



Carbon dioxide

Safety Data Sheet

According to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

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Carbon dioxide

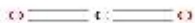
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SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

PRODUCT NAME: Carbon dioxide
CAS RN: 124-38-9
EC#: 204-696-9
SYNONYM: Anhydride carbonique, Carbonic acid anhydride, Carbon dioxide, Carbonic acid gas, Carbonic anhydride, Carbon oxide, Dry ice
SYSTEMATIC NAME: Carbon dioxide.
MOLECULAR FORMULA: CO₂
STRUCTURAL FORMULA:



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

1.2.1. Relevant identified uses

Humans use carbon dioxide in many different ways. The most familiar example is its use in soft drinks and beer, to make them fizzy. Carbon dioxide released by baking powder or yeast makes cake batter rise. Some fire extinguishers use carbon dioxide because it is denser than air. Carbon dioxide can blanket a fire, because of its heaviness. It prevents oxygen from getting to the fire and as a result, the burning material is deprived of the oxygen it needs to continue burning.

Carbon dioxide is also used in a technology called supercritical fluid extraction that is used to decaffeinate coffee. The solid form of carbon dioxide, commonly known as Dry Ice, is used in theatres to create stage fogs and make things like "magic potions" bubble.

Uses advised against: None

1.3. Details of the supplier of the safety data sheet

Jubilant Ingrevia Limited

FACTORY AND REGISTERED OFFICE ADDRESS: Jubilant Ingrevia Limited, Bhartiagram, Gajraula, District: Amroha, Uttar Pradesh -244223, India.
T +91-5924-267437, +91-5924-267438

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T +91-120-4361000 - F +91-120-4234881 / 84 / 85 / 87 / 95 / 96 support@jubl.com - www.jubilantingrevia.com

1.4. Emergency telephone number

For Chemical Emergency ONLY (in the case of fire, leak, spill, exposure or accident) Call
Chemtrec: 1-800-424-9300 (US), 1-703-527-3887 (Outside U.S.)
Chemtrec (India) : 000-800-100-7141

For ALL other emergencies call Emergency Control Room Gajraula at 99970 22412

SECTION 2: HAZARD(S) IDENTIFICATION

2.1. Classification of the substance or mixture

GHS-US classification

Gases under pressure: Compressed gas/ Liquefied gas

2.2. Label Elements

Hazard Pictogram: GHS 04

Signal Word: Warning!



HAZARD AND PRECAUTIONARY STATEMENTS:

HAZARD STATEMENTS

- H280: Contains gas under pressure: may explode if heated.



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PRECAUTIONARY STATEMENTS

- **General** : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position.
- **Prevention** : Not applicable.
- **Response** : Not applicable.
- **Storage** : P410+P403: Protect from sunlight. Store in a well-ventilated place.
- **Disposal** : Not applicable.

Hazards not otherwise classified:

In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.
May cause frostbite.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

	Chemical	CAS #	EC#	Purity
1.	Carbon dioxide	124-38-9	204-696-9	>99%

3.2 Mixtures

- Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures

- **Eyes**: If in eyes rinse cautiously with water for at least 15 minutes. Remove contact lenses if easy to do so. Continue rinsing. Seek medical attention.
- **Skin**: Immediately take off all contaminated clothing. Wash thoroughly with water for at least 15 minutes. Wash contaminated clothes before reuse. Seek immediate medical attention.
- **Inhalation**: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- **Ingestion**: As this product is a gas, refer to the inhalation section.

4.2 Most important symptoms and effects, both acute and delayed:

Acute effects

Eye contact : No known significant effects or critical hazards.
Inhalation : No known significant effects or critical hazards.
Ingestion : As this product is a gas, refer to the inhalation section.
Skin contact : No known significant effects or critical hazards.
Frostbite : Try to warm up the frozen tissues and seek medical attention.

Chronic effects:

- Flushing of the skin, an impaired response of the circulatory system to exercise, a fall in blood pressure, decreased oxygen consumption, and impaired attentiveness. Adaptation to some of the effects of long-term exposure to CO₂ has been reported.

4.3 Indication of any immediate medical attention and special treatment needed

- Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been inhaled.
Description of necessary first aid measures
- Specific treatments : No specific treatment.

SECTION 5 : FIRE-FIGHTING MEASURES

5.1. Extinguishing media

- *Appropriate extinguishing media*: Product is extinguishing agent. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media: None.

