R744 (CO2)

A-Gas (South Africa) (Pty) Ltd

Chemwatch Hazard Alert Code: 1

Chemwatch: **1013**
Version No: **10.1**
Safety Data Sheet

Initial Date: **14/06/2005**
Revision Date: **20/06/2022**
Print Date: **06/11/2026**
L.GHS.ZAF.EN

SECTION 1 Identification of the substance / mixture and of the company / undertaking

Product Identifier

Product name	R744 (CO2)
Synonyms	CO2; carbonic anhydride; carbonic acid gas; carbon dioxide propellant; carbon dioxide liquid; carbonoxide (CO2); carbon-12 dioxide; carbon-12C dioxide-16O2; carbonic acid anhydride; dry ice; EN 439C1; Khladon744; R 744; 080 Welding Grade 081 Industrial Grade 082 Food Grade 083 Hotel Grade; 084 Beergas; 086 McDonald's Grade; 176 Anaerobic Grade; 200 Fogg - Pesticide Grade; Grades 131 206 207 261; Aligal; lasal; Refrigerant 744; BOC Gases Pack Sizes:; Gas withdrawal; 6 kg (D), 10 kg (VT), 15 kg (E), 22 kg (F), 31 kg (G); Liquid withdrawal: 6 kg (DE), 15 kg (EE), 31 kg (GE); carbon dioxide, food grade; carbon dioxide, wine grade; carbon dioxide bulk; YY-RES-34452; carbon dioxide, compressed; Carbon Dioxide Cylinder, Gas and Liquid Withdrawal. Product code: 080, 081, 082, 083, 084, 086, 131, 176, 200. Refrigerant 744.; carbon dioxide, compressed (CO2}
Proper shipping name	CARBON DIOXIDE
Chemical formula	CO2
Other means of identification	Not Available
CAS number	124-38-9

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Used in the carbonation of beverages; welding shielding gas; inert atmosphere; manufacture of carbonates; in fire prevention and fire extinction; a rice fumigant; as an antiseptic in bacteriology and in the frozen food industry; refrigerant.

Details of the manufacturer or importer of the safety data sheet

Registered company name	**A-Gas (South Africa) (Pty) Ltd**
Address	8 Railway Road, Montague Gardens Cape Town 7441 South Africa
Telephone	+27 (0) 21 551 8790
Fax	+27 (0) 21 551 8758
Website	www.agas.com
Email	info.sa@agas.com

Emergency telephone number

Association / Organisation	**A-Gas (South Africa) (Pty) Ltd**	**CHEMWATCH EMERGENCY RESPONSE (24/7)**
Emergency telephone number(s)	**0800 00 5817**	**0800 296456 (ID#: 1013)**
Other emergency telephone number(s)	**Not Available**	**+61 3 9573 3188**

SECTION 2 Hazards identification

Classification of the substance or mixture

Classification	Gases Under Pressure (Liquefied Gas)

Label elements

Page 1 continued...

Hazard pictogram(s)	
Signal word	**Warning**

Hazard statement(s)

H280	Contains gas under pressure; may explode if heated.

Precautionary statement(s) General

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.
P103	Read label before use.

Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

P410+P403	Protect from sunlight. Store in a well-ventilated place.

Precautionary statement(s) Disposal

Not Applicable

No further product hazard information.

SECTION 3 Composition / information on ingredients

Substances

CAS No	%[weight]	Name
124-38-9	>99.8	carbon dioxide

Mixtures

See section above for composition of Substances

SECTION 4 First aid measures

Description of first aid measures

Eye Contact	For exposure to dry ice powder: Keep patient calm. Immediately flush eye with tepid water in large quantities, or with sterile saline solution. ▸ If product comes in contact with eyes remove the patient from gas source or contaminated area. ▸ Take the patient to the nearest eye wash, shower or other source of clean water. ▸ Open the eyelid(s) wide to allow the material to evaporate. ▸ Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners. ▸ The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage. ▸ Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s) ▸ Transport to hospital or doctor. ▸ Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur. ▸ If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage. ▸ Ensure verbal communication and physical contact with the patient. **DO NOT** allow the patient to rub the eyes **DO NOT** allow the patient to tightly shut the eyes **DO NOT** introduce oil or ointment into the eye(s) without medical advice **DO NOT** use hot or tepid water.
Skin Contact	If skin or hair contact occurs: ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation. In case of cold burns (frost-bite):

Continued...

