BOC GASES

***MATERIAL SAFETY DATA SHEET***

PRODUCT NAME: CARBON DIOXIDE, GAS

## 1. Product and Company Identification

**BOC Gases,**
**Division of,**
**The BOC Group, Inc.**
**575 Mountain Avenue**
**Murray Hill, NJ 07974**

**TELEPHONE NUMBER:** (908) 464-8100
**24-HOUR EMERGENCY TELEPHONE NUMBER:**
CHEMTREC (800) 424-9300

**BOC Gases**
**Division of**
**BOC Canada Limited**
**5975 Falbourne Street, Unit 2**
**Mississauga, Ontario L5R 3W6**

**TELEPHONE NUMBER:** (905) 501-1700
**24-HOUR EMERGENCY TELEPHONE NUMBER:**
(905) 501-0802
**EMERGENCY RESPONSE PLAN NO:** 2-0101

**PRODUCT NAME:** CARBON DIOXIDE, GAS
**CHEMICAL NAME:** Carbon Dioxide
**COMMON NAMES/SYNONYMS:** Carbonic Anhydride
**TDG (Canada) CLASSIFICATION:** 2.2
**WHMIS CLASSIFICATION:** A

**PREPARED BY:** Loss Control (908)464-8100/(905)501-1700
**PREPARATION DATE:** 6/1/95
**REVIEW DATES:** 11/18/03

## 2. Composition, Information on Ingredients

**EXPOSURE LIMITS[1]:**

| INGREDIENT | % VOLUME | PEL-OSHA[2] | TLV-ACGIH[3] | $LD_{50}$ or $LC_{50}$ Route/Species |
|---|---|---|---|---|
| Carbon Dioxide<br>FORMULA: $CO_2$<br>CAS: 124-38-9<br>RTECS #: FF6400000 | 99.8 TO 99.999 | 5000 ppm TWA | 5000 ppm TWA<br>30,000 ppm STEL | Not Available |

[1] Refer to individual state or provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 2003 Threshold Limit Values for Chemical Substances and Physical Agents.
IDLH (Carbon Dioxide): 40,000 ppm

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

## 3. Hazards Identification

EMERGENCY OVERVIEW

Odorless, colorless, nonflammable gas. Simple Asphyxiant – This product does not contain oxygen and may cause asphyxia if released in a confined area. Maintain oxygen levels above 19.5%. Carbon dioxide acts as a weak narcotic at high concentrations (30,000 ppm). Inhalation of high concentrations of carbon dioxide can cause reduced hearing acuity, changes in respiration and increased blood pressure and pulse. Contents under pressure. Use and store below 125 °F.

**ROUTE OF ENTRY:**

| Skin Contact | Skin Absorption | Eye Contact | Inhalation | Ingestion |
|---|---|---|---|---|
| No | No | No | Yes | No |

**HEALTH EFFECTS:**

| Exposure Limits | Irritant | Sensitization |
|---|---|---|
| Yes | No | No |
| Teratogen | Reproductive Hazard | Mutagen |
| No | No | No |
| Synergistic Effects<br>None reported | | |

Carcinogenicity: -- NTP: No IARC: No OSHA: No

**EYE EFFECTS:**
Liquid and cold vapor may cause tissue freezing.

**SKIN EFFECTS:**
May cause frostbite.

**INGESTION EFFECTS:**
No adverse effects anticipated.

**INHALATION EFFECTS:**
Depending on concentration and duration of exposure carbon dioxide may cause increased respiration, headache, mild narcotic effects, increased blood pressure and pulse, and asphyxiation. Symptoms of overexposure to carbon dioxide become more apparent when atmospheric oxygen is decreased to 15-17%. Chronic harmful effects are not known from repeated inhalation of concentrations below the PEL/TLV.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** None known.

**POTENTIAL ENVIRONMENTAL EFFECTS:** Not expected to be toxic to fish and wildlife.

## 4. First Aid Measures

**EYES:**
For liquid or cold vapor, flush eyes with lukewarm water and obtain immediate medical attention.

**SKIN:**
For frostbite, immediately warm affected area with lukewarm water (< 105 °F).

**INGESTION:**
Not anticipated.

**INHALATION:**
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO CARBON DIOXIDE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

## 5. Fire Fighting Measures

| | | |
|---|---|---|
| Conditions of Flammability: Nonflammable | | |
| Flash point:<br>None | Method:<br>Not Applicable | Autoignition<br>Temperature: None |
| LEL(%): None | UEL(%): None | |
| Hazardous combustion products: None | | |
| Sensitivity to mechanical shock: None | | |
| Sensitivity to static discharge: None | | |

**FIRE AND EXPLOSION HAZARDS:**
Nonflammable. Cylinder may vent rapidly or rupture violently from pressure when involved in a fire situation.

**EXTINGUISHING MEDIA:**
None required. Use media appropriate for surrounding fire.

**FIRE FIGHTING INSTRUCTIONS:**
Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear. Continue to cool fire-exposed containers until well after flames are extinguished.

## 6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment (See Section 8). Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. Ventilate enclosed areas. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

## 7. Handling and Storage

**Electrical Classification:** Non-Hazardous

Dry carbon dioxide can be handled in most common structural materials. Moist carbon dioxide is generally corrosive by its formation of carbonic acid. 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 susceptible to corrosion. At normal temperatures carbon dioxide is compatible with most plastics and elastomers.

