1. Product and Company Identification

Material name: Carbon Dioxide (CO2) Cartridge

Version #: 01
Issue date: 04-11-2013
Revision date:
Supersedes date:
CAS #: N/A

Manufacturer information
Supplier: Hologic Inc
250 Campus Drive
Marlborough, Massachusetts 01752
USA
Email: sds@hologic.com
Telephone: (800) 442-9892
Emergency telephone: (3E): 1-866-519-4752 CODE: 333605

Manufacturer: Liss Patrongyártó, Töltő és Forgalmazó Kft
(Liss Ltd.)
Carl von Linde út 1.
H-9653 Répcelak
Telephone: +06 (95) 588 100
Fax: +06 (95) 588 114
Emergency telephone: +36 1 476 6464

2. Hazards Identification

Physical state: Gas.
Appearance: Colorless gas.
Emergency overview: CAUTION
Contents under pressure. Gas reduces oxygen available for breathing. Contact with liquefied gas might cause frostbites, in some cases with tissue damage.

OSHA regulatory status: This product is hazardous according to OSHA 29 CFR 1910.1200.

Potential health effects
- Routes of exposure:
  - Inhalation: Skin contact. Eye contact.
  - Eyes: Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").
  - Skin: Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").
  - Inhalation: Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels.

- Ingestion: This material is a gas under normal atmospheric conditions and ingestion is unlikely.


- Chronic effects: May affect the nervous system and cause headache, nausea, vomiting, and narcosis.

Potential environmental effects: This material is not expected to be harmful to aquatic life. Emissions of gas affecting global warming.

3. Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>124-38-9</td>
<td>&gt;99</td>
</tr>
</tbody>
</table>

Composition comments: All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.
4. First Aid Measures

First aid procedures

Eye contact
GAS: Flush thoroughly with water for at least 15 minutes. Make sure to remove any contact lenses from the eyes before rinsing.
LIQUEFIED GAS: If frostbite occurs, immediately flush eyes with plenty of warm water (not exceeding 105°F/41°C) for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention if irritation develops or persists.

Skin contact
GAS: Remove contaminated clothing immediately and wash skin with soap and water.
LIQUEFIED GAS: If frostbite occurs, immerse involved area in warm water (between 100°F/38°C and 110°F/43°C, not exceeding 112°F/44°C). Keep immersed for 20 to 40 minutes. Seek medical assistance.

Inhalation
Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory tract irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation. Get medical attention.

Ingestion
Seek medical advice.

General advice
First aid personnel must be aware of own risk during rescue.

5. Fire Fighting Measures

Flammable properties
The product is not flammable.

Extinguishing media
Dry chemical. Carbon Dioxide. Halon.

Suitable extinguishing media
Large Fires: Foam, water spray or fog.
Use fire-extinguishing media appropriate for surrounding materials.

Protection of firefighters
Specific hazards arising from the chemical
The product itself does not burn. Closed containers can burst violently when heated, due to excess pressure build-up.

Protective equipment and precautions for firefighters
Self-contained breathing apparatus, operated in positive pressure mode and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.

Fire fighting equipment/instructions
Evacuate area. Stop flow of gas. Remove pressurized gas cylinders from the immediate vicinity.
Cool material exposed to heat with water spray and remove it if no risk is involved.

Hazardous combustion products
Carbon oxides. Nitrogen oxides.

6. Accidental Release Measures

Personal precautions
Avoid inhalation and contact with skin and eyes. Ensure adequate ventilation. Wear appropriate personal protective equipment (See Section 8). Stay upwind. Ventilate closed spaces before entering them.

Environmental precautions
Avoid release to the environment.

Methods for cleaning up
Ventilate well, stop flow of gas or liquid if possible.

7. Handling and Storage

Handling
Avoid breathing gas. Avoid contact with eyes, skin, and clothing. Keep container closed. Use only with adequate ventilation. Contents under pressure. Do not puncture. Close valve after each use and when empty. Do not attempt to refill spent cartridges. Wear appropriate personal protective equipment. Wash thoroughly after handling.

