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MSDS V1.1	Liquid Carbon Dioxide	DG008L



Label 2.2: Non flammable, non toxic gas.



NFPA RATING

1 IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

Trade Name	: Carbon Dioxide (Liquid)
Chemical Formula	: CO ₂
Chemical Family	: Acid anhydrides (Acid.)
MSDS No.	: DG008L
Company Identification	: Aldakheel Industrial Gases Plant (DIGAS)
Emergency Phone Number	: 04-8455-101


2 COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS NUMBER	CONCENTRATION
Carbon dioxide (Liquid)	124-38-9	>99%*

*The symbol > means "greater than"

3 HAZARDS IDENTIFICATION

Emergency Overview	: CAUTION! High-pressure liquid and gas. Can cause rapid suffocation. Can increase respiration and heart rate. May cause nervous system damage. May cause frostbite. May cause dizziness and drowsiness. Self-contained breathing apparatus and protective clothing may be required by rescue workers.
Effects of a Single (Acute) Overexposure -Inhalation	: Asphyxiant. Effects are due to lack of oxygen. Moderate concentrations may cause headaches, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. Lack of oxygen can kill.
Skin Contact	: No harm expected from vapour. Liquid may cause frostbite.
Swallowing	: This product is a gas at normal temperature and pressure. Liquid may cause frostbite.
Skin Absorption	: No harm expected from vapour. Liquid may cause frostbite.
Eye Contact	: Vapour may cause a stinging sensation; liquid may cause frostbite.
Effects of Repeated (Chronic) Overexposure	: No evidence of adverse effects from available information.
Other Effects of Overexposure	: Damage to retial ganglion cells and central nervous system may occur.
Medical Conditions Aggravated by Overexposure	: Repeated or prolonged exposure is not known to aggravate medical condition.
Significant Laboratory Data With Possible Relevance to Human Health Hazard Evaluation	: A single study has shown an increase in heart defects in rats exposed to 6% carbon dioxide in air for 24 hours at different time during gestation. There is no evidence that carbon dioxide is tetratogenic in humans.

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4 FIRST AID MEASURES

Inhalation	: If inhaled, remove to fresh air. If not breathing, give artificial respiration. Get medical attention. Keep patient warm and at rest.
Skin/eye contact	: For exposure to liquid, immediately warm frostbite area with warm water not to exceed 41 C. In case of massive exposure, remove contaminated clothing while showering with warm water. Call a physician.
Swallowing	: This product is a gas at normal temperature and pressure.
Eye Contact	: For contact with the liquid, immediately flush eyes thoroughly with warm water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed throughly. See a physician, preferably an ophthalmologist, immediately.
Notes to Physician	: There is no specific antidote. Treatment of over-exposure should be directed at the control of symptoms and the clinical condition. Victim may not be aware of asphyxiation.

5 FIRE-FIGHTING MEASURES


Flammable class	: Non flammable.
Extinguishing media	
Suitable extinguishing media	: All known extinguishants can be used.
Hazardous combustion products	: None.
Specific physical and chemical hazards	: Gas cannot catch fire. Container may rupture due to heat of fire. No part of a container should be subjected to a temperature higher than 52 C. Most containers are provided with a pressure relief device designed to vent contents when they are exposed to elevated temperature.
Specific methods	: If possible, stop flow of product. Move away from the container and cool with water from a protected position. If leaking do not spray water on to container. Water surrounding area (from protected position) to contain fire.
Sensitivity to Impact	: Avoid impact against container.
Sensitivity to Static Discharge	: Not applicable.
Protective equipment and precautions for firefighters	: Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

6 ACCIDENTAL RELEASE MEASURES

Personal precautions	: Evacuate area. Ensure adequate air ventilation. Use protective clothing. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
Environmental precautions	: Try to stop release. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
Clean up methods	: Ventilate area.

7 HANDLING AND STORAGE

Precautions to be taken in handling	: Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact DIGAS.
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7 HANDLING AND STORAGE (Continued)