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5.2 : Special hazards arising from the substance or mixture

- Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.
- Hazardous thermal decomposition products: Decomposition products may include the following materials: carbon dioxide, carbon monoxide

5.3 : Advice for firefighters

Special protective actions for fire-fighters

- Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters

- Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

SECTION 6 : ACCIDENTAL RELEASE MEASURES

6.1: Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

- No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment

For emergency responders :

- If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For nonemergency personnel".

6.2 : Environmental precautions

- Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

6.3 : Methods and materials for containment and cleaning up

Minor Spills

- Immediately contact emergency personnel. Stop leak if without risk.

Major Spill

- Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

6.4 : Reference to other sections

- Never return spills in original containers for re-use. Dispose of in accordance with local regulations.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

- Put on appropriate personal protective equipment (see Section 8).
- Contains gas under pressure. Avoid breathing gas. Do not puncture or incinerate container.
- Use equipment rated for cylinder pressure.
- Close valve after each use and when empty.
- Protect cylinders from physical damage; do not drag, roll, slide, or drop.
- Use a suitable hand truck for cylinder movement.
- Avoid contact with eyes, skin and clothing.
- Empty containers retain product residue and can be hazardous
- Use in a well ventilated place/Use protective clothing commensurate with exposure levels.

Advice on general occupational hygiene

- Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed.
- Workers should wash hands and face before eating, drinking and smoking.
- Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

7.2. Conditions for safe storage, including any incompatibilities

- Store in accordance with local regulations.
- Store in a segregated and approved area.
- Store away from direct sunlight in a dry and well-ventilated area, away from incompatible materials (see Section 10).
- Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over.
- Cylinder temperatures should not exceed 52 °C (125 °F).
- Keep container tightly closed and sealed until ready for use.
- See Section 10 for incompatible materials before handling or use.

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SECTION 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

- Exposure Limits Values
- Control parameters

Chemical Name	ACGIH TLV	OSHA PEL	USA. OSHA - TABLE Z-1 Limits for Air Contaminants -1910.1000	NIOSH REL
Carbon dioxide	TWA 5000 ppm; STEL30000 ppm	8H TWA 5000 ppm (9000 mg/m ³)	TWA 10,000 ppm (18,000 mg/m ³) STEL 30,000 ppm (54,000 mg/m ³)	10H TWA 5000 ppm; STEL 30000 ppm

Exposure Limits (International):

- Not available.

8.2 Exposure controls

Appropriate Engineering Controls:

- Provide exhaust ventilation or other engineering controls to keep the relevant airborne concentrations below their respective occupational exposure limits. Local ventilation is usually preferred. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protection:

- Protective clothing should be selected specifically for the working place, depending on concentration and quantity of the hazardous substances handled. The resistance of the protective clothing to chemicals should be ascertained with the respective supplier.
- Hands:** Wear appropriate protective gloves to prevent skin exposure.
The protective gloves to be used must comply with the specifications of EC directives 89/686/EEC and the resultant standard EN374.
- Eyes:** Safety goggles/ Chemical Safety glasses and Face shield.
- Clothing:** Boots and clothing to prevent contact.
- Respirator:** Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

For emergency situations, wear a positive pressure, pressure-demand, full face piece self- contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. (EPA,1998).

General Hygiene and general comments:

- Wash hands and face after working with substance.
- Immediately change contaminated clothing.
- Apply skin protective barrier cream.

SECTION 9 : PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties.

Sr. No.	Parameter	Typical value
1.	Appearance	Colourless gas.
2.	Odor	At low concentrations, the gas is odorless and at higher concentrations it has a sharp, acidic odor.
3.	Odor Threshold	Not available
4.	Melting point	-56°C at 5.11 atm & -109°F (Sublimes)
5.	Boiling point	78.464 °C (sublimes)
6.	Flash point	[Product does not sustain combustion.]
7.	Evaporation rate (n-BuAc=1)	Not available
8.	Explosive limits	Not available
9.	Vapor pressure	56.5 atm
10.	Vapor density (air=1)	1.53 at 78.2 °C (Air = 1)
11.	Density	1.56 at -79°C
12.	Solubility in water	1.48 mg/mL at 25 °C
13.	Solubility in organic solvents	Miscible with hydrocarbons and most organic liquids.
14.	pH	pH of saturated CO ₂ solutions varies from 3.7 at 101 kPa (1 atm) to 3.2 at 2370 kPa (23.4 atm)
15.	Log Kow (octanol/water)	0.83

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16.	Auto-ignition temperature	Not available
17.	Decomposition temperature	substance decomposes on heating above 2000 °C
18.	Viscosity	21.29 uPa-sec at 300 K /26.85 °C/
19.	Molecular Weight	44.01
20.	pKa (@25°C)	Not available
21.	Flammability	Non flammable gas
22.	Oxidizer	No oxidizing properties
23.	Corrosive material	Not available
24.	Explosive material	Containers may burst in the heat of a fire!