Storage
Keep container tightly closed. Store in a cool, dry place with adequate ventilation. Keep away from incompatible materials, open flames, and high temperatures. Keep out of the reach of children.

8. Exposure Controls / Personal Protection

Occupational exposure limits
US. ACGIH Threshold Limit Values

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide (CAS 124-38-9)</td>
<td>STEL</td>
<td>30000 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>5000 ppm</td>
</tr>
</tbody>
</table>

Carbon Dioxide (CO2) Cartridge

Revision date: -  Issue date: 04-11-2013
US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide (CAS 124-38-9)</td>
<td>PEL</td>
<td>9000 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5000 ppm</td>
</tr>
</tbody>
</table>

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide (CAS 124-38-9)</td>
<td>STEL</td>
<td>54000 mg/m3</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>30000 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9000 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5000 ppm</td>
</tr>
</tbody>
</table>

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide (CAS 124-38-9)</td>
<td>STEL</td>
<td>15000 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>5000 ppm</td>
</tr>
</tbody>
</table>

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide (CAS 124-38-9)</td>
<td>STEL</td>
<td>30000 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>5000 ppm</td>
</tr>
</tbody>
</table>

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide (CAS 124-38-9)</td>
<td>STEL</td>
<td>54000 mg/m3</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>30000 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9000 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5000 ppm</td>
</tr>
</tbody>
</table>

Mexico. Occupational Exposure Limit Values

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide (CAS 124-38-9)</td>
<td>STEL</td>
<td>27000 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15000 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>9000 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5000 ppm</td>
</tr>
</tbody>
</table>

Engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal protective equipment

Eye / face protection: Wear safety glasses with side shields (or goggles).
Skin protection: Wear appropriate clothing to prevent skin contamination or freezing.
Respiratory protection: If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA 29 CFR 1910.134. Respirator type: Wear air supplied respiratory protection.

General hygiene considerations

Do not eat, drink or smoke when using the product. Observe good industrial hygiene practices.

9. Physical & Chemical Properties

Appearance: Colorless gas.
Physical state: Gas.
<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Compressed gas.</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not available.</td>
</tr>
<tr>
<td>pH</td>
<td>Not available.</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>43700 mm Hg (21.1°C / 70°F)</td>
</tr>
<tr>
<td>Vapor density</td>
<td>1.5</td>
</tr>
<tr>
<td>Boiling point</td>
<td>-109 °F (-78.33 °C)</td>
</tr>
<tr>
<td>Melting point/Freezing point</td>
<td>Not available.</td>
</tr>
<tr>
<td>Solubility (water)</td>
<td>Soluble in water.</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flammability limits in air,</td>
<td>Not available.</td>
</tr>
<tr>
<td>upper, % by volume</td>
<td></td>
</tr>
<tr>
<td>Flammability limits in air,</td>
<td>Not available.</td>
</tr>
<tr>
<td>lower, % by volume</td>
<td></td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>44.01 g/mol</td>
</tr>
<tr>
<td>Molecular formula</td>
<td>C-O2</td>
</tr>
</tbody>
</table>

**10. Chemical Stability & Reactivity Information**

- **Chemical stability**: This product is stable under expected conditions of use.
- **Conditions to avoid**: Heat and direct sunlight.
- **Hazardous decomposition products**: Temperatures above 1700° C may cause decomposition and the release of oxygen and highly toxic carbon monoxide.
- **Possibility of hazardous reactions**: Hazardous polymerization does not occur.

