Carbon Dioxide, Liquefied: Product Identification

Trade Name: Carbon Dioxide, Refrigerated Liquid  
Synonyms: Carbonic Acid; Carbonic Anhydride; CO₂; Liquefied CO₂  
Chemical Family: Cryogenic Liquid, Inert  
Chemical I.D. No.: UN2187; STCC # 4904509  
Chemical Formula: CO₂  
DOT Hazard Class: 2.2  
Label Required:  

Carbon Dioxide, Liquefied: Composition

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS #</th>
<th>Wt%</th>
<th>OSHA PEL¹</th>
<th>ACGIH STEL²</th>
<th>NIOSH IDLH³</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>124-38-9</td>
<td>99.90</td>
<td>5,000</td>
<td>30,000</td>
<td>40,000</td>
<td>ppm</td>
</tr>
</tbody>
</table>

¹ = Permissible Exposure Limit (8-Hr. Time Weighted Average).  
² = Short Term Exposure Limit (15 Minute Exposure).  
³ = Immediately Dangerous to Life and Health.

Carbon Dioxide, Liquefied: NFPA Code

3 Health Hazard (Blue):  
Can cause injury despite medical treatment.

0 Flammability Hazard (Red):  
Will not burn.

0 Reactivity Hazard (Yellow):  
Normally stable. Not reactive with water.

NONE Special Notice (White):  
None
Carbon Dioxide, Liquefied: Physical and Chemical Properties

Sublimation Point: -109°F (-78°C) @ 1 Atmosphere
Vapor Pressure: 881.4 psia @ 72.3°F (60 atm @ 22.4°C)
Solubility in H₂O: 0.14g / 100g @ 32°F (0°C)
Specific Gravity: 8.5 lb/gal (1.02 g/cc)
Volatile by Volume: 100%
Vapor Density: 1.522  (air = 1.0)
Odor: Odorless
Appearance: Colorless Gas

Carbon Dioxide, Liquefied: Fire and Explosion Data

Flash Point: Not Flammable.
Flammable Limits in Air %/Vol.: Not Flammable
Autoignition Temperature: Not Flammable
Extinguishing Media: N.A.
Special Fire Fighting Procedure: N.A.
Unusual Fire or Explosion Data: N.A.  (Not Available)

Carbon Dioxide, Liquefied: Reactivity Data

Stability: Stable
Hazardous Polymerization: Will not occur
Conditions to avoid / Incompatibility: Reactive metals such as potassium, sodium, and magnesium. Other incompatible materials are acrylaldehyde, aziridine, cesium oxide, metal acetylides, and peroxides.

Hazardous Decomposition Products: Carbon monoxide may be formed at temperatures above 3,092°F (1,700°C).

Carbon Dioxide, Liquefied: Health Hazard Data

Carcinogenicity: NTP: NO
IARC Monographs: NO
OSHA Regulated: NO

Occupational Exposure Limits:

OSHA Permissible Exposure Limit (PEL): 5,000 ppm, 8 hour Time Weighted Average.
ACGIH Short-term Exposure Limit (STEL): 30,000 ppm, 15 minute Short Term Exposure Limit.
NIOSH Immediately Dangerous to Life and Health (IDLH): 40,000 ppm.
Effects of Overexposure:

**Acute:**
- **Eyes:** Contact with solid or gas can cause frostbite and freeze burns.
- **Skin:** Dermal contact with solid or gas can cause frostbite and freeze burns.
- **Inhalation:** Can result in increased respiration, dizziness, shortness of breath and headache vomiting. Exposure to high concentrations for a period of time can result in unconsciousness leading to coma and death.
- **Ingestion:** Not considered a likely scenario.

**Chronic:** None known for Carbon Dioxide.

Additional Medical and Toxicological Information:

Agents such as CO₂, which can induce hypoxia at high concentrations, have been shown to produce teratogenic effects in laboratory animals. May aggravate pre-existing pulmonary conditions.

