

Section 11 - Toxicological Information

Information on toxicological effects

Components		
Carbon dioxide (99.998%)	124-38-9	Acute Toxicity: Inhalation-Rat LC50 • 470000 ppm 30 Minute(s); Reproductive: Inhalation-Rat TClO • 6 pph 24 Hour(s)(10D preg); <i>Reproductive Effects: Specific Developmental Abnormalities: Musculoskeletal system; Reproductive Effects: Specific Developmental Abnormalities: Cardiovascular (circulatory) system; Reproductive Effects: Specific Developmental Abnormalities: Respiratory system</i>
Ozone (0.002%)	10028-15-6	Acute Toxicity: Inhalation-Rat LC50 • 4800 ppb 4 Hour(s); <i>Lungs, Thorax, or Respiration: Acute pulmonary edema; Blood: Hemorrhage;</i> Irritation: Eye-Rabbit • 2 ppm 4 Hour(s)

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
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

Respiratory sensitization	OSHA HCS 2012 • Classification criteria not met
Serious eye damage/Irritation	OSHA HCS 2012 • Classification criteria not met

Potential Health Effects

Inhalation

Acute (Immediate)

- This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces. 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 can cause burns similar to frostbite.

Chronic (Delayed)

- No data available

Key to abbreviations

LC = Lethal Concentration

TC = Toxic 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

- No studies have been found.

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

	UN number	UN proper shipping name	Transport hazard class (es)	Packing group	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 • None known.

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, Pressure(Sudden Release of)

State Right To Know				
Component	CAS	MA	NJ	PA
Carbon dioxide	124-38-9	Yes	Yes	Yes
Ozone	10028-15-6	Yes	Yes	Yes

Inventory				
Component	CAS	Canada DSL	Canada NDSL	TSCA
Carbon dioxide	124-38-9	Yes	No	Yes
Ozone	10028-15-6	No	Yes	Yes

Canada**Labor****Canada - WHMIS - Classifications of Substances**

- | | | |
|------------------|------------|--|
| • Ozone | 10028-15-6 | A, C, D1A, D2A, D2B, F |
| • Carbon dioxide | 124-38-9 | A; Uncontrolled product according to WHMIS classification criteria (solid) |

Canada - WHMIS - Ingredient Disclosure List

- | | | |
|------------------|------------|-----|
| • Ozone | 10028-15-6 | 1 % |
| • Carbon dioxide | 124-38-9 | 1 % |

Environment**Canada - CEPA - Priority Substances List**

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

United States**Labor****U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals**

• Ozone	10028-15-6	100 lb TQ
• Carbon dioxide	124-38-9	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	100 lb EPCRA RQ
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	100 lb TPQ
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	1.0 % de minimis concentration
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

United States - California**Environment****U.S. - California - Proposition 65 - Carcinogens List**

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

United States - Pennsylvania**Labor****U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List**

• Ozone	10028-15-6	
• Carbon dioxide	124-38-9	Not Listed

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

• Ozone	10028-15-6	Not Listed
• Carbon dioxide	124-38-9	Not Listed

Section 16 - Other Information

Last Revision Date	● 25/September/2015
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