SAFETY DATA SHEET (SDS)
Liquid Carbon dioxide
Please ensure that this SDS is received by the appropriate persons

Review Date: 27/9/2022 v01 **Emergency: 0860 02 02 02** **Document Number: AFX-SDS-0026**

1. PRODUCT AND COMPANY IDENTIFICATION

Product Synonym	Carbon dioxide
Chemical Formula	CO_2
Trade Name	Technical Carbon Dioxide / wet Technical Carbon Dioxide PCC Food Carbon Dioxide Food Carbon Dioxide PCC Instrument Grade Carbon Dioxide Instrument Grade Carbon Dioxide PCC Pharmaceutical Grade Carbon Dioxide Carbon Dioxide CP/ Laser grade (N4.5) Medical Carbon Dioxide Medical Carbon Dioxide Wet CO2 Bulk Liquid
Colour Coding	Green cylinders Liquid in tanks
Product Code	40-RC / 40-RC-W 573-PA 518701-SE-C 514103-RC-C / 514203-RC-C 514101-PA-N 514202-SE-C 514106-RC-C 201-CB-P1/ 201-HB-P1/ 201-KB/ 201-RC 201-KB-W/ 201-RC-W 66 / 66-BEV
Company Identification	African Oxygen Limited Grayston Office Park Building 7 128 Peter Road Sandown, Sandton, 2196 Tel. No: (011) 490-0400 Fax No: (011) 490-0530 Email: customer.service@afrox.linde.com www.afrox.com
Emergency Numbers	**0860 02 02 02 (Afrox)**

2. HAZARD IDENTIFICATION

Classification	- Classification under South African Hazardous Chemical Substances Regulations subsequently amended. (HCS) - Classification under the Globally Harmonized System of classification and labelling of chemicals (GHS)
Emergency Overview	Colour: None Odour: None Taste: Acidic Physical State: Compressed Gas Form:Gas under pressure
Main Hazards	- All cylinders are portable gas containers and must be regarded as pressure vessels at all times. - Carbon dioxide does not support life. It can act as a simple asphyxiant by diluting the concentration of oxygen in air below the levels necessary to support life. As it is heavier than air it will tend to concentrate at lower levels.
Adverse Health Effects	- Carbon dioxide acts as a stimulant and depressant on the central nervous system. Increases in heart rate and blood pressure have been noted at a concentration of 7.6 percent, and 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. 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%.
GHS Classification	- Gas under pressure (Liquefied gas)
GHS Pictogram	
GHS Signal Words	Warning
GHS Hazard Statements	- H280: Contains gas under pressure, may explode if heated
GHS Precautionary Statements	**Storage:** - P403 : Store in a well-ventilated place. **Prevention:** - P280 : Wear protective gloves/eye protection/face protection. **Response:** - None **Disposal** - None
Other Hazards that do not result in classification	- May increase respiration and heart rate. - May cause frostbite or freezing of skin. - Will displace oxygen in an enclosed space - Asphyxiant in high concentrations

3. COMPOSITION OF INGREDIENTS

Chemical name **Chemical family**	Carbon dioxide Carbon Anhydride
CAS No	124-38-9
UN No	1013

	2187
ERG No	121 120
Hazard class	2.2
Hazchem Warning	Non-flammable Non-toxic Gas

4. FIRST AID MEASURES

Eye contact	The liquid may cause frostbite - Rinse the eye with water immediately. - Remove contact lenses, if present and easy to do. Continue rinsing. - Flush thoroughly with water for at least 15 minutes. - Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.
Skin Contact	The liquid may cause frostbite. - For exposure to liquid, immediately warm frostbite area with warm water not to exceed 41°C. Water temperature should be tolerable to normal skin. - Maintain skin warming for at least 15 minutes or until normal colouring and sensation have returned to the affected area. - In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.
Ingestion	- Ingestion is not considered a potential route of exposure.
Inhalation	- In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. - Remove victim to uncontaminated area wearing self-contained breathing apparatus. - Keep victim warm and rested. Seek medical attention. Apply artificial respiration if breathing stopped. - Low concentrations of CO2 cause increased respiration and headache.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	- Material will not burn. In case of fire in the surroundings: use appropriate extinguishing agent.
Unsuitable extinguishing media:	- None.
Specific Hazards	- None.
Special fire fighting procedures:	- In case of fire: Stop leak if safe to do so. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.
Special protective equipment for firefighters:	- Exposed Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces a self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:	- WARNING! Liquid and gas under pressure. Rapid release of gaseous Carbon dioxide through a pressure relief device (PRD) or valve can result in the formation of dry ice, which is very cold and can cause frostbite. - Evacuate area. - Provide adequate ventilation. - Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. - Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. - In an enclosed or non-ventilated space, a self-contained breathing apparatus must be used.
Environmental Precautions	- Prevent further leakage or spillage if safe to do so.
Methods and material for containment and cleaning up:	- Provide adequate ventilation.

