

**SAFETY DATA SHEET (SDS)**

**Carbon monoxide**

Please ensure that this SDS is received by the appropriate persons


Review Date: 23/9/2022 v01

Emergency: 0860 02 02 02

Document Number: AFX-SDS-0037

1. PRODUCT AND COMPANY IDENTIFICATION	
Product Synonym	Carbon Monoxide Carbon Monoxide
Chemical Formula	CO
Trade Name	Carbon Monoxide
Colour Coding	Red body with yellow shoulder and lime green valve guard
Product Code	540303-NE-C
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: <a href="mailto:customer.service@afrox.linde.com">customer.service@afrox.linde.com</a> <a href="http://www.afrox.com">www.afrox.com</a>
Emergency Numbers	<b>0860 02 02 02 (Afrox)</b>

2. HAZARD IDENTIFICATION	
Classification	- Classification under South African Hazardous Chemical Substances Regulations subsequently amended. (HCS) - FLAMMABLE GASES - Category 1 - GASES UNDER PRESSURE Liquefied gas - ACUTE TOXICITY (inhalation) - Category 2 - SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 2 - TOXIC TO REPRODUCTION - Category 1 - AQUATIC HAZARD (ACUTE) - Category 1 - GASES UNDER PRESSURE - Compressed gas
Emergency Overview	Colour: None Odour: None Taste: None Physical State: Permanent gas
	- All cylinders are portable gas containers and must be regarded as pressure vessels at all times. - Carbon monoxide does not support life.
Adverse Health Effects	- Harmful to living organisms.
Chemical Hazards	Acute Toxicity
Biological Hazards	Vapour is harmful to living organisms
Vapour Inhalation	Acute toxicity

GHS Classification	Flammable gas -Category 1 Acute toxicity – Category 2 Aquatic Hazard - Category 1 Toxic to Reproduction – Category 1
GHS Pictogram	
GHS Signal Words	Danger
GHS Hazard Statements	H280: Contains gas under pressure; may explode if heated H220: Extremely Flammable gas H360: May damage fertility or the unborn child H330: Fatal if inhaled H314: Causes severe skin burns and eye damage H400: Very toxic to aquatic life
GHS Precautionary Statements	<b>Prevention:</b> - P201: Obtain special instructions before use - P202: Do not handle until all safety precautions have been read and understood - P280: Wear protective gloves / protective clothing/eye protection/face protection - P260: Do not breathe gas or vapours - P271: Use only outdoors or in a well-ventilated area - P284: In case of inadequate ventilation, wear CO appropriate respiratory protection -P210: Keep away from heat / sparks / open flames/hot surfaces. No smoking -P273: Avoid release to the environment P264: Wash exposed skin & hands thoroughly after handling  <b>Response:</b> - P308 + P313: IF exposed or concerned: Get medical advice/attention - P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing - P310: Immediately call a POISON CENTRE/doctor/ emergency medical advice - P320: Specific treatment is urgent (see first aid measures in Section 4 - P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely - P381: Eliminate all ignition sources if safe to do so - P391: Collect spillage - P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting - P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all

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	<p>contaminated clothing. Rinse skin with water/shower</p> <ul style="list-style-type: none"> <li>- P363 Wash contaminated clothing before reuse</li> <li>- P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing</li> </ul> <p><b>Storage:</b></p> <ul style="list-style-type: none"> <li>- P405: Store locked up</li> <li>- P403 + P233: Store in a well-ventilated place. Keep container tightly closed</li> </ul> <p><b>Disposal:</b></p> <ul style="list-style-type: none"> <li>- P501: Dispose of contents/container in accordance with local regulations</li> </ul>
<b>Other Hazards that do not result in classification</b>	<p><b>- AVOID EXPOSURE OF (PREGNANT) WOMEN! IN ALL CASES CONSULT A DOCTOR!</b></p>

	<p>beneficial, as has treatment in a hyperbaric chamber. The physician should be informed that the patient has inhaled toxic quantities of carbon monoxide. Prompt medical attention is mandatory in all cases of overexposure to carbon monoxide. Rescue personnel should be equipped with self-contained breathing apparatus.</p> <p>In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.</p> <p>Low concentrations of Carbon monoxide can cause irritation, Headache. Confusion. Dizziness. Nausea. Weakness. Unconsciousness.</p> <p>Adverse symptoms may include the following: reduced fetal weight, increase in fetal deaths, skeletal malformations</p>
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3. COMPOSITION OF INGREDIENTS	
<b>Chemical name</b>	Carbon monoxide
<b>Chemical family</b>	Carbon monoxide
<b>CAS No</b>	630-08-0
<b>UN No</b>	1016
<b>ERG No</b>	119
<b>Hazard class</b>	Class 2.3
<b>Hazchem Warning</b>	2SE Toxic Gas