**11. Toxicological Information**

- **Sensitization**: Not a skin sensitizer.
- **Acute effects**: Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. Carbon dioxide when inhaled in elevated concentrations may act to produce mild narcotic effects, stimulation of the respiratory center, and asphyxiation depending on the concentration present and duration of exposure. Low concentrations (3-5%) cause increased respiration and headache. Concentrations at 8% or higher cause headache, nausea and vomiting which may lead to unconsciousness if not moved to open air or given oxygen promptly. At concentrations of 10% or higher, carbon dioxide causes rapid circulatory insufficiency leading to coma and death.
- **Local effects**: Contact with compressed gas can cause damage (frostbite) due to rapid evaporative cooling.
- **Chronic effects**: May cause central nervous system effects.
- **Carcinogenicity**: No data recorded.
- **Mutagenicity**: No data recorded.
- **Neurological effects**: May cause drowsiness or dizziness.
- **Reproductive effects**: No data available.

**12. Ecological Information**

- **Ecotoxicity**: This material is not expected to be harmful to aquatic life. Emissions of gas affecting global warming.
- **Persistence and degradability**: Not available.
- **Bioaccumulation / Accumulation**: Not available.
Mobility in environmental media

The product is a volatile substance, which may spread in the atmosphere.

13. Disposal Considerations

Waste codes

The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Disposal instructions

Dispose in accordance with all applicable regulations.

Waste from residues / unused products

Dispose in accordance with all local, State and Federal regulations.

Contaminated packaging

Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

DOT

Basic shipping requirements:

UN number UN2037
Proper shipping name Receptacles, small, containing gas or gas cartridges
Hazard class 2.2
Subsidiary hazard class 5.1
Additional information:
Special provisions A14
Packaging exceptions 306
Packaging non bulk 304
Packaging bulk None

BULK

Basic shipping requirements:

UN number UN2037
Proper shipping name Receptacles, small, containing gas or gas cartridges
Hazard class 2.2
Subsidiary hazard class 5.1
Additional information:
Special provisions A14
Packaging exceptions 306
Packaging non bulk 304
Packaging bulk None

IATA

UN number UN2037
UN proper shipping name Receptacles, small, containing gas or gas cartridges
Transport hazard class(es) 2.2
Subsidiary class(es) 5.1
Labels required 2.2, 5.1

IMDG

UN number UN2037
UN proper shipping name Receptacles, small, containing gas or gas cartridges
Transport hazard class(es) 2.2
Subsidiary class(es) 5.1
Labels required 2.2, 5.1

TDG

UN number UN2037
Proper shipping name Receptacles, small, containing gas or gas cartridges
Hazard class 2.2
Subsidiary hazard class 5.1
Special provisions A14
Labels required 2.2, 5.1
Packaging exceptions 306
Packaging non bulk 304
Packaging bulk None
15. Regulatory Information

US federal regulations
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)
None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - Yes
Reactivity Hazard - No

Section 302 extremely hazardous substance (40 CFR 355, Appendix A)
No

SARA 311/312 Hazardous chemical
No

Drug Enforcement Administration (DEA) (21 CFR 1308.11-15)
Not controlled

Food and Drug Administration (FDA)
Total food additive
Direct food additive
GRAS food additive

Canadian regulations
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.

WHMIS status
Controlled

WHMIS classification
A - Compressed Gas

Inventory status

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

State regulations

US - California Hazardous Substances (Director's): Listed substance
Carbon dioxide (CAS 124-38-9) Listed.
US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance
Not listed.

US - New Jersey RTK - Substances: Listed substance
Carbon dioxide (CAS 124-38-9) Listed.

US. Massachusetts RTK - Substance List
Carbon dioxide (CAS 124-38-9) Listed.

US. New Jersey Worker and Community Right-to-Know Act
Not regulated.

US. Pennsylvania RTK - Hazardous Substances
Carbon dioxide (CAS 124-38-9) Listed.

Mexico regulations
This safety data sheet was prepared in accordance with the Official Mexican Standard (NOM-018-STPS-2000).

16. Other Information

HMIS® ratings
Health: 1
Flammability: 0
Physical hazard: 0

NFPA ratings
Health: 1
Flammability: 0
Instability: 0

Disclaimer
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