

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND THE COMPANY/UNDERTAKING

Product Identifier: Carbon Dioxide (Refrigerated)
Chemical formula: CO₂
Synonyms: Carbon Dioxide (refrigerated)

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

Use of the Substance/Mixture: General Industrial
Restrictions on Use: No data available
Details of the supplier of the safety data sheet: CryoService Ltd
Warndon Business Park
Worcester
Email Address – Technical: info@cryoservice.co.uk
Telephone: +44(0)1905 758300
Emergency telephone number: (24h): +44(0)1905 758300

2. HAZARDS IDENTIFICATION

Classification according to Regulation 1272/2008 (CLP)

Gases under pressure - Refrigerated liquefied gas H281: Contains refrigerated gas; may cause cryogenic burns or injury.

Label Elements according to Regulation 1272/2008 (CLP)

Hazard pictograms/symbols.



Signal Word: Warning
Hazard Statements: H281: Contains refrigerated gas; may cause cryogenic burns or injury.
Precautionary Statements:
Prevention: P282: Wear cold insulating gloves/face shield/eye protection.
Response: P315: Get immediate medical advice/attention.
P336: Thaw frosted parts with lukewarm water. Do not rub affected area.
Storage: P403: Store in a well-ventilated place

Classification (Directive)

Not a hazardous substance or preparation according to EC-directives.
67/548/EEC or 1999/45/EC.
No EC labelling required.

Other hazards

Extremely cold liquid and gas under pressure.
Direct contact with liquid can cause frostbite.
Can cause rapid suffocation.
Avoid breathing gas.
Self contained breathing apparatus (SCBA) may be required.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/Mixture:

Substance

Components	EINECS / ELINCS Number	CAS Number	Concentration (volume)
Carbon Dioxide	204-696-9	124-38-9	100 %

Components	Classification (Directive)	Classification (CLP)	REACH Reg. #
Carbon Dioxide		Press. Gas	

If REACH registration numbers do not appear the substance is either exempt from registration, does not meet the minimum volume threshold for registration, or the registration date has not yet come due.

Concentration is nominal. For the exact product composition, please refer to CryoService Limited technical specifications.

4. FIRST AID MEASURES

Description of first aid measures

General advice:

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye contact:

In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Keep eye wide open while rinsing.

Skin contact:

In case of frostbite, obtain medical treatment immediately. As soon as practical, place the affected area in a warm water bath- which has a temperature not to exceed 40°C (105 °F). Do not rub frozen parts as tissue damage may result. Cover wound with sterile dressing.

Ingestion:

Ingestion is not considered a potential route of exposure.

Inhalation:

Move to fresh air. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. In case of shortness of breath, give oxygen.

Most important symptoms and effects, both acute and delayed

Symptoms:

Shivering fit. Sweating. Blurred vision. Headache. Increased pulse rate. Shortness of breath. Rapid respiration. Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness, salivation, nausea, vomiting, loss of mobility/consciousness.

Indication of any immediate medical attention and special treatment needed

No data available

5. FIRE-FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media:

All known extinguishing media can be used.

Extinguishing media which must not be used for safety reasons:

No data available.

Special hazards arising from the substance or mixture:

Spill will rapidly vaporise forming an oxygen deficient vapor cloud. Vapor cloud may obscure visibility. Do not direct water spray at container vent. Move away from container and cool with water from a protected position. Keep containers and surroundings cool with water spray.

Advice for fire-fighters:

Wear self contained breathing apparatus for fire fighting if necessary.

Further information:

No data available

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:	Monitor carbon dioxide level. Evacuate personnel to safe areas. Ventilate the area. Monitor oxygen level. Wear self-contained breathing apparatus when entering the area unless atmosphere is proved to be safe.
Environmental precautions:	Prevent further leakage or spillage. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Do not discharge into any place where its accumulation could be dangerous.
Methods and material for containment and cleaning up:	Ventilate the area.
Additional advice:	If possible, stop flow of product. Increase ventilation to the release area and monitor oxygen level. Vapor cloud may obscure visibility. Do not spray water directly at leak. If leak is from container or container valve, call the CryoService emergency telephone number. If the leak is in the user's system, close the supply valve and safely vent the pressure before attempting repairs.