Carbon Dioxide, Liquefied: Emergency First Aid Procedures

**Eye contact:** If carbon dioxide contacts the eye, immediately warm the tissue with large amounts of lukewarm water, including under the eyelids. Seek medical attention immediately, preferably an Ophthalmologist. Speed and thoroughness in rinsing eyes are important to avoid permanent injury.

**Skin Contact:** Immediately flush the affected area with lukewarm, not hot, water. If a freeze burn has occurred, get medical attention.

**Inhalation:** Remove to fresh air. If breathing has stopped, apply artificial respiration. Keep warm and at rest. Get immediate medical attention. **Note:** Carbon Dioxide has no warning properties!

**Ingestion:** Not considered a likely scenario.

Carbon Dioxide, Liquefied: Suggested Protection

**Eye Protection:** CO₂ is extremely cold (–109°F, –78°C), contact with solid and/or gas may cause tissue damage. Remove contact lenses and wear safety glasses, chemical goggles or face shield when handling this chemical.

**Skin Protection:** CO₂ is extremely cold (–109°F, –78°C), contact with solid and/or gas may cause tissue damage. Wearing of appropriate protective clothing and gloves that provide some insulating ability is suggested to prevent contact with this chemical.

**Inhalation:** Wearing of SCBA is required if containing large spills or upon entry into large tanks, vessels, and other designated confined space areas. Situations where airborne concentrations may exceed occupational exposure limit, require proper ventilation.

**Ventilation:** Provide adequate general and local exhaust ventilation to attain occupational exposure limits and to prevent the formation of an oxygen deficient atmosphere, particularly in a confined space area.
Carbon Dioxide, Liquefied: Spill or Leak

Spill Procedures: Keep spill response perimeter back to point of 19% (or more) oxygen. Wear self-contained breathing apparatus for any emergency situation requiring work in spill area.

Consult DOT "Emergency Response Guide" - Guide 120

Carbon Dioxide, Liquefied: Waste Disposal

Procedure: Liquid Carbon Dioxide will not leave residue; no chemical clean-up will be necessary. Vegetation, insects, reptiles, fish and small mammals contacted by liquid Carbon Dioxide and/or the vapor cloud may be injured or killed. Further environmental restoration measures may be required.

Carbon Dioxide, Liquefied: Special Precautions and Comments

Storage Precautions: The high vapor pressure of liquid Carbon Dioxide is the main concern in storage. Protect vessel from puncture and store away from sources of heat that will cause the pressure to increase.

Consult the Compressed Gas Association Publication, G-6: “Carbon Dioxide”

Carbon Dioxide, Liquefied: EPA SARA Title III Information

EPCRA Section 311/312 Hazard Categorization:

<table>
<thead>
<tr>
<th></th>
<th>Acute</th>
<th>Chronic</th>
<th>Fire</th>
<th>Pressure</th>
<th>Reactive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

EPCRA & CAA Hazardous Substances:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>% / wt.</th>
<th>CAA 112(r)</th>
<th>302 TPQ lb.</th>
<th>304 RQ lb.</th>
<th>313 TRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>none listed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key: CAA 112(r) = Toxic Substance with potential for airborne release
Sec. 302 TPQ = Extremely Hazardous Substances (EHS) Threshold Planning Quantity
Sec. 304 RQ = EHS and CERCLA Reportable Quantity if spilled
Sec. 313 TRI = Toxic Chemicals to be reported on Toxic Release Inventory if spilled

DYNO NOBEL INC. Disclaimer
The information contained herein is provided for reference purposes only and is intended only for persons having relevant technical skills. Because conditions and manner of use are outside of our control, the user is responsible for determining the conditions of safe use of the product. While the information is believed to be correct, DYNO NOBEL INC. shall in no event be responsible for any damages whatsoever, directly or indirectly, resulting from the publication or use of or reliance upon the information contained herein. (No warranty, either expressed or implied, of merchantability or fitness for a particular purpose, or of any nature with respect to the product, or to the information, is made herein.)