Use only in well-ventilated areas. Carbon dioxide vapor is heavier than air and will accumulate in low areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the system. Do not insert any object (i.e.: screwdriver) into valve cap openings as this can damage the valve causing leakage.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time.

For additional storage recommendations, consult Compressed Gas Association's Pamphlet P-1, AV-7, G-6, G-6.1, G-6.2, G-6.3, G-6.5, G-6.7, G-6.9, PS-5 and TB-10.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

## 8. Exposure Controls, Personal Protection

**ENGINEERING CONTROLS:**
Use local exhaust in combination with general ventilation as necessary to control air contaminants to at or below acceptable exposure guidelines.

**EYE/FACE PROTECTION:** Safety goggles or glasses as appropriate for the job.

**SKIN PROTECTION:** Protective gloves of any material appropriate for the job.

**RESPIRATORY PROTECTION:**
For emergency release use a positive pressure NIOSH approved air-supplying respirator systems (SCBA or airline/escape bottle) using at a minimum Grade D air.

**OTHER/GENERAL PROTECTION:**
Safety shoes.

## 9. Physical and Chemical Properties

| PARAMETER | VALUE | UNITS |
|---|---|---|
| Physical state (gas, liquid, solid) | : Gas | |
| Vapor pressure at 70 $^{o}$F | : 856 | psia |
| Vapor density at 70 $^{o}$F, 1 atm (Air = 1) | : 1.53 | |
| Evaporation point | : Not Available | |
| Boiling point (CO2 Sublimes) | : -109.3 | $^{o}$F |
| | : -78.5 | $^{o}$C |
| Freezing point | : -69.8 | $^{o}$F |
| | : -56.6 | $^{o}$C |
| pH | : Not Available | |
| Specific gravity | : Not Available | |
| Oil/water partition coefficient | : Not Available | |
| Solubility ($H_20$) | : High, 0.145 | g/ml, @25 °C |
| Odor threshold | : Not Applicable | |
| Odor and appearance | : A colorless, odorless gas. | |

## 10. Stability and Reactivity

**STABILITY:**
Stable

**INCOMPATIBLE MATERIALS/CONDITIONS:**
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.

**HAZARDOUS DECOMPOSITION PRODUCTS:**
Carbon monoxide and oxygen when heated above 3092 $^{o}$F (1700$^{o}$C). Carbonic acid is formed in the presence of moisture.

**HAZARDOUS POLYMERIZATION:**
Will not occur.

## 11. Toxicological Information

**SKIN AND EYE:** Adverse effects are not expected.

**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.

**OTHER:** Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

Exposure of female rats to 60,000 ppm carbon dioxide for 24 hours has produced toxic effects to the embryo and fetus in pregnant rats. Toxic effects to the reproductive system have been observed in other mammalian species at similar concentrations.

Chronic, harmful effects are not known from repeated inhalation of low (3 to 5 molar %) concentrations.

## 12. Ecological Information

Product does not contain Class I or Class II ozone depleting substances. Not toxic. Will not bioconcentrate.

## 13. Disposal Considerations

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 BOC Gases or authorized distributor for proper disposal.

## 14. Transport Information

| PARAMETER | United States DOT | Canada TDG |
|---|---|---|
| **PROPER SHIPPING NAME:** | Carbon Dioxide | Carbon Dioxide |
| **HAZARD CLASS:** | 2.2 | 2.2 |
| **IDENTIFICATION NUMBER:** | UN 1013 | UN 1013 |
| **SHIPPING LABEL:** | NONFLAMMABLE GAS | NONFLAMMABLE GAS |

## 15. Regulatory Information

**SARA TITLE III NOTIFICATIONS AND INFORMATION**
**SARA TITLE III HAZARD CLASSES:**
Acute Health Hazard.
Sudden Release of Pressure Hazard

**SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:**
This product does not contain toxic chemicals subject to reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

**U.S. TSCA/Canadian DSL:** All ingredients are listed on the U.S. Toxic Substances Control Act (TSCA) inventory or exempt from listing and on the Canadian Domestic Substance List (DSL).

**California Proposition 65:** This product does not contain ingredient(s) known to the State of California to cause cancer or reproductive toxicity.

**Canadian Controlled Products Regulations (CPR):** This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

## 16. Other Information

| NFPA HAZARD CODES | HMIS HAZARD CODES | RATINGS SYSTEM |
|---|---|---|
| Health: 1 | Health: 0 | 0 = No Hazard |
| Flammability: 0 | Flammability: 0 | 1 = Slight Hazard |
| Instability: 0 | Reactivity: 0 | 2 = Moderate Hazard |
| | | 3 = Serious Hazard |
| | | 4 = Severe Hazard |

Note: The Reactivity Hazard Rating is based on the 2nd Edition of the National Paint and Coatings Association's (NPCA's) Hazardous Materials Identification System (HMIS®). Hazard ratings were based on the best available information at the time of the review. Ratings will be reassigned in accordance with Compressed Gas Association (CGA) guidelines as published in the future edition of CGA Pamphlet P-19.

| | |
|---|---|
| ACGIH | American Conference of Governmental Industrial Hygienists |
| DOT | Department of Transportation |
| IARC | International Agency for Research on Cancer |
| NTP | National Toxicology Program |
| OSHA | Occupational Safety and Health Administration |
| PEL | Permissible Exposure Limit |
| SARA | Superfund Amendments and Reauthorization Act |
| STEL | Short Term Exposure Limit |
| TDG | Transportation of Dangerous Goods |
| TLV | Threshold Limit Value |
| WHMIS | Workplace Hazardous Materials Information System |

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

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