7. HANDLING AND STORAGE

Precautions for safe handling

Know and understand the properties and hazards of the product before use. Only experienced and properly instructed persons should handle compressed gases / cryogenic liquid. Before using the product, determine its identity by reading the label. Do not remove or deface labels provided by the supplier for the identification of the container contents. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. If user experiences any difficulty operating container valve discontinue use and contact supplier. Do not remove or interchange connections or use adapters. Ensure the complete gas system has been checked for leaks before use. Prevent entrapment of cryogenic liquid in closed systems not protected with relief device. A small quantity of liquid produces large volumes of vaporised gas at atmospheric pressure. Under normal conditions, these containers will periodically vent product to limit pressure build-up. Ensure that the container is in a well-ventilated area to avoid creating an oxygen-deficient atmosphere. Use adequate pressure relief in systems and piping to prevent pressure build-up; liquid in a closed container can generate extremely high pressures when vapourised by warming. When moving containers, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport containers. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Do not subject containers to abnormal mechanical shocks which may cause damage to their valve or safety devices. Only transfer lines designed for cryogenic liquids shall be used.

Conditions for safe storage, including any incompatibilities

Do not allow storage temperature to exceed 50°C (122°F). Containers should be stored in a designated area which should be well ventilated, preferably in the open air. Where this is not possible fixed Oxygen depletion monitors or permanent forced air ventilation should be considered. Full containers should be stored so that oldest stock is used first. Do not store in a confined space. Store containers in location free from fire risk and away from sources of heat and ignition. Stored containers should be periodically checked for general condition and leakage. Containers should not be stored in conditions likely to encourage corrosion. All vents should be piped to the exterior of the building. Cryogenic containers are equipped with pressure relief devices to control internal pressure. Under normal conditions these containers will periodically vent product. Observe all regulations and local requirements regarding storage of containers.

Specific end use(s)

Refer to section 1 or the extended SDS if applicable.

For further information on storage, handling, and use, consult CryoService Limited.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Exposure limit(s)

Carbon dioxide	Time Weighted Averager (TWA): EH40 WEL	5,000 ppm	9,150 mg/m ³
Carbon dioxide	Short Term Exposure Limit (STEL): EH40 WEL	15,000 ppm	27,400 mg/m ³

If applicable, refer to the extended section of the SDS for further information on CSA.

Exposure controls

Engineering measures

Provide natural or mechanical ventilation to prevent accumulation above exposure limits.
Natural or mechanical ventilation to prevent oxygen deficient atmospheres below 19.5% oxygen.
If indicated in a risk assessment keep self contained breathing apparatus readily available for emergency use.

Personal protective equipment

Respiratory protection: Not required provided use is in a well ventilated area and/or protected by monitoring equipment.

Hand protection: Loose fitting thermal insulated or leather gloves.
The breakthrough time of the selected glove(s) must be greater than the intended use period.

Eye protection: Safety glasses recommended when handling pressurised containers.
Protect eyes, face and skin from liquid splashes.

Skin and body protection: Never allow any unprotected part of the body to touch uninsulated pipes or vessels which contain cryogenic fluids. The extremely cold metal will cause the flesh to stick fast and tear when one attempts to withdraw from it.
Safety shoes are recommended when handling containers.

Special instructions for protection and hygiene: Ensure adequate ventilation, especially in confined areas.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance:	Liquefied gas. Colourless.
Odor:	No odor warning properties.
Odor threshold:	No data available.
pH:	Not applicable.
Melting point/range:	-56.6 °C (-70 °F)
Boiling point/range:	-78.5 °C (-109 °F)
Flash point:	Not applicable.
Evaporation rate:	Not applicable.
Flammability (solid, gas):	No data available.
Upper/lower explosion/flammability limit:	No data available.
Vapour pressure:	831.04 psia (57.30 bar) at 20 °C (68 °F)
Water solubility:	2.000 g/l
Relative vapor density:	1.52 (air = 1)
Relative density:	1.03 (water = 1)
Partition coefficient (n-octanol/water):	Not applicable.
Autoignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	Not applicable.
Explosive properties:	No data available.
Oxidising properties:	No data available.
Molecular Weight:	44 g/mol

10. STABILITY AND REACTIVITY

Reactivity:	Refer to possibility of hazardous reactions and/or incompatible materials sections.
Chemical stability:	Stable under normal conditions.
Possibility of hazardous reactions:	No data available.
Conditions to avoid:	No data available.
Incompatible materials:	Carbon steel. Most plastics due to embrittlement from the low temperatures.
Hazardous decomposition Products:	No data available.