5. FIRE-FIGHTING MEASURES	
<b>Suitable extinguishing media</b>	<ul style="list-style-type: none"> <li>- Material will burn. In case of fire in the surroundings: use appropriate extinguishing agent.</li> <li>- Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out. In other cases, extinguish with carbon dioxide, water spray, powder. In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position</li> </ul>
<b>Unsuitable extinguishing media:</b>	- None
<b>Specific Hazards</b>	<ul style="list-style-type: none"> <li>- Asphyxiant</li> <li>- Toxic</li> <li>- Contains gas under pressure</li> <li>- Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion</li> </ul>
<b>Special fire fighting procedures:</b>	<ul style="list-style-type: none"> <li>- 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</li> <li>- Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire</li> </ul>
<b>Special protective equipment for firefighters:</b>	- Exposed Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, a self-contained breathing apparatus

4. FIRST AID MEASURES	
<b>Eye contact</b>	<ul style="list-style-type: none"> <li>- Rinse the eye with water immediately</li> <li>- Remove contact lenses, if present and easy to do. Continue rinsing</li> <li>- Flush thoroughly with water for at least 15 minutes</li> <li>- Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.</li> </ul>
<b>Skin Contact</b>	<ul style="list-style-type: none"> <li>- In case of massive exposure, remove clothing. Seek medical evaluation and treatment as soon as possible.</li> <li>- Adverse symptoms may include the following: reduced fetal weight, increase in fetal deaths, skeletal malformations</li> </ul>
<b>Ingestion</b>	<ul style="list-style-type: none"> <li>- Ingestion is not considered a potential route of exposure</li> <li>- Adverse symptoms may include the following: reduced fetal weight, increase in fetal deaths, skeletal malformations</li> </ul>
<b>Inhalation</b>	Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, and given artificial respiration and oxygen at the same time. The administration of the oxygen at an elevated pressure (up to 2 to 2.5 atmospheres), has shown to be

6. ACCIDENTAL RELEASE MEASURES	
<b>Personal precautions, protective equipment and</b>	<ul style="list-style-type: none"> <li>- WARNING! Gas under pressure.</li> <li>- Evacuate area</li> <li>- Consult an expert!</li> <li>- Provide adequate ventilation.</li> </ul>

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<b>emergency procedures:</b>	<ul style="list-style-type: none"> <li>- Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.</li> <li>- In an enclosed or non-ventilated space, a self-contained breathing apparatus must be used</li> <li>- Remove all ignition sources.</li> </ul>
<b>Environmental Precautions</b>	- Prevent further leakage or spillage if safe to do so
<b>Methods and material for containment and cleaning up:</b>	- Provide adequate ventilation

	Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place.
<b>Conditions for safe storage, including any incompatibilities</b>	-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.

**7. HANDLING AND STORAGE**

<b>Safe Handling</b>	<p>-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. 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 contaminants particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier.</p>
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**8. EXPOSURE CONTROLS AND PERSONAL PROTECTION**

<b>Occupational Exposure Hazards (HCS)</b>	- OEL eight-hour TWA 50 ppm
<b>Engineering Control Measures</b>	<p>- 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.</p> <p><b>A Risk assessment should be conducted to evaluate the suitability of PPE to the task being performed</b></p>
<b>Personal Protection</b>	- 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.
<b>Inhalation</b>	- A harmful concentration of this gas in the air will be reached very quickly on loss of containment
<b>Eyes</b>	-Wear full face shield
<b>Hands</b>	<p>-Guideline: Protective gloves against mechanical risks.</p> <p>-Additional Information: Wear working gloves while handling containers</p>
<b>Body protection:</b>	-Wear protective overalls
<b>Feet</b>	- Wear safety shoes while handling containers