	‣ Move casualty into warmth before thawing the affected part; if feet are affected carry if possible ‣ Bathe the affected area immediately in luke-warm water (not more than 35 deg C) for 10 to 15 minutes, immersing if possible and without rubbing ‣ **DO NOT** apply hot water or radiant heat. ‣ Apply a clean, dry, light dressing of "fluffed-up" dry gauze bandage ‣ If a limb is involved, raise and support this to reduce swelling ‣ If an adult is involved and where intense pain occurs provide pain killers such as paracetomol ‣ Transport to hospital, or doctor ‣ Subsequent blackening of the exposed tissue indicates potential of necrosis, which may require amputation.
Inhalation	‣ Following exposure to gas, remove the patient from the gas source or contaminated area. ‣ NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer. ‣ Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures. ‣ If the patient is not breathing spontaneously, administer rescue breathing. ‣ If the patient does not have a pulse, administer CPR. ‣ If medical oxygen and appropriately trained personnel are available, administer 100% oxygen. ‣ Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction. ‣ Keep the patient warm, comfortable and at rest while awaiting medical care. ‣ **MONITOR THE BREATHING AND PULSE, CONTINUOUSLY.** ‣ Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary.
Ingestion	‣ Not considered a normal route of entry.

Indication of any immediate medical attention and special treatment needed

Persons with cardiovascular or pulmonary disease are at increased risk. Prolonged breathing of cold vapour may damage lung tissue.
For frost-bite caused by liquefied petroleum gas:

- If part has not thawed, place in warm water bath (41-46 C) for 15-20 minutes, until the skin turns pink or red.
- Analgesia may be necessary while thawing.
- If there has been a massive exposure, the general body temperature must be depressed, and the patient must be immediately rewarmed by whole-body immersion, in a bath at the above temperature.
- Shock may occur during rewarming.
- Administer tetanus toxoid booster after hospitalization.
- Prophylactic antibiotics may be useful.
- The patient may require anticoagulants and oxygen.

[Shell Australia 22/12/87]
For gas exposures:

BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary oedema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures.

ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary oedema.
- Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.
EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

SECTION 5 Firefighting measures

Extinguishing media

SMALL FIRE: Use extinguishing agent suitable for type of surrounding fire.
LARGE FIRE: Cool cylinder.
DO NOT direct water at source of leak or venting safety devices as icing may occur.

Special hazards arising from the substance or mixture

Fire Incompatibility	None known.

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Advice for firefighters

Fire Fighting	---------- GENERAL ---------- ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Wear breathing apparatus and protective gloves. ▸ Fight fire from a safe distance, with adequate cover. ▸ Use water delivered as a fine spray to control fire and cool adjacent area.
Fire/Explosion Hazard	▸ Non combustible. ▸ Not considered a significant fire risk, however containers may burn. **Contains low boiling substance:** Closed containers may rupture due to pressure buildup under fire conditions. ▸ Vented gas is more dense than air and may collect in pits, basements.

SECTION 6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	▸ Avoid breathing vapour and any contact with liquid or gas. Protective equipment including respirator should be used. ▸ **DO NOT** enter confined spaces where gas may have accumulated. ▸ Increase ventilation.
Major Spills	▸ Clear area of all unprotected personnel and move upwind. ▸ Alert Emergency Authority and advise them of the location and nature of hazard. ▸ Wear breathing apparatus and protective gloves. ▸ Prevent by any means available, spillage from entering drains and water-courses. ▸ Remove leaking cylinders to a safe place. ▸ Fit vent pipes. Release pressure under safe, controlled conditions ▸ Burn issuing gas at vent pipes. ▸ DO NOT exert excessive pressure on valve; DO NOTattempt to operate damaged valve.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	· Consider use in closed pressurised systems, fitted with temperature, pressure and safety relief valves which are vented for safe dispersal. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature · The tubing network design connecting gas cylinders to the delivery system should include appropriate pressure indicators and vacuum or suction lines. · Fully-welded types of pressure gauges, where the bourdon tube sensing element is welded to the gauge body, are recommended. · Before connecting gas cylinders, ensure manifold is mechanically secure and does not containing another gas. ▸ **DO NOT** transfer gas from one cylinder to another.
Other information	▸ Store in an upright position. ▸ Cylinders should be stored in a purpose-built compound with good ventilation, preferably in the open. ▸ Such compounds should be sited and built in accordance with statutory requirements. ▸ The storage compound should be kept clear and access restricted to authorised personnel only. ▸ Cylinders stored in the open should be protected against rust and extremes of weather.