11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Likely routes of exposure

Effects on eye:	Contact with liquid may cause cold burns/frostbite.
Effects on skin:	Contact with liquid may cause cold burns/frostbite. May cause severe frostbite.
Inhalation effects:	Concentrations of 10% CO ₂ or more can produce unconsciousness or death. Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. Carbon Dioxide is physiologically active, affecting circulation and breathing. At concentrations between 2 and 10%, carbon dioxide can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Asphyxiation may bring about unconsciousness without warning and so rapidly that victim may be unable to protect themselves.
Ingestion effects:	Ingestion is not considered a potential route of exposure.
Symptoms:	Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness, salivation, nausea, vomiting, loss of mobility/consciousness.

Acute Toxicity

Acute Oral Toxicity:	No data is available on the product itself.
Inhalation:	Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. 5% CO ₂ has been found to act synergistically to increase the toxicity of certain other gases (CO ₂ , NO ₂). CO ₂ has been shown to enhance the production of carboxy or methemoglobin by these gases possibly due to carbon dioxide's stimulatory effects on the respiratory and circulatory systems.
Acute Dermal Toxicity:	No data is available on the product itself.
Skin corrosion/irritation:	No data available.
Serious eye damage/eye irritation:	No data available.
Sensitisation:	No data available.

Chronic toxicity or effects from long term exposures

Carcinogenicity:	No data available.
Reproductive toxicity:	No data available on the product itself.
Germ cell mutagenicity:	No data available on the product itself.
Specific target organ systemic toxicity (single exposure):	No data available.
Specific target organ systemic toxicity (repeated exposure):	No data available.
Aspiration hazard:	No data available.

12. ECOLOGICAL INFORMATION

Toxicity

Aquatic toxicity: Not applicable.

Toxicity to fish - Components

Carbon Dioxide LC50 (1 h) : 240 mg/l Species: Rainbow trout (*Oncorhynchus mykiss*).

Carbon Dioxide LC50 (96 h) : 35 mg/l Species: Rainbow trout (*Oncorhynchus mykiss*).

Toxicity to other organisms: Not applicable.

Persistence and degradability

No data available.

Bioaccumulative potential

No data is available on the product itself.

Mobility in soil

No data available.

Reults of PBT and vPvB assessment

If applicable, refer to the extended section of the SDS for further information on CSA.

Other adverse effects

When discharged in large quantities may contribute to the greenhouse effect.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods: Return unused product in original container to supplier. Contact supplier if guidance is required.

Contaminated packaging: Return container to supplier.

14. TRANSPORT INFORMATION

ADR

UN/ID No: UN2187
Proper shipping name: CARBON DIOXIDE, REFRIGERATED LIQUID
Class or Division: 2
Tunnel Code: (C/E)
Label(s): 2.2
ADR/RID Hazard ID No: 22

IATA

UN/ID No: UN2187
Proper shipping name: CARBON DIOXIDE, REFRIGERATED LIQUID
Class or Division: 2.2
Label(s): 2.2

IMDG

UN/ID No: UN2187
Proper shipping name: CARBON DIOXIDE, REFRIGERATED LIQUID
Class or Division: 2.2
Label(s): 2.2

RID

UN/ID No: UN2187
Proper shipping name: CARBON DIOXIDE, REFRIGERATED LIQUID
Class or Division: 2
Label(s): 2.2

Further Information

Avoid transport on vehicles where the load space is not separated from the driver's compartment by a gas tight bulk head. 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. The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact CryoService.

15. REGULATORY INFORMATION

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

Country	Regulatory List	Notification
USA	TSCA	Included on Inventory
EU	EINECS	Included on Inventory
Canada	DSL	Included on Inventory
Australia	AICS	Included on Inventory
South Korea	ECL	Included on Inventory
China	SEPA	Included on Inventory
Philippines	PICCS	Included on Inventory
Japan	ENCS	Included on Inventory

WGK Identification Number: Not water endangering.

Chemical Safety Assessment

Refer to extended SDS for CSA information.

This product is either exempt from REACH, does not meet the minimum volume threshold for a CSA, or the CSA has not yet been completed.

16. OTHER INFORMATION

Ensure all national/local regulations are observed.

Hazard Statements:

H281 Contains refrigerated gas; may cause cryogenic burns or injury.

Prepared by: CryoService Limited Safety Department

For additional information, please visit our web site at
<http://www.cryoservice.co.uk>

This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws. Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directive 91/155/EEC, 93/67/EEC and 2000/21/EC.

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.