

## MATERIAL SAFETY DATA SHEET (MSDS) LIQUID CARBON DIOXIDE

Please ensure that this MSDS is received by an appropriate person

DATE: May 2015

Version 2

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Ref. No.: MS004

### 1 PRODUCT AND COMPANY IDENTIFICATION

|                               |  |
|-------------------------------|--|
| <b>Product Name</b>           | LIQUID CARBON DIOXIDE  |
| <b>Chemical Formula</b>       | CO <sub>2</sub>  |
| <b>Trade Names</b>            | Liquid Carbon Dioxide<br>Cryogenic Carbon Dioxide  |
| <b>Colour coding</b>          | The Portable Cryogenic Container (PCC) is made of polished stainless steel, and has the relevant decal affixed to the body of the PCC to clearly identify contents. There is also a permanent tag fitted to the PCC for traffic ID purposes. |
| <b>Valve</b>                  | The vapour outlet valve is Brass - 0,860 inch by 14 tpi right-hand male valve  |
| <b>Company Identification</b> | Afrox Malawi Limited<br>Johnstone Road<br>Ginnery Corner, Blantyre<br>Tel No: +265(1)871 611<br>Fax No: +265(1)871 260   |
| <b>EMERGENCY NUMBER</b>       | <b>+265 (1) 871 611 (24 hours)</b>   |



### 2 COMPOSITION/INFORMATION ON INGREDIENTS

|                 |                       |
|-----------------|-----------------------|
| Chemical Name   | Carbon Dioxide        |
| Chemical Family | Carbon Anhydride      |
| CAS No.         | 124-38-9              |
| UN No.          | 2187                  |
| ERG No.         | 120                   |
| Hazard Warning  | 2 C Non-flammable Gas |

### 3 HAZARDS IDENTIFICATION

#### Main Hazards

Excessive exposure to heat could cause the internal pressure to increase significantly, with the consequent violent rupturing of the vessel. The spillage of liquid carbon dioxide results in sublimation of the product, with the immediate formation of solid carbon dioxide at a temperature of approximately -78°C.

#### Adverse Health Effects

Carbon dioxide acts as a stimulant and a depressant on the central nervous system. Increases in heart rate and blood pressure have been noted at a concentration of 7.6 percentage & dyspnea (laboured breathing), headache, dizziness and sweating occur if exposure at that level is prolonged.

#### Chemical Hazards

Carbon dioxide is relatively non-reactive and non-toxic. It will not burn or support combustion. In the presence of moisture it can aggressively bring about corrosion in a variety of steel materials.

#### Biological Hazards

The greatest physiological effect of carbon dioxide is to stimulate the respiratory centre, thereby controlling the volume and rate of respiration. It is able to cause dilation and constriction of blood vessels and is a vital constituent of the acid-base mechanism that controls the pH of the blood.

#### Vapour Inhalation

At concentrations of 10% and above, unconsciousness can result in one minute or less. Impairment in performance has been noted during prolonged exposure to concentrations of 3% carbon dioxide, even when the oxygen concentration was 21%.

### 4 FIRST AID MEASURES

**Eye Contact** Should solid carbon dioxide come into contact with EYES or SKIN serious "cold" burns could occur.

**Skin Contact** (See Section 3 above)

**Ingestion** (See Section 3 above)

Prompt medical attention is mandatory in all cases of overexposure to carbon dioxide. Rescue personnel should be equipped with self-contained breathing apparatus. In case of frostbite from contact with solid carbon dioxide, place the frost-bitten part in warm water, about 40- 42°C. If warm water is not available, or is impractical to use, wrap the affected part gently in blankets. Encourage the patient to exercise the affected part whilst it is being warmed. Do not remove clothing whilst frosted. 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 removed to an uncontaminated area, and given mouth-to-mouth resuscitation and supplemental oxygen.

#### Eye Contact

The spillage of liquid carbon dioxide results in sublimation of the product, with the immediate formation of solid carbon dioxide at a temperature of approximately -78°C. Should this come into contact with EYES or SKIN serious "cold" burns could occur. Never induce oil or ointment into the eyes without medical advice. Do not wash the eyes with hot or even tepid water. Remove victim from source of contamination. Open eyelids to allow solid to evaporate. If pain is persistent, refer patient to ophthalmologist for treatment.

### 5 FIRE FIGHTING MEASURES

#### Extinguishing Media

Carbon dioxide is an extinguishing medium.

#### Specific Hazards

Carbon dioxide does not support life. It can act as a simple asphyxiant by diluting the concentration of oxygen in the air below the levels to support life.

#### Emergency Actions

If possible, shut off the source of excess carbon dioxide. Evacuate area. Keep the tanker, PCC or storage vessel cool by spraying with water if exposed to fire. If a tanker has overturned, do not attempt to right or move it. CONTACT THE NEAREST AFROX BRANCH.

#### Protective Clothing

Self-contained breathing apparatus. Safety gloves and shoes, or boots, should be worn when handling containers.

#### Environmental Precautions

Carbon dioxide is heavier than air and could accumulate in low-lying areas. Care should be taken when entering a potentially oxygen- deficient environment. If possible, ventilate the affected area.

### 6 ACCIDENTAL RELEASE MEASURES

#### Personal Precautions

Do not enter any area where carbon dioxide has been spilled unless tests have shown that it is safe to do so.

