

MATERIAL SAFETY DATA SHEET
Title: LIQUID CARBON DIOXIDE MATERIAL SAFETY DATA SHEET
Date of Issue: 1 October 2021
Date of Next Review: 1 October 2026

MATERIAL SAFETY DATA SHEET CARBON DIOXIDE, REFRIDGERATED LIQUID



IDENTIFICATION:

Chemical Name: Carbon Dioxide, Refrigerated Liquid
Synonyms: LCO₂, Liquid Carbon Dioxide
UN Number: 2187

Use: Food Freezing, Viticulture.

HAZARDS IDENTIFICATION:

Dangerous Goods Class and Subsidiary Risk: 2.2

HSNO Classification: Not Hazardous

Hazard Statement:
 Contains refrigerated liquid, may cause cryogenic burns and injury.

Precautionary Statements:
 Read label before use.
 Read Safety Data Sheet before use.
 Protect from sunlight and heat.
 Store in a well-ventilated place.
 Wear protective gloves and eye protection.

COMPOSITION / INGREDIENTS:

Chemical Entity	CAS Number	Proportion
Carbon Dioxide	124-38-9	100%

Contains no other components or impurities that will influence the classification of the product.

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FIRST AID MEASURES:

Health Effects

Acute

Swallowed: Can cause cold burn if swallowed.

Eye: Can cause severe cold burn if brought in contact with eye.

Skin: Can cause severe cold burn if brought in contact with skin.

Inhaled: Carbon Dioxide is non-toxic, by diluting the oxygen concentration in air below the level necessary to support life; it can act as an asphyxiant.

Effects of oxygen deficiency are:

16%: breathing and pulse rate increased, impaired thinking and attention, reduced coordination;

14%: Abnormal fatigue upon exertion, emotional upset, faulty coordination, poor judgement;

12.5%: Very poor judgement and coordination, impaired respiration that can cause permanent hearing damage, nausea and vomiting;

Below 10%: Inability to perform various movements, loss of consciousness, convulsions, and death.

The effects of carbon dioxide enrichment are:

1%: Slight and unnoticeable increase in breathing rate;

2%: Breathing becomes deeper and rate will increase above the normal level. Prolonged exposure for several hours may cause a headache and a feeling of exhaustion;

3%: Breathing will start to feel laboured and breathing rate will increase to twice the normal rate. Hearing ability will be reduced; blood pressure and pulse rate will increase. Headaches will also be evident.

4 – 5%: Breathing rate will increase to four times the normal rate. Signs of intoxication will be evident after ½ hour exposure and you will have a slight choking feeling in addition to the symptoms above.

5 – 10%: Carbon dioxide will have a sharp smell. There will be visual disturbance, laboured breathing, headache, and ringing in the ears. Confusion will be followed by loss of consciousness.

10 – 100%: Levels above 10% will lead to rapid loss of consciousness. Further exposure at higher concentrations leads to asphyxiation.

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Chronic

Long term exposure to carbon dioxide has no known health effects. Prolonged exposure to an oxygen deficient atmosphere (below 19% oxygen in air) may affect the heart and nervous system.

Exposure to liquid carbon dioxide can result in cold burns, which need immediate medical attention.

Frozen tissue can die (frostbite).

First Aid

Inhalation: In high concentrations may cause headache, nausea and vomiting, which may lead to unconsciousness as well as asphyxiation.

Symptoms of asphyxiation may include loss of mobility/consciousness.

Remove victim to uncontaminated area whilst wearing self-contained breathing apparatus. Victim may not be aware of asphyxiation.

Keep victim warm and rested. Call a doctor.

Prompt medical attention is mandatory in all cases of overexposure to Carbon Dioxide. Apply artificial respiration if breathing stopped.

Advice to Doctor

Advise doctor that victim has been exposed to carbon dioxide and an oxygen deficient atmosphere.

In case of dry ice formation:

Swallowed: Seek medical attention immediately. Drink large quantities of warm water (not hot) to help thaw affected areas.

In case of liquid exiting cylinder and dry ice formation:

Skin Contact: Solid or liquid carbon dioxide can cause severe cold burn upon contact with skin.

In case of cold burn move the victim to a warm place (about 22°C) but do not apply direct heat. **Never use dry heat.**

Do not rub frozen parts, as tissue damage may result.

Gently, flush the affected areas of the skin with large quantities of unheated tap water. Do not use hot water or any other form of direct heat.