9.2 : Other information

- Not available.

SECTION 10: STABILITY AND REACTIVITY

- **Stability:** Stable under recommended storage conditions and temperature & pressure. Mechanical exhaust required. When not in use, tightly seal the container and store in well ventilated place.
- **Conditions to avoid:** Keep away from heat, moisture and incompatible chemicals. Avoid excessive heat and light.
- **Incompatible chemicals:** Strong oxidizing agents. Strong acids. Strong bases.
- **Hazardous decomposition:** Thermal decomposition may produce carbon monoxide.
- **Hazardous Polymerization:** Not reported.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product information

Inhalation: In high concentration the gas may cause a suffocation. Victim may not be aware of asphyxiation. In confined or poorly ventilated areas, vapors can readily accumulate and can cause unconsciousness and death.

Eye Contact: None known.

Skin Contact: None known.

Ingestion: Not an expected route of exposure.

a) **Acute toxicity**

- Carbon dioxide at high concentration in air causes stinging sensation in eyes nose and throat. Also damage to central nervous system and retinal ganglion cells. Solid is damaging to tissues, may causes serious frostbite and blisters. It causes of death in breathing high concentration of carbon dioxide in air. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound. Since CO₂ is most potent cerebrovascular dilator known, it should not be used in patients with increased intracranial pressure, intracranial bleeding , expending lesions, head injury or coma.

RTECS: FF6400000

LC50: Rodent-rat: 470000 ppm/30M

Rodent-mouse: 200000ppm/2H

(Lethal concentration, 50 percent kill)

LD 50: Not available

b) **Skin Corrosion/Irritation**

- It is not irritating to skin but Solid(Dry ice) is damaging to tissues, may causes serious frostbite and blisters.

c) **Serious Eye Damage/Irritation**

- No information available.

d) **Respiratory Or Skin Sensitization;**

- It may causes respiratory irritation.

e) **Germ Cell Mutagenicity**

- No information available.

f) **Carcinogenicity**

- IARC: No component of this product present at levels greater than or equal to 0.1 % is identified as probable, possible or confirmed human carcinogen by IARC.
- ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
- NTP: No component of this product present at levels greater than or equal to 0.1 % is identified as a known or anticipated carcinogen by NTP.

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- OSHA: No component of this product present at levels greater than or equal to 0.1 % is identified as a carcinogen or potential carcinogen by OSHA.

g) Reproductive Toxicity

- No information available.

h) Aspiration Hazard.

- No information available.

Signs and Symptoms of Exposure

- Unconsciousness, Nausea, Dizziness, Headache

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

Ecotoxicity:

- This product has no known eco-toxicological effects.

12.2 Persistence and degradability

- Carbon dioxide is natural existing compound in the biosphere in the normal atmosphere ranges from 0.02% to 0.06%. It is essential for photosynthesis and plant growth. CO₂ absorbed by leaves and water absorbed by roots are converted to simple sugars by sun energy in plant chlorophyll. The sugars are building blocks for growth process.

12.3 Bioaccumulative potential

- BCF=3.162
- No bio accumulative substance.

12.4 Mobility in soil

- K_{oc}= 1.498
- Log K_{oc}=0.176
- Henry's Law Constant: 1.711E-003 atm m³/mole.
- Log K_{ow} = 0.83

12.5 Other adverse effects

Environment Fate:

Based on the environmental modeling, this material has a low potential to get absorbed in the organic matter of soil and is non-volatile from water bodies. Since this is an estimated result it is recommended that the material should not be disposed into the environment. The material should never be disposed into the sewage.


SECTION 13: DISPOSAL CONSIDERATIONS

Waste treatment methods

- Dispose of this material in accordance with standard practice for disposal of potentially hazardous materials as required by applicable federal, state or local laws. Note that disposal regulations may also apply to empty containers and equipment rinsates.

SECTION 14: TRANSPORT INFORMATION

- This substance is considered to be Hazardous for transport by Air/Rail/Road and Sea and thus regulated by IATA/ICAO/ARD/RID/IMO/IMDG.