Precautions to be taken in storage : Store and use with adequate ventilation. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 52 C. Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls
Local exhaust : Preferred.
Mechanical (General) : General exhaust ventilation may be acceptable if it can maintain an adequate supply of air.
Special : Not applicable.
Other : Not applicable.
Personal protection
Respiratory Protection : Use air supplied respirator when working in confined space or where local exhaust or ventilation does not keep exposure below TLV.
Skin Protection : Insulated neoprene gloves.
Eye/Face Protection : Wear safety glasses when handling cylinders.
Other Protective Equipment : Metatarsal shoes for cylinder handling. Protective clothing where needed.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Colourless.
Odor	: Odourless gas. It is felt by some to have a slight, pungent odour and biting taste.
Odor Thresold	: Odourless.
Physical State	: Compressed Liquefied Gas.
pH	: Not applicable.
Boiling Point	: Sublimation -78.5 C
Flash Point (test method)	: Not applicable.
Freezing Point	: Not applicable.
Evaporation Rate (Butyl Acetate = 1)	: >1 compared to (Butyl Acetate = 1)
Flammable Limits in Air, % by volume	: LOWER Not applicable UPPER Not applicable
Vapor Pressure	: 5775.2 k Pa (@ 20°C)
Vapor Density	: 0.00198 g/ml @ 0 C
Specific Gravity Liquid (Water =1)	: Not applicable.
Specific Gravity Vapor (Air = 1)	: 1.522g/ml @ 0 °C
Solubility In Water	: Slight.
Coefficient of water/oil distribution	: Not applicable.
Autoignition Temperature	: Not applicable.
Percent Volatiles by Volume	: 100% (v/v)
Molecular Weight	: 44.01 g/mole
Molecular Formula	: CO ₂

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10 STABILITY AND REACTIVITY


Stability	: The product is stable.
Conditions of Chemical Instability	: Not applicable.
Incompatibility (materials to avoid)	: Alkali metals, alkaline earth metals, metal acetylides, chromium, titanium above 550 C, uranium above 750 C.
Hazardous Decomposition Products	: In the presence of an electrical discharge, carbon dioxide is decomposed to form carbon monoxide and oxygen.
Hazardous Polymerization	: will not occur.
Conditions to Avoid	: None Known.
Conditions to Reactivity	: None Known.

11 TOXICOLOGICAL INFORMATION

Acute Dose Effect	: LC50 = 90,000 ppm, 5 min., human
Study Results	: Carbon dioxide is an asphyxiant. It initially stimulates respiration and then causes respiratory depression. High concentrations result in narcosis. Symptoms in humans are as follows:
Effect:	: CO2
	: Concentration:
-Breathing rate increases slightly	: 1%
-Breathing rate increases to 50% above normal level. Prolonged exposure can cause headache, tiredness.	: 2%
Breathing increases to twice normal rate and becomes labored. Weak narcotic effect. Impaired hearing, headache, increased blood pressure and pulse rate.	: 3%
Breathing increases to approximately four times normal rate, symptoms of intoxication become evident, and slight choking may be felt.	: 4%-5%
Characteristic sharp odor noticeable. Very labored breathing, headache, visual impairment, and ringing in the ears. Judgment may be impaired, followed within minutes by loss of consciousness.	: 5%-10%
-Unconsciousness occurs more rapidly above 10%level. Prolonged exposure to high concentrations may eventually result in death from asphyxiation.	: 10%-100%
Reproductive Effects	: A single study has shown an increase in heart defects in rats exposed to 6% carbon dioxide in air for 24 hours at different times during gestation. There is no evidence that carbon dioxide is teratogenic in humans.

12 ECOLOGICAL INFORMATION

Ecological Information	: No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals.
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13 DISPOSAL CONSIDERATION

Waste Disposal Method : Do not attempt to dispose of residual or unused quantities. Return cylinder to DIAGAS.

14 TRANSPORT INFORMATION

Transport Information

- : Avoid transport on vehicles where the load space 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.
- : Before transporting product containers
 - Ensure that containers are firmly secured.
 - Ensure cylinder valve is closed and not leaking.
 - Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
 - Ensure valve protection device (where provided) is correctly fitted.
 - Ensure there is adequate ventilation.
 - Compliance with applicable regulations.

15 OTHER INFORMATION

Asphyxiant in high concentrations.
Keep container in a well-ventilated place.
Do not breathe the gas.
Ensure all national/local regulations are observed.
The hazard of asphyxiation is often overlooked and must be stressed during operator training.

HAZARD RATING SYSTEMS:

NFPA Ratings:

Health =2
 Flammability =0
 Instability =0

HMIS Ratings:

Health =1
 Flammability =0
 Physical Hazard =3

STANDARD VALVE CONNECTIONS:

THREADED : CGA-320
PIN-INDEX YOKE : CGA-940 (Medical Use)

Use the proper CGA connections. **DO NOT USE ADAPTERS.**

This Material Safety Data Sheet has been established for the best knowledge of DIGAS.

Details given in this document are believed to be correct at the best of DIGAS knowledge. 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.

End of Documents.