Conditions for safe storage, including any incompatibilities

Suitable container	▸ Cylinder: ▸ Ensure the use of equipment rated for cylinder pressure. ▸ Ensure the use of compatible materials of construction. ▸ Valve protection cap to be in place until cylinder is secured, connected. ▸ Cylinder must be properly secured either in use or in storage.
Storage incompatibility	Carbon dioxide: ▸ reacts violently with strong bases and alkali metals (especially their dusts) ▸ may ignite or explode when heated or in suspended chemically active metals (and their hydrides) such as aluminium, chromium, manganese, magnesium (above 775 C), titanium (above 550 C), uranium (above 750 C) or zirconium , diethylmagnesium ▸ is incompatible with water, acrolein, acrylaldehyde, amines, anhydrous ammonia, aziridine, metal acetylides (such as lithium acetylide), caesium monoxide (moist), lithium, potassium, sodium, sodium carbide, sodium-potassium alloy, sodium peroxide, titanium ▸ may build up static electricity when discharged at high flow rates from storage cylinders or fire extinguishers - this may produce sparks resulting in ignition of flammables or explosives.

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- may decompose to toxic carbon monoxide and flammable oxygen when exposed to electrical discharges or very high temperatures
- Compressed gases may contain a large amount of kinetic energy over and above that potentially available from the energy of reaction produced by the gas in chemical reaction with other substances



+	+	+	+	+	+	+

X — *Must not be stored together*
0 — *May be stored together with specific preventions*
+ — *May be stored together*

Note: Depending on other risk factors, compatibility assessment based on the table above may not be relevant to storage situations, particularly where large volumes of dangerous goods are stored and handled. Reference should be made to the Safety Data Sheets for each substance or article and risks assessed accordingly.

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
South Africa Occupational Exposure Limits for Airborne Pollutants	carbon dioxide	Carbon dioxide	5000 ppm / 9000 mg/m3	Not Available	30000 ppm / 54000 mg/m3	Not Available
South Africa Hazardous Chemical Substances - Recommended Limits	carbon dioxide	Carbon Dioxide	5000 ppm / 9000 mg/m3	27000 mg/m3 / 15000 ppm	Not Available	Not Available
South Africa Occupational Exposure Limits - Restricted Limits for Hazardous Chemical Agents	carbon dioxide	Carbon dioxide	10000 ppm	60000 ppm	Not Available	Not Available

MATERIAL DATA

1800 mg/m3 10 D/R NA -
May act as a simple asphyxiants; these are gases which, when present in high concentrations, reduce the oxygen content in air below that required to support breathing, consciousness and life; loss of consciousness, with death by suffocation may rapidly occur in an oxygen deficient atmosphere.
CARE: Most simple asphyxiants are odourless or possess low odour and there is no warning on entry into an oxygen deficient atmosphere. If there is any doubt, oxygen content can be checked simply and quickly. It may not be appropriate to only recommend an exposure standard for simple asphyxiants rather it is essential that sufficient oxygen be maintained.
For carbon dioxide:
NOTE: Detector tubes for carbon dioxide, measuring in excess of 0.01 % vol.,are commercially available. Long-term measurements (4 hrs) may be conducted to detect concentrations exceeding 250 ppm.
Studies using physically fit males in confined spaces indicate the TLV-TWA and STEL provides a wide margin of safety against asphyxiation and from undue metabolic stress, provided normal amounts of oxygen are present in inhaled air. Lowered oxygen content, increased physical activity and prolonged exposures each impact on systemic and respiratory effects.

Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits.
These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time-weighted average unless specified otherwise.
CR = Cancer Risk/10000; UF = Uncertainty factor:
TLV believed to be adequate to protect reproductive health:
LOD: Limit of detection
Toxic endpoints have also been identified as:
D = Developmental; R = Reproductive; TC = Transplacental carcinogen
Jankovic J., Drake F.: A Screening Method for Occupational Reproductive
American Industrial Hygiene Association Journal 57: 641-649 (1996)

Exposed individuals are **NOT** reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odour Safety Factor (OSF) is determined to fall into either Class C, D or E.

