Carbon Dioxide, Refrigerated Liquid

Safety Data Sheet

SECTION 1: Identification of the substance/mixture and of the company/undertaking

Product identifier

Product Name **Carbon Dioxide**

Other means of identification

Safety data sheet number **SDS-YO-008**

UN/ID no. UN1013

Trade name **Liquid Carbon Dioxide Grade N3, Beverage Grade LCO2**

Recommended use of the chemical and restrictions on use

Recommended Use Industrial and professional use. Food and Beverage

Uses advised against Consumer use

Details of the supplier of the safety data sheet

Yateem Oxygen W.L.L
P.O. Box 60, Manama, Bahrain
Email: wecare@yateemoxygen.com
Website: www.yateemoxygen.com
Customer Service: +973 17400677

Emergency telephone number

Company Phone Number +973 17400456

Emergency Contact Number +973 17456248; +973 17400675

SECTION 2: Hazards identification

Classification

OSHA Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Gasses under pressure	Refrigerated Liquified gas
Simple asphyxiants	Yes

Label elements

Signal word **Warning**

Hazard Statements

Contains refrigerated gas; may cause cryogenic burns or injury
May displace oxygen and cause rapid suffocation
May increase respiration and heart rate

Precautionary Statements – Prevention

Do not handle until all safety precautions have been read and understood
Use and store only outdoors or in a well-ventilated place
Wear cold insulating gloves, face shield, and eye protection
Use a backflow preventive device in piping
Do NOT change or force fit connections
Close valve after each use and when empty
Always keep container in upright position

Precautionary Statements – Response:

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Get medical attention/advice.
IF ON SKIN:. Get immediate medical advice/attention. Thaw frosted parts with lukewarm water. Do not rub affected area.

Hazards not otherwise classified (HNOC): Not applicable

SECTION 3: Composition/information on ingredients

Chemical Name	CAS No.	Volume %	Chemical Formula
CARBON DIOXIDE	124-38-9	>99	CO_2

SECTION 4: First aid measures

Description of first aid measures

General advice Show this safety data sheet to the doctor in attendance.

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

Skin contact For dermal contact or suspected frostbite, remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if contact with the product has resulted in blistering of the dermal surface or in deep tissue freezing.

Eye contact If frostbite is suspected, flush eyes with cool water for 15 minutes and obtain immediate medical attention.

Ingestion Not an expected route of exposure

Self-protection of the first aider Rescue personnel should be equipped WITH SELF-CONTAINED BREATHING APPARATUS

Most important symptoms and effects, both 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 evaporating liquid may cause cold burns/frostbite.

In Indication of any immediate medical attention and special treatment needed

Note to physicians Treat symptomatically.

SECTION 5: Firefighting measures

Suitable extinguishing media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media None

Specific extinguishing methods

Continue to cool fire exposed cylinders until flames are extinguished. Damaged cylinders should be handled only by specialists.

Specific hazards arising from the chemical

Non-flammable gas. Cylinders may rupture under extreme heat.

Protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, NIOSH (approved or equivalent) and full protective gear.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal precautions	Evacuate personnel to safe areas. Ensure adequate ventilation, especially in confined areas. Monitor oxygen level. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Use personal protection recommended in Section 8
Other information	When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

Environmental precautions

Environmental precautions	Prevent spreading of vapors through sewers, ventilation systems and confined areas.

Methods and material for containment and cleaning up

Methods for containment	Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. If leak is in container or container valve, contact the appropriate emergency telephone number in Section 1 or call your closest Yateem Oxygen location.
Methods for cleaning up	Return Portable Cryogenic Container to Yateem Oxygen

SECTION 7. Handling and Storage

Precautions for safe handling

Advice on safe handling

Never allow any unprotected part ot the body to touch uninsulated pipes or vessels that contain cold fluids. The extremely cold metal will cause moist flesh to stick fast and tear when one attempts to withdraw from it. Do NOT change or force fit connections. For applications with moist Carbon Dioxide, 316, 309 and 310 stainless steels may be used as well as Hastelloy® A, B, & C and Monel®. Ferrous nickel alloys are slightly suspectable to corrosion. At normal temperatures carbon dioxide is compatible with most plastics and elastomers.

Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distance, use a cart designed to transport cylinders. Never attempt to lift a cylinder by its valve protection cap. Never insert an object (e.g. wrench, screwdriver, pry bar,etc.) into valve cap openings. Doing so may damage valve, causing leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Use only with adequate ventilation. Use a backflow preventive device in piping. Close valve after each use and when empty. Ensure the complete gas system has been checked for leaks before use.

Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Never attempt to refill a compressed gas cylinder without the owner's written consent

Only experienced and properly instructed persons should handle gases under pressure. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

For additional recommendations, consult Compressed Gas Association's Pamphlets SB-7, G-4.3, G-4.1, G-4.4, P-2.5, G-4.9, P-14, and SB-2

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Conditions for safe storage, including any incompatibilities

Storage Conditions	Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Stored containers should be periodically checked for general condition and leakage
Incompatible materials	Certain reactive metals, hydrides, moist cesium monoxide, or lithium acetylene carbide diammino may ignite. Passing carbon dioxide over a mixture of sodium peroxide and aluminum or magnesium may explode

SECTION 8: Exposure controls/personal protection

Control parameters

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
CARBPM DIOXIDE	STEL: 30000 ppm	TWA: 5000 ppm	IDLH: 40000 ppm
124-38-9	TWA: 5000 ppm	TWA: 9000 mg/m3 (vacated) TWA: 10000 ppm (vacated) TWA: 18000 mg/m3 (vacated) STEL: 30000 ppm (vacated) STEL: 54000 mg/m3	TWA: 5000 ppm TWA: 9000 mg/m3 STEL: 30000 ppm STEL: 54000 mg/m3

ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value. OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits. NIOSH IDLH: Immediately Dangerous to Life or Health.

Other Information Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Appropriate Engineering Controls

Engineering Controls Local exhaust ventilation to prevent accumulation of high concentrations and maintain air-oxygen levels at or above 19.5%. Oxygen detectors should be used when asphyxiating gases may be released. Systems under pressure should be regularly checked for leakages.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).
If splashes are likely to occur, wear: Goggles. Face-shield.

Skin and body protection Work gloves and safety shoes are recommended when handling cylinders.
Wear cold insulating gloves when handling liquid

Respiratory protection None under normal use. Use positive pressure airline respirator with escape cylinder or self-contained breathing apparatus for oxygen-deficient atmospheres (<19.5%). If exposure limits are exceeded or irritation is experienced, NIOSH approved respiratory protection should be worn. Positive pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice.
Do not get in eyes, on skin, or on clothing

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Physical state	Refrigerated liquified Gas
Appearance	Colorless.
Odor	Odorless
Odor threshold	No information available
pH	Not applicable
Melting/freezing point	Not applicable
Evaporation rate	Not applicable
Flammability (solid, gas)	Non-Flammable gas
Lower flammability limit:	Not applicable
Upper flammability limit:	Not applicable
Flash point	Not applicable

Autoignition temperature	No data available
Decomposition temperature	No data available
Water solubility	0.145 g/ml @25 ^{0}C
Partition coefficient	No data available
Kinematic viscosity	Not applicable

Chemical Name	Molecular weight	Boiling point / range	Vapor Pressure	Vapor density (air =1)	Gas Density kg/m^3@20°C	Critical Temperature
CARBON DIOXIE	44.01	-78.5 °C (sublimes)	838 psig (5778 kpa) @21.1 °C	1.522	1.839	31.1°C

SECTION 9: Stability and Reactivity

Reactivity
Not reactive under normal conditions

Chemical stability
Stable under normal conditions.