#### Environmental Precautions

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As carbon dioxide is classified as a "green-house" gas, any spillage should be avoided at all times.

## Small Spills

Shut off the source of escaping carbon dioxide.

## Large Spills

Ventilate the area. Evacuate the area. Shut off the source of the spill if this can be done without risk. Restrict access to the area until completion of the clean-up procedure. Ventilate the area using forced- draught necessary.

## 7 HANDLING AND STORAGE

When liquid carbon dioxide is held in any closed vessel or space, there must be an appropriate pressure relief device because of the very large pressure increases that can occur as the liquid carbon dioxide is vapourised. Liquid carbon dioxide must also be handled with all the precautions required for safety with any cryogenic fluid. Keep out of reach of children.

## 8 EXPOSURE CONTROLS/PERSONAL PROTECTION Occupational

### Exposure Hazards

As carbon dioxide is a simple asphyxiant, avoid any areas where spillage has taken place. Only enter once testing has proved atmosphere to be safe, and remember that gas is heavier than air.

### Engineering Control Measures

Engineering control measures are preferred to reduce exposure to oxygen-depleted atmospheres. General methods include forced-draught ventilation, separate from other exhaust ventilation systems. Ensure that sufficient fresh air enters at, or near, floor level.

### Personal Protection

Self-contained breathing apparatus should always be worn when entering area where oxygen depletion may have occurred. Safety goggles, gloves and shoes, or boots, should be worn when handling containers. Wear loose fitting overalls, preferably without pockets.

## 9 PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL DATA

|  |                 |
|--|-----------------|
| Chemical Symbol                        | CO <sub>2</sub> |
| Molecular Weight                       | 44.01           |
| Specific volume @ 101,325 kPa          | 547ml/kg        |
| Relative density (Air=1) @ 101,325 kPa | 1.53            |
| Critical Temperature                   | 31.0°C          |
| Colour                                 | None            |
| Taste                                  | Acidic          |
| Odour                                  | None            |

## 10 STABILITY AND REACTIVITY

### Conditions to avoid

The dilution of the oxygen concentration in the atmosphere to levels which cannot support life. Never expose the PCC's to excessive heat, as this may cause sufficient build-up of pressure to rupture.

### Incompatible Materials

Special materials of construction are required for containers operating below -28,8°C.

**Hazardous Decomposition Products** None

## 11 TOXICOLOGICAL INFORMATION

|   |                 |
|---|-----------------|
| Acute Toxicity Skin & eye contact Chronic                       | TLV 5000 VPM    |
| Toxicity  | No known effect |
| Carcinogenicity   | No known effect |
| Mutagenicity  | No known effect |
| Reproductive Hazards  | No known effect |
| (For further information see Section 3. Adverse Health effects) | No known effect |

## 12 ECOLOGICAL INFORMATION

Carbon dioxide is heavier than air and can cause pockets of oxygen depleted atmosphere in low-lying areas. It does not pose a hazard to the ecology.

## 13 DISPOSAL CONSIDERATIONS

### Disposal Methods

Small amounts may be blown to atmosphere under controlled conditions. Large amounts should only be handled by gas supplier.

### Disposal of Packaging

The disposal of containers must only be handled by the gas supplier.

## 14 TRANSPORT INFORMATION

### ROAD TRANSPORTATION

|                 |                      |
|-----------------|----------------------|
| UN No           | 2187                 |
| ERG No          | 120                  |
| Hazchem warning | 2C Non-flammable Gas |

### SEA TRANSPORTATION

|                 |                   |
|-----------------|-------------------|
| IMDG            | 2187              |
| Class           |                   |
| Packaging group |                   |
| Label           | Non-flammable Gas |

### AIR TRANSPORTATION

|                          |       |
|--------------------------|-------|
| ICAO/IATA Code           | 2187  |
| Class                    | 2.2   |
| Packaging group          |       |
| Packaging instructions   |       |
| - Cargo                  | 202   |
| - Passenger              | 202   |
| Maximum quantity allowed |       |
| - Cargo                  | 500kg |
| - Passenger              | 50kg  |

## 15 REGULATORY INFORMATION

| EEC Hazard class |  | Non-flammable |  |
|------------------|--|---------------|--|
| Risk Phrase      | Description  | Safety Phrase | Description  |
| R34              | Causes Burns   | S2            | Keep out of reach of Children  |
| R44              | Risk of explosion if heated under confinement          | S9            | Keep container in a well-Ventilated place                                |
| R58              | May cause long-term adverse effects in the environment | S12           | Do not keep the container sealed   |
|                  |  | S15           | Keep away from heat  |
|                  |  | S24           | Avoid contact with skin  |
|                  |  | S25           | Avoid contact with eyes  |
|                  |  | S36           | Wear suitable protective clothing  |
|                  |  | S38           | In case of insufficient ventilation, wear suitable respiratory equipment |
|                  |  | S51           | Use only in well-ventilated areas  |

National legislation: None

Refer to SANS 10234 for explanation of the above.

## 16 OTHER INFORMATION

### Bibliography

SANS 10234 - Labelling of Dangerous Substances

## 17 EXCLUSION OF LIABILITY

Information contained in this publication is accurate at the date of publication. The company does not accept liability arising from the use of this information, or the use, application, adaptation or process of any products described herein.