The Odour Safety Factor (OSF) is defined as:

OSF= Exposure Standard (TWA) ppm/ Odour Threshold Value (OTV) ppm

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Classification into classes follows:

Class	OSF	Description
A	550	Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV-TWA for example) is being reached, even when distracted by working activities
B	26-550	As "A" for 50-90% of persons being distracted
	1-26	As "A" for less than 50% of persons being distracted
D	0.18-1	10-50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	As "D" for less than 10% of persons aware of being tested

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.
Individual protection measures, such as personal protective equipment	
Eye and face protection	‣ Chemical goggles. ‣ Full face shield may be required for supplementary but never for primary protection of eyes. ‣ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.
Skin protection	See Hand protection below
Hands/feet protection	‣ When handling sealed and suitably insulated cylinders wear cloth or leather gloves. ‣ Insulated gloves: ‣ NOTE: Insulated gloves should be loose fitting so that may be removed quickly if liquid is spilled upon them. Insulated gloves are not made to permit hands to be placed in the liquid; they provide only short-term protection from accidental contact with the liquid.
Body protection	See Other protection below
Other protection	‣ Protective overalls, closely fitted at neck and wrist. ‣ Eye-wash unit. ‣ Ensure availability of lifeline in confined spaces. ‣ Staff should be trained in all aspects of rescue work.

Respiratory protection

Full face respirator with supplied air.

- Positive pressure, full face, air-supplied breathing apparatus should be used for work in enclosed spaces if a leak is suspected or the primary containment is to be opened (e.g. for a cylinder change)
- Air-supplied breathing apparatus is required where release of gas from primary containment is either suspected or demonstrated.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	A colourless, odourless gas; slightly soluble in water. A saturated solution of gas in water has pH of 3.8. High pressure liquefiable gas: Critical temperature 31 deg. C approx.

Physical state	Liquified Gas	**Relative density (Water = 1)**	1.10 @ -37 C
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	Not Applicable
pH (as supplied)	Not Applicable	**Decomposition temperature (°C)**	Not Applicable
Melting point / freezing point (°C)	-78.5	**Viscosity (mm2/s)**	0.015(101 kPa,26 C)
Initial boiling point and boiling range (°C)	-56.6 (526.9 kPa)	**Molecular weight (g/mol)**	44
Flash point (°C)	Not Applicable	**Taste**	Not Available
Evaporation rate	Not Available	**Explosive properties**	Not Available
Flammability	Not Applicable	**Oxidising properties**	Not Available
Upper Explosive Limit (%)	Not Applicable	**Surface Tension (dyn/cm or mN/m)**	Not Available

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Lower Explosive Limit (%)	Not Applicable	**Volatile Component (%vol)**	100
Vapour pressure (kPa)	6300 @ 25 C	**Gas group**	Not Available
Solubility in water	Partly miscible	**pH as a solution (1%)**	Not Available
Vapour density (Air = 1)	1.53	**VOC g/L**	Not Available
Heat of Combustion (kJ/g)	Not Available	**Ignition Distance (cm)**	Not Available
Flame Height (cm)	Not Available	**Flame Duration (s)**	Not Available
Enclosed Space Ignition Time Equivalent (s/m3)	Not Available	**Enclosed Space Ignition Deflagration Density (g/m3)**	Not Available

SECTION 10 Stability and reactivity

Reactivity	See section 7
Chemical stability	‣ Unstable in the presence of incompatible materials. ‣ Product is considered stable. ‣ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 Toxicological information

Information on toxicological effects

a) Acute Toxicity	Based on available data, the classification criteria are not met.
b) Skin Irritation/Corrosion	Based on available data, the classification criteria are not met.
c) Serious Eye Damage/Irritation	Based on available data, the classification criteria are not met.
d) Respiratory or Skin sensitisation	Based on available data, the classification criteria are not met.
e) Mutagenicity	Based on available data, the classification criteria are not met.
f) Carcinogenicity	Based on available data, the classification criteria are not met.
g) Reproductivity	Based on available data, the classification criteria are not met.
h) STOT - Single Exposure	Based on available data, the classification criteria are not met.
i) STOT - Repeated Exposure	Based on available data, the classification criteria are not met.
j) Aspiration Hazard	Based on available data, the classification criteria are not met.

Inhaled	The material is not classified as causing respiratory irritation under Regulation (EC) No 1272/2008 (CLP), as amended. Nevertheless, inhalation of the material, particularly following prolonged exposure, may cause respiratory discomfort and, occasionally, respiratory distress. Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo. Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. Carbon dioxide is an odourless gas which gives very poor warning of exposure. The gas can produce rapid unconsciousness and death from oxygen deficiency at concentrations of 10% in air. Even concentrations of 3% may produce shortness of breath and headache. Carbon dioxide is the most powerful cerebral vasodilator known. Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. The vapour may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure. Symptoms of asphyxia (suffocation) may include headache, dizziness, shortness of breath, muscular weakness, drowsiness and ringing in the ears. If the asphyxia is allowed to progress, there may be nausea and vomiting, further physical weakness and unconsciousness and, finally, convulsions, coma and death. Significant concentrations of the non-toxic gas reduce the oxygen level in the air. As the amount of oxygen is reduced from 21 to 14 volume %, the pulse rate accelerates and the rate and volume of breathing increase.
Ingestion	Solid carbon dioxide will cause severe cold burns to mouth and throat. Overexposure is unlikely in this form. Not normally a hazard due to physical form of product. Considered an unlikely route of entry in commercial/industrial environments
Skin Contact	The material is not classified as a skin irritant under Regulation (EC) No 1272/2008 (CLP), as amended. Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting. Open cuts, abraded or irritated skin should not be exposed to this material Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