S. No	Agency	UN Number	Shipping name	Hazard Class	Packing Group
Land Transport	ADR/RIC	1013	Carbon dioxide†	2.2	Not applicable
Maritime Transport	IMDG	1013	Carbon dioxide†	2.2	Not applicable
Air Transport	IATA	1013	Carbon dioxide†	2.2	Not applicable
UN Label	Non-Flammable gas				



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Environmental hazards:

- Marine pollutant: No

SECTION 15: REGULATORY INFORMATION

Classification as per CLP Regulation 1272/2008:

- **Hazards Class and Category:** Press. Gas (Comp.)
- **Hazard Statements:**H280

Chemical Inventory Lists:	Status
TSCA:	Listed
EINECS:	204-696-9
Canada(DSL/NDSL):	Listed/DSL
Japan:	Listed
Korea:	KE-04683
Australia:	Listed
China: IECSC	Listed

US information

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

Carbon Dioxide is not listed

SARA 302/304 : Carbon Dioxide is not listed

SARA 311/312 : See section 2 for more information

California Prop. 65: Carbon Dioxide is not listed

CAA (Clean Air Act): Carbon Dioxide is not listed

CWA (Clean Water Act): Carbon Dioxide is not listed

EU Information

Water hazard class (WGK): Non hazardous to water

Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006: Carbon Dioxide is not listed

SECTION 16: OTHER INFORMATION

a) Compilation information of safety data sheet

Compilation information of safety data sheet

Chemical: Carbon dioxide

CAS #: 124-38-9

File Name: 0634Gj Ghs07 Div.3 sds Carbon dioxide

Revision Number: 07

Date of Issue of SDS: March 28, 2024

Revision Due Date: February, 2027

b) A key or legend to aberrations and acronyms used in the safety data sheet;

- PBT =Persistent Bio accumulative and Toxic.
- vPvB= Very Persistent and Very Bio accumulative.
- SCBA= Self Contained Breathing Apparatus.
- NIOSH REL= National Institute for Occupational Safety and Health Recommended Exposure Limit. OSHA PEL=Occupational Safety and Health Administration Permissible Exposure Limit.
- OELTWA= Occupational Exposure Limit Time Weighted Averages.
- IDLH= Immediately Dangerous to Life or Health.
- UEL= Upper Explosive Limit.
- LEL= Lower Explosive Limit.
- RTECS= Registry of Toxic Effects of Chemical Substances.
- NTP=National Toxicology Program.
- IARC= International Agency for Research on Cancer.
- EPA=Environmental Protection Agency.
- TSCA= Toxic Substances Control Act.
- CERCLA= Comprehensive Environmental Response, Compensation, and Liability Act.

- SARA= Superfund Amendments and Reauthorization Act.
- NFPA= National Fire Protection Association.



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- WHIMS= Workplace Hazardous Materials Information System.
- DSL/NDSL= Domestic/Non-Domestic Substances List.
- CSR=Chemical Safety Report.
- BCF = Bio Concentration Factor.
- DNEL = Derived No Effect Level.
- PNEC = Predicted No Effect Concentration.
- TLV = Threshold Limit Value.
- ACGIH = American Conference of Governmental Industrial Hygienists.
- REACH = Registration, Evaluation .Authorization and Restriction of Chemicals.
- CLP = Classification, Labeling and Packaging.
- LD / LC = Lethal Doses / Lethal Concentration.
- GHS = Globally Harmonised System.
- ADR = Accord europeen relative au transport international de marchandises.
- IMDG-Code = International Maritime Code for Dangerous Goods.
- EmS = Emergency measures on Sea.
- ICAO = International Civil Aviation Organization.
- IATA/DGR= International Air Transport Association/Dangerous Goods Regulation.

(a) Key Literature reference and sources for data

Biographical reference and data sources

- CLP REG (regulation) (EC) no. 1272/2008, last modification by regulation (EC) no. 790/2009
- DIR 67/548/EWG, last modification by DIR 2009/2/EC
- REG (EC) no. 1907/2006, last modification by REG (EC) Nr. 453/2009

Internet

- RTECS
- ESIS

Company's Declaration:

Information contained in this SDS is believed to be correct but no representation, guarantee or warranties of any kind are made as to its accuracy, suitability for a particular application or results to be obtained from them. This SDS shall be used as a guide only. Jubilant Ingrevia Limited makes no warranties expressed or implied of the adequacy of this document for any particular purpose.

(End of Safety Data Sheet)