The skin should gradually change colour, via blue, back to pink.

Loosen any clothing that might restrict the circulation to the affected area but take care not to remove any clothing frozen to flesh.

Apply DRY, sterile, non-adhering dressing with a large bulky protective covering to protect the wounds

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Do not apply dry sterile dressing too tightly in case it restricts blood circulation. Keep the affected body part at rest. It will become swollen, painful and prone to infection when thawed.

Treat the person for shock.

Do not give person alcohol to drink or tobacco to smoke. Both will restrict blood flow to the wound and retard recovery.

Obtain medical assistance immediately.

General:

Rescuers should not enter an oxygen deficient atmosphere without using self-contained full face positive pressure breathing equipment.

FIRE FIGHTING MEASURES:

Flammability:

Non Flammable.

Fire/Explosion Hazard:

Non-flammable, however exposure to fire may cause container to rupture/explode. Cylinders involved in a fire/explosion may rocket. Move cylinders from vicinity of fire if safe to do so.

Cool cylinders by spraying flooding quantities of water from a protected location. If unable to keep cylinders cool, evacuate area, minimum distance 200 meters.

Extinguishing Media:

Use appropriate media to extinguish source of surrounding fire. Cool cylinders with water if possible.

Hazchem Code: 2 T

Recommended Protective Clothing:

In confined spaces, use self-contained breathing apparatus.

Thermal protection from cold temperatures are required

ACCIDENTIAL RELEASE MEASURES:

Personal Protection:

Personnel handling liquid carbon dioxide shall be provided with full overalls, safety footwear, safety glasses and leather or PVC gloves.

In areas where equipment failure may cause an immediate high concentration of carbon dioxide, ensure adequate ventilation and have approved self-contained, full face respiratory equipment readily available for emergencies.



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Spills and Disposal:

Ventilate area. Stop leak if it can be done without risk. Allow gas to dissipate to atmosphere. Cold vapours are heavier than air. In case of large spillage evacuate nearby trenches, excavations, pits and the like.

Reference Guide:

Standard SNZ HB 76:2008 Dangerous Goods – Initial Emergency Response Guide.
AS/NZS 1337 – Eye Protection for Industrial Applications
AS/NZS 2161.1 – Occupational Protective Gloves – Selection, use and maintenance
AS/NZS 1715 – Selection, Use and Maintenance of Respiratory Protective Devices
AS/NZS 1716 – Respiratory Protective Devices

General:

Low air temperature due to close proximity of liquefied atmosphere gases can cause hypothermia and all persons at risk should be warmly clad.

Avoid liquid spillage as cold liquids embrittle many materials on contact.

Only experienced and properly instructed personnel should handle liquefied gases.

HANDLING AND STORAGE:

Handling

Flammability: Non Flammable.

General:

Low air temperature due to close proximity of liquefied atmosphere gases can cause hypothermia and all persons at risk should be warmly clad.
Avoid liquid spillage as cold liquids embrittle many materials on contact.

Only experienced and properly instructed personnel should handle liquefied gases.

Approved Handlers:

Approved handlers are not required, non-hazardous gas (HSNO).

Approved Fillers:

Approved Fillers are required when transferring liquid from containers to containers.

Storage:

Keep containers below 50oC in a well ventilated place.

Supplied in portable cryogenic liquid containers or by bulk road tanker to cryogenic storage vessels installed at users' premises.

Separation:

Carbon dioxide can be stored with most common substances.



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Cold vapours are heavier than air. In case of large spillage evacuate nearby trenches, excavations, pits and the like

EXPOSURE CONTROLS / PERSONAL PROTECTION:

Exposure Standards:

TWA 5,000 ppm v/v STEL 30,000 ppm v/v

Engineering Controls:

Provide adequate local exhaust and dilution (general) ventilation and supply sufficient replacement air to maintain oxygen concentration above 19%. Cryogenic liquids embrittle many materials on contact.

Thermal insulation of components in direct contact with liquid carbon dioxide.

Personal Protection:

Personnel handling liquid carbon dioxide shall be provided with full overalls, safety footwear, safety glasses and leather or PVC gloves.

In areas where equipment failure may cause an immediate high concentration of carbon dioxide, ensure adequate ventilation and have approved self-contained, full face respiratory equipment readily available for emergencies.