Explosion data
Sensitivity to Mechanical Impact None
Sensitivity to Static Discharge None

Possibility of Hazardous Reactions
None under normal processing.

Conditions to avoid
Due to the presence of Carbon dioxide, Carbonic acid is formed in the presence of moisture

Incompatible materials
Certain reactive metals, hydrides, moist cesium monoxide, or lithium acetylene carbide diamino may ignite. Passing carbon dioxide over a mixture of sodium peroxide and aluminum or magnesium may explode.

Hazardous Decomposition Products
Oxygen. Carbon monoxide.

SECTION 11: Toxicological Information

Information on likely routes of exposure

Inhalation	Acidosis, adrenal cortical exhaustion, and other metabolic stresses have resulted from prolonged continuous exposure to 1-2% carbon dioxide (10,000 ppm-20,000 ppm). The ACGIH TLV of 5,000 ppm is expected to provide a good margin of safety from asphyxiation and undue metabolic stress provided sufficient oxygen levels are maintained in the air. Increased physical activity, duration of exposure, and decreased oxygen content can affect systemic and respiratory effects resulting from exposure to carbon dioxide
Skin contact	Contact with evaporating liquid may cause cold burns/frostbite.
Eye contact	Contact with evaporating liquid may cause cold burns/frostbite.
Ingestion	Not an expected route of exposure.

Information on toxicological effects

Symptoms	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%.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	Not classified.
Sensitization	Not classified.
Germ cell mutagenicity	Not classified.
Carcinogenicity	It does not contain any carcinogens or potential carcinogens listed by OSHA, IARC or NTP.
Reproductive toxicity	Not classified.
Developmental Toxicity	Not classified.
STOT - single exposure	Not classified.
STOT - repeated exposure	Not classified.
Chronic toxicity	Chronic harmful effects are not known from repeated inhalation of concentrations below PEL/TLV.
Target Organ Effects	Central Vascular System (CVS), Respiratory system.
Aspiration hazard	Not applicable.

Numerical measures of toxicity

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50	Inhalation LC50 (CGA P20)
CARBON DIOXIDE 124-38-9	-	-	47,000 ppm (Rat)	-

Product Information

Oral LD50	No information available.
Dermal LD50	No information available.
Inhalation LC50	TCLo - 10,000 ppm (Rat) 24 hours/30 days-continuous
Inhalation LC50	No information available.

SECTION 12: Ecological Information

Ecotoxicity
No known acute aquatic toxicity.

Persistence and degradability
No information available

Bioaccumulation
No information available

Global warming potential (GWP) 1

SECTION 13. Disposal Considerations

Waste treatment methods

Disposal of wastes Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to YATEEM OXYGEN for proper disposal.

SECTION 14. Transportation Information

TDG

UN/ID no.	UN2187
Proper shipping name	Carbon Dioxide, refrigerated Liquid
Hazard Class	2.2

IATA

UN/ID no.	UN2187
Proper shipping name	Carbon Dioxide, refrigerated liquid
Hazard Class	2.2
ERG Code	2L

IMDG

UN/ID no.	UN2187
Proper shipping name	Carbon Dioxide, refrigerated liquid
Hazard Class	2.2
EmS-No.	F-C, S-V

SECTION 15. Regulatory Information

National Legislation Complies

SEC https://www.sce.gov.bh/en/index

MTT http://www.transportation.gov.bh/content/caa-laws-and-regulations

OHSC http://www.scosh.org/en/legislation/legislations#legislationContainer

International Inventories

TSC :Complies **DSL/NDSL** :Complies **EINECS/ELINCS** :Complies

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

SEC – Specific Council of Environment

MTT – Ministry of Transport and Telecommunications;

OHSC - Occupational Health and Safety Council

SECTION 16: Other Information

NFPA **Health hazards** 3 **Flammability** 0 **Instability** 0 **Physical and Chemical Properties** Simple asphyxiant

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

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End of Safety Data Sheet