PHYSICAL AND CHEMICAL PROPERTIES

Appearance    Colourless liquid or gas.*
Oxidising Properties   None.
Odour   No odour warning properties.
Relative Density (gas)   1.52 (air = 1)
Flammability   None.
Relative Density (liquid)   1.03 (water = 1)
Symbol/Formula   CO₂
Solubility in Water   2000 mg/l
Boiling Point   –78.5(s)°C (@ 1 atmosphere)
Molecular Weight   44
Volume Expansion Ratio (liquid to gas)   535 (@ 15°C)
Critical Temperature   30°C
* Cold gas may appear white due to ‘fogging’ of surrounding air.

STABILITY & REACTIVITY

The substance is stable in normal use. It may cause embrittlement or damage to materials not designed for use at very low temperatures or for the pressures generated by vapourisation.

Compatible materials

<table>
<thead>
<tr>
<th>Materials</th>
<th>Gas (warm &amp; dry)</th>
<th>Liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/Steel</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Other Steels</td>
<td>0</td>
<td>X</td>
</tr>
<tr>
<td>Copper</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Brass</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Aluminium</td>
<td>✓</td>
<td>0</td>
</tr>
<tr>
<td>Rubber</td>
<td>0</td>
<td>X</td>
</tr>
<tr>
<td>PTFE</td>
<td>✓</td>
<td>X</td>
</tr>
</tbody>
</table>

Before using this gas in any new process, carry out a full compatibility study.

TOXICOLOGICAL INFORMATION

Low concentrations cause increased respiration. Symptoms are headache, nausea and vomiting, which may lead to unconsciousness.

ECOLOGICAL INFORMATION

Discharging in large quantities may contribute to the greenhouse effect. Cryogenic liquid may cause localised frost damage.

DISPOSAL INFORMATION

Do not discharge into areas where its accumulation may be dangerous. Discharging large quantities to the atmosphere should be avoided.

TRANSPORT INFORMATION

Refer to the section “Handling and Storage” (above).

In case of accident or emergency, advise the emergency services of the presence of containers.

Do not store containers in vehicles – remove them once the destination is reached.

Fire-fighting equipment should be carried.

Only use vehicles where the load is segregated from the driver’s compartment.

Extra regulations apply to vehicles carrying large quantities of dangerous substances.

Contact CryoService for information concerning these, or for other transportation information.

| UN number   | 2187   |
| Class       | 2.2    |
| ADR/RID Item No | 2,3°A |
| ADR/RID Hazard No | 22    |
| Labelling ADR | Label 2: non-flammable non-toxic gas |
| Hazchem Code | 2RE    |
| Transport Category | 3     |

REGULATORY INFORMATION

EC   Not classified as a dangerous classification substance.

Risk phrases   Asphyxiant in high concentrations. May cause frostbite.

Safety   Keep container in a well-ventilated place.

phrases   Do not breathe gas.

Use suitable protective equipment.

Statutory instruments relevant to the transportation and use of this product include the following and their amendments:


Control of Substances Hazardous to Health Regulations.

The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations.

The Chemicals (Hazard Information and Packaging for Supply) Regulations.

OTHER INFORMATION

To the best of our knowledge the information supplied on this sheet is correct and adequate for normal use. It should not be considered as exhaustive.

Because the conditions of use of this product are outside our control, CryoService cannot accept responsibility for any injury, loss or damage resulting from the use of this product.

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability can be accepted for injury or damage.

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MATERIAL SAFETY DATA SHEET
CARBON DIOXIDE, REFRIGERATED LIQUID  
MSDS 1161  Version 4

IDENTIFICATION OF SUBSTANCE/ PREPARATION AND COMPANY
Product name  Carbon Dioxide, refrigerated liquid
Chemical formula  CO₂
Company identification  See footer
Emergency phone number  See footer

COMPOSITION
Product type  Substance
Components  None which influence the classification
CAS number  00124-38-9
EEC number  2046969

HAZARDS IDENTIFICATION
Cryogenic (refrigerated) liquid gas.

Skin  May cause burns or frostbite upon contact.
Eyes  May cause damage upon contact.
Inhalation  Asphyxiant at high concentrations.

FIRST-AID MEASURES
Eye contact  Immediately flush eyes thoroughly with tepid water for at least 15 minutes. Obtain medical assistance.
Skin contact  Immediately flush the affected area with tepid water for at least 15 minutes. Obtain medical assistance.
Inhalation  Symptoms may include loss of mobility/consciousness. Using self-contained breathing apparatus, remove casualty from exposure. Call a doctor. Keep casualty warm and rested. If breathing has stopped, apply artificial respiration.

FIRE-FIGHTING MEASURES
Ensure that the emergency services are aware of the presence of cryogenic gas storage vessels on the premises.
Extinguishing media  None required for product or container.
Specific method  If there is no risk, close valve and remove container from affected area. Where container cannot be removed, every effort should be made to keep it cool by spraying with large quantities of water from a protected position.
Specific hazard  The container may rupture violently if heated. Non-flammable.
Protective equipment  Use self-contained breathing apparatus and protect skin/eyes against contact with liquid/cold articles.

ACCIDENTAL RELEASE MEASURES
Personal  Evacuate area. Wear suitable protective clothing. Wear self-contained breathing apparatus if it is necessary to enter the area.
Environment  Close the valve, and/or remove container to the open air if safe to do so. Prevent from entering basements, workpits, sewers and other low lying areas where accumulation could be dangerous.

HANDLING AND STORAGE
Only trained personnel should handle or use containers.
Do not subject containers to excessive heat or mechanical shock.
Where possible, containers should be out of doors or in a well-ventilated place.
Prepare and implement a procedure to deal with any emergency.
Obey all in-house and statutory regulations.
If more than one gas or mixture is kept, ensure that they can be readily identified and separated if necessary.
Use only equipment suitable for the gas(es), temperatures and pressure involved and inspect regularly.
Do not remove labels from containers.
Do not handle containers by the valves.
Do not use oil or grease on valves, fittings, or any other associated equipment.
Always close valves using moderate force only, even when the container is empty.
Use a suitable pressure regulator.
Fit a non-return system if there is any risk of back-flow into the container.
Containers should be kept upright even when empty.
Do not transfer this gas into another container by decantation or re-pressurisation.

EXPOSURE CONTROLS/PERSONAL PROTECTION
Workplace  Long term (8hrs TWA)  –  5000ppm
Exposure limits  Short term (15minutes)  –  15000ppm

Beware of liquid splashes or high-pressure release.
Ensure adequate ventilation. Protect eyes, face and skin from liquid splashes.
Keep appropriate safety equipment in the working area.