7. HANDLING AND STORAGE

Safe Handling	- Only experienced and properly instructed persons should handle gases under pressure. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Avoid suckback of water, acid and alkalis. Keep container

	below 50°C in a well-ventilated place. Observe all regulations and local requirements regarding storage of containers. When using do not eat, drink or smoke. Store in accordance with local/regional/national/international regulations. Never use direct flame or electrical heating devices to raise the pressure of a container. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Damaged valves should be reported immediately to the supplier Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Replace valve outlet caps or plugs and container caps were supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminates particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place. Depressurisation of liquid CO2 below approximately 5 bar can create solid CO2 which may block protective devices, pipework and create dry-ice within containers. Containers, which contain or have contained flammable or explosive substances, must not be inerted with Carbon dioxide.
Conditions for safe storage, including any incompatibilities	-Containers should not be stored in conditions likely to encourage corrosion. Keep away from food, drink and animal feeding stuffs. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep pressure containers away from combustible material.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Occupational Exposure Hazards (HCS)	- TWA 5000 ppm - STEL 15000 ppm - IDLH 40000 ppm -As Carbon dioxide is a simple asphyxiant, avoid any areas where spillage has taken place. Only enter once testing has proved the atmosphere to be safe and remember that CO_2 gas is heavier than air.
Engineering Control Measures	- Engineering control measures are preferred to reduce exposures. General methods include mechanical ventilation, process or personal enclosure, and control of process conditions. Administrative controls and personal protective equipment may also be required. **Risk assessment should be conducted to evaluate the suitability of PPE to the task being performed**
Personal Protection	- When allowed by a risk assessment Respiratory Protective Equipment (RPE) may be used. The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD. Self-contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres.
Eyes	-Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible.
Hands	-Guideline: Protective gloves against mechanical risks. -Additional Information: Wear working gloves while handling containers
Body protection:	-No special precautions.
Feet	- Wear safety shoes while handling containers

9. PHYSICAL AND CHEMICAL PROPERTIES

Chemical Name	**Carbon dioxide**
Chemical Symbol	CO_2
Physical state	Gas
Form:	Liquefied gas
Colour:	Colourless
Odour:	Odourless
Odour Threshold:	Odour threshold is subjective and is inadequate to warn of over-exposure.
pH:	3.2 - 3.7 The pH of saturated CO2 solutions varies from 3.7 at 101 kPa (1 atm) to 3.2 at 2370 kPa (23.4 atm)
Melting Point:	-56.6 °C
Boiling Point:	-78.5 °C
Sublimation Point:	-78.5 °C
Critical Temp. (°C):	31.0 °C
Flash Point:	Not applicable

Evaporation Rate:	Not applicable.
Flammability (solid, gas):	Non-flammable Gas
Flammability limit - upper (%):	Not applicable.
Flammability limit - lower(%):	Not applicable.
Vapour pressure:	57 bar (20 °C)
Vapour density (air=1)	1.832 (20 °C)
Relative density:	1.512 (-56.6 °C)
Solubility(ies)	
Solubility in Water:	2000 mg/l (25 °C)
Partition coefficient (n-octanol/water):	0.83
Autoignition Temperature:	Not applicable.
Decomposition Temperature:	Not known.
Viscosity	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0.07 mPa.s (20 °C)
Explosive properties:	Not applicable
Oxidising Properties:	Not applicable
Molecular weight	44.01 g/mol (CO_2)