**9. PHYSICAL AND CHEMICAL PROPERTIES**

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<b>Chemical Name</b>	<b>Carbon monoxide</b>
<b>Chemical Symbol</b>	CO
<b>Physical state</b>	Gas
<b>Form:</b>	Gas
<b>Colour:</b>	Colourless
<b>Odour:</b>	Odourless
<b>Odour Threshold:</b>	Not applicable
<b>pH:</b>	Acidic
<b>Melting Point:</b>	-205°C
<b>Boiling Point:</b>	-191°C
<b>Sublimation Point:</b>	Not applicable
<b>Critical Temp. (°C):</b>	-140.2°C
<b>Flash Point:</b>	Not applicable
<b>Evaporation Rate:</b>	Not applicable
<b>Flammability ( gas):</b>	Extremely Flammable
<b>Flammability limit - upper (%):</b>	74.2
<b>Flammability limit - lower(%):</b>	10.9
<b>Vapour pressure:</b>	Permanent gas
<b>Vapour density</b>	1.16 @20°C
<b>Relative density:</b>	0.97@ 20 °C
<b>Solubility(ies)</b>	
<b>Solubility in Water:</b>	0.0022 l/kg water 20°C
<b>Partition coefficient (n-octanol/water):</b>	Not known
<b>Autoignition Temperature:</b>	607°C
<b>Decomposition Temperature:</b>	Not known
<b>Viscosity</b>	
<b>Kinematic viscosity:</b>	No data available
<b>Dynamic viscosity:</b>	No data available
<b>Explosive properties:</b>	Not applicable
<b>Oxidising Properties:</b>	Not applicable
<b>Molecular weight</b>	28.01 g/mol

<b>Chronic Toxicity</b>	No data on chronic toxicity.
<b>Carcinogenicity</b>	Based on available data, the classification criteria are not met.
<b>Mutagenicity</b>	Based on available data, the classification criteria are not met.
<b>Reproductive Hazards</b>	The substance may have effects on the cardiovascular system and central nervous system. May cause toxicity to human reproduction or development.

#### 12. ECOLOGICAL INFORMATION

<b>Toxicity</b>	Ecological damage caused by this product
<b>Persistence and degradability</b>	Not applicable to gases and gas mixtures
<b>Bioaccumulative Potential Product</b>	No bio-accumulating hazard
<b>Mobility in soil</b>	No hazard
<b>Results of PBT and vPvB assessment</b>	Not classified as persistent, bio-accumulating, and toxic (PBT)
<b>Other adverse effects</b>	Not known
<b>Effect on ozone layer</b>	None
<b>Effect on the global warming (CO2=1)</b>	3

#### 13. DISPOSAL CONSIDERATIONS

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

#### 10. STABILITY AND REACTIVITY

<b>Reactivity</b>	-Not reactive
<b>Chemical stability</b>	- Stable under normal conditions
<b>Possibility of hazardous reactions</b>	- Under normal conditions of storage and use, hazardous reactions will not occur
<b>Conditions to avoid</b>	- Overheating of cylinders. Never use cylinders as rollers or supports; or for any other purpose than the storage of Carbon Monoxide
<b>Incompatible Materials</b>	Oxidisers
<b>Hazardous Decomposition of Products</b>	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

#### 11. TOXOLOGICAL INFORMATION

<b>Acute Toxicity</b>	Extremely toxic The substance may cause effects on the blood. This may result in carboxyhaemoglobinemia and cardiac disorders. Exposure at high levels could cause death. Medical observation is indicated.
<b>Skin &amp; eye contact</b>	Causes eye damage.

#### 14. TRANSPORT INFORMATION

##### Road Transportation

<b>UN No.</b>	1016
<b>Shipping Name</b>	Carbon monoxide
<b>ERG No.</b>	119
<b>Class</b>	2.3
<b>Subsidiary Risk</b>	Flammable, Toxic gases
<b>Hazchem Warning</b>	Toxic Flammable Gas

##### Sea Transportation

<b>IMDG</b>	1016
<b>Shipping Name</b>	Carbon monoxide
<b>ERG No.</b>	119
<b>Class</b>	2.3
<b>Subsidiary Risk</b>	Corrosive Flammable, Toxic gases
<b>Label</b>	Toxic corrosive Flammable Gas

##### Air Transportation

<b>ICAO/IATA Code</b>	1016
<b>Class</b>	2.3
<b>Packing Group:</b>	NA
<b>Packaging instructions</b>	- Cargo: not allowed - Passenger: not allowed

#### 15. REGULATORY INFORMATION

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EEC Hazard class: Toxic, Corrosive gas. National legislation OHSact and Regulations 85 of 1993.	
<b>SANS 11014:2010 Edition 1</b>	Safety data sheet for chemical products - Content and order of sections
<b>SANS 10228:2012 Edition 6</b>	The identification and classification of dangerous goods for transport by road and rail modes
<b>SANS 10234:2019 Edition 2</b>	Globally Harmonized System of classification and labelling of chemicals (GHS)
<b>SUPPLEMENT TO SANS 10234 Edition 1</b>	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

<b>Revision Date</b>	12/6/2023 v01
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#### 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

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