Reference Guide:

AS/NZS 1337 – Eye Protection for Industrial Applications

AS/NZS 2161.1 – Occupational Protective Gloves – Selection, use and maintenance

AS/NZS 1715 – Selection, Use and Maintenance of Respiratory Protective Devices

AS/NZS 1716 – Respiratory Protective Devices

PHYSICAL AND CHEMICAL PROPERTIES:
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Physical Properties

Appearance: Colourless, sharp odour Flashpoint: non flammable

Sublimation Temp.: -78.5°C

Flammability Limits: Non flammable

Vapour Pressure: (at 15°C) 5090 kPa

Solubility in Water (at 0°C): 1.716 m3/kg

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Other Properties

Relative Density (at 15°C) : (Air = 1): 1.53 (101.3 kPa, 15°C):

Density of Liquid/Gas: 1.873 kg/m³

Molecular Weight: 44.01

Critical Temperature: 31.06°C

STABILITY AND REACTIVITY:

Flammability: Non-flammable.

Materials Compatibility: Not Applicable, If spillage occurs, may cause embrittlement to particular materials.

TOXICOLOGY INFORMATION:

In high concentrations causes rapid circulatory insufficiency. Symptoms are headache, nausea and vomiting, which may lead to unconsciousness.

ECOLOGICAL INFORMATION:

May cause frostbite to plants and vegetation.

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

Global warming factor (CO₂=1) : 1

DISPOSAL CONSIDERATIONS:

Do not discharge into any place where its accumulation could be dangerous. To atmosphere in large quantities should be avoided.

TRANSPORT INFORMATION:

UN Number: 2187

Proper Shipping Name: CARBON DIOXIDE, REFRIDGERATED LIQUID

Dangerous Goods Class and Subsidiary Risk: 2.2

Packing Group: Not applicable

Hazchem Code: 2T

Other Information:

Avoid transport on vehicles where the load 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.

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Before transporting product containers:

Ensure that containers are firmly secured.
Ensure cylinder valve is closed and not leaking.
Ensure there is adequate ventilation.
Compliance with applicable regulations.

REGULATORY INFORMATION:

Environmental Protection Agency Register Approval No: HSR001018

HSNO Controls:

Hazardous Substances (Compressed Gases) Regulations 2004.
Hazardous Substances (Tank Wagon and Transportable Containers) Regulations 2004.

Approved Handlers: Approved handlers are not required, non-hazardous gas (HSNO).

Approved Fillers: Approved Fillers are required when trans filling liquids from container to container.

OTHER INFORMATION:

Bulk Liquid Carbon Dioxide is supplied in Cryogenic Dewars
Liquid Carbon Dioxide (Siphon Tubes) are supplied in High pressure cylinders.

Cylinder Colour:

Industrial – Siphon Dip Tube: AS2700 – Green Grey Body and Shoulders (N32) with a Black stripe down cylinder (N61)

References:

NZS 5433:2007 Transport of Dangerous Goods on Land
EPA Website – Approvals Register – www.epa.govt.nz
SNZ HB76:2008 Dangerous Goods – Initial Emergency Response Guide
AS1678 2C1 Emergency Procedure Guide – Transport – Non-Flammable, Compressed Gas
AS 4484-2004 - Gas Cylinders for Industrial, Scientific, medical and refrigerant use -
Labelling and colour coding
AS 2473.2-2007 - Valves for compressed gas outlets - Part 2 Outlet connections (threaded) and stem (inlet) threads
AS 2473.3-2007 - Valves for compressed gas outlets - Part 3 Outlet connections for medical gases (including pin-indexed yoke connections)
Operators Handbook for the Transport of Dangerous Goods by Road – NZ Road Transport & Logistics Industry Training Organisation
NZCIC Code of Practice – Preparation of Safety Data Sheets



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MSDS SUMMARY:

This MSDS summarises to our best knowledge, at the date of issue, the health and safety hazard information regarding this product and general guidance on how to safely handle the product in the workplace. All due care has been taken to include accurate and up-to-date information in this MSDS.

Each user should read this MSDS and consider the information in the context of how the product will be handled and used in the workplace in conjunction with other products. If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact Southern Gas Services Limited.

As far as lawfully possible, no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this MSDS can be accepted.

Our responsibility for products sold is subject to our standard terms and conditions, a copy of which is available on request.

This MSDS has been prepared in accordance with NZCIC Code of Practice – Preparation of Safety Data Sheets.

This MSDS is subject to change without notice.