10. STABILITY AND REACTIVITY

Reactivity	- No reactivity hazard other than the effects described in sub-sections below.
Chemical stability	- Stable under normal conditions.
Possibility of hazardous reactions	- None.
Conditions to avoid	- Overheating of cylinders. Never use cylinders as rollers or supports; or for any other purpose than the storage of Carbon dioxide
Incompatible Materials	- Alkali metals, Alkaline earth metals, Acetylide forming metals, Chromium, Titanium > 550°C, Uranium (U) > 750°C, Magnesium > 775°C.
Hazardous Decomposition of Products	- Electrical discharges and high temperatures decompose Carbon dioxide into carbon monoxide and oxygen. The welding process may generate hazardous fumes and gases.

11. TOXOLOGICAL INFORMATION

Acute Toxicity	Based on available data, the classification criteria are not met.
Skin & eye contact	Based on available data, the classification criteria are not met.
Chronic Toxicity	Based on available data, the classification criteria are not met.
Carcinogenicity	Based on available data, the classification criteria are not met.
Mutagenicity	Based on available data, the classification criteria are not met.
Reproductive Hazards	Based on available data, the classification criteria are not met.

12. ECOLOGICAL INFORMATION

Toxicity	- No ecological damage caused by this product.
Persistence and degradability	Not applicable to gases and gas mixtures.
Bioaccumulative Potential Product	The subject product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.
Mobility in soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.
Results of PBT and vPvB assessment	Not classified as persistent, bioaccumulating and toxic (PBT). Not classified as persistent, very persistent and very bioaccumulating (vPvB).
Other adverse effects	No ecological damage caused by this product.
Effect on ozone layer	None
Effect on the global warming (CO_2=1)	1 When discharged in large quantities may contribute to the greenhouse effect.

13. DISPOSAL CONSIDERATIONS

Disposal Methods	- Do not discharge into any place where its accumulation could be dangerous. Vent to atmosphere in a well-ventilated place. .
Disposal of Packaging	- The container is the property of the supplier and the disposal of the containers must only be handled by the supplier.

14. TRANSPORT INFORMATION

Road Transportation	
UN No.	1013/2187
Shipping Name	CARBON DIOXIDE
ERG No.	120
Class	2.2
Subsidiary Risk	Non-flammable, non-toxic gases
Hazchem Warning	2C Non-flammable Gas
Sea Transportation	
IMDG	1013/2187
Shipping Name	CARBON DIOXIDE
ERG No.	120
Class	2.2
Subsidiary Risk	Non-flammable, non-toxic gases
Label	Non-flammable Gas
Air Transportation	
ICAO/IATA Code	1013/2187
Class	2.2
Packing Group:	-

Packaging instructions	- Cargo: allowed - Passenger: allowed

15. REGULATORY INFORMATION

EEC Hazard class: Toxic, Corrosive gas.
National legislation OHSact and Regulations 85 of 1993.

SANS 11014:2010 Edition 1	Safety data sheet for chemical products - Content and order of sections
SANS 10228:2012 Edition 6	The identification and classification of dangerous goods for transport by road and rail modes
SANS 10234:2019 Edition 2	Globally Harmonized System of classification and labelling of chemicals (GHS)
SUPPLEMENT TO SANS 10234 Edition 1	List of classification and labelling of chemicals in accordance with the Globally Harmonized System (GHS)

16. OTHER INFORMATION

- Ensure all national/local regulations are observed.
- Ensure users and relevant persons understand the asphyxiation hazard
- Regularly check supplier's information sources for updated versions of SDS's

Revision Date	27/9/2022 v01

Bibliography

Compressed Gas Association, Arlington, Virginia
Handbook of Compressed Gases - 3rd Edition
Matheson Gas Data Book - 6th Edition
SANS 11014 - Safety data sheet for chemical products: Content and order of sections
SANS 10234 - List of classification and labelling of chemicals in accordance with the Globally Harmonized System (GHS)
SANS 10265 – Classification and Labelling of Dangerous Substances

EXCLUSION OF LIABILITY