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	Vapourising liquid causes rapid cooling and contact may cause cold burns, frostbite, even through normal gloves. Frozen skin tissues are painless and appear waxy and yellow. Signs and symptoms of frost-bite may include "pins and needles", paleness followed by numbness, a hardening an stiffening of the skin, a progression of colour changes in the affected area, (first white, then mottled and blue and eventually black; on recovery, red, hot, painful and blistered).
Eye	Although the material is not classified as an eye irritant under Regulation (EC) No 1272/2008 (CLP), as amended, direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn). Direct contact with the eye may not cause irritation because of the extreme volatility of the gas; however concentrated atmospheres may produce irritation after brief exposures..
Chronic	Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. There is some evidence to provide a presumption that human exposure to the material may result in impaired fertility on the basis of: some evidence in animal studies of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects but which is not a secondary non-specific consequence of other toxic effects. There is some evidence that human exposure to the material may result in developmental toxicity. This evidence is based on animal studies where effects have been observed in the absence of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not secondary non-specific consequences of the other toxic effects. Principal route of occupational exposure to the gas is by inhalation. Although prolonged exposure to carbon dioxide, at levels up to 1.5% in inhaled air, are well tolerated, calcium/ phosphorus metabolism may be affected. Serum levels of calcium and urinary phosphorus progressively fall. Prolonged exposure at 2% concentration, may produce deepened respiration. At 3%, impaired performance is evident.

R744 (CO2)	**TOXICITY**	**IRRITATION**
	Not Available	Not Available

Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*

Acute Toxicity	✗	**Carcinogenicity**	✗
Skin Irritation/Corrosion	✗	**Reproductivity**	✗
Serious Eye Damage/Irritation	✗	**STOT - Single Exposure**	✗
Respiratory or Skin sensitisation	✗	**STOT - Repeated Exposure**	✗
Mutagenicity	✗	**Aspiration Hazard**	✗

Legend: ✗ *– Data either not available or does not fill the criteria for classification*
✓ *– Data available to make classification*

SECTION 12 Ecological information

Toxicity

R744 (CO2)	**Endpoint**	**Test Duration (hr)**	**Species**	**Value**	**Source**
	LC50	96h	Fish	35mg/l	1

Legend:	*Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. US EPA, Ecotox database - Aquatic Toxicity Data 4. ECETOC Aquatic Hazard Assessment Data 5. NITE (Japan) - Bioconcentration Data 6. METI (Japan) - Bioconcentration Data 7. Vendor Data 8. User defined data*

For carbon dioxide:
Environmental fate:
Carbon dioxide in earth's atmosphere is considered a trace gas currently occurring at an average concentration of about 385 parts per million by volume or 582 parts per million by mass. The mass of the Earth atmosphere is 5.14×10+18 kg , so the total mass of atmospheric carbon dioxide is 3.0×10+15 kg (3,000 gigatonnes). Atmospheric concentrations of carbon dioxide fluctuate slightly with the change of the seasons, driven primarily by seasonal plant growth .
Due to human activities such as the combustion of fossil fuels and deforestation, the concentration of atmospheric carbon dioxide has increased by about 35% since preindustrial times.

Persistence and degradability

Ingredient	**Persistence: Water/Soil**	**Persistence: Air**
carbon dioxide	LOW	LOW

Bioaccumulative potential

Continued...

Ingredient	Bioaccumulation
carbon dioxide	LOW (LogKOW = 0.83)

Mobility in soil

Ingredient	Mobility
carbon dioxide	HIGH (Log KOC = 1.498)

SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	▸ Evaporate residue at an approved site. ▸ Return empty containers to supplier. If containers are marked non-returnable establish means of disposal with manufacturer prior to purchase. ▸ Ensure damaged or non-returnable cylinders are gas-free before disposal.

SECTION 14 Transport information

Labels Required

	
Marine Pollutant	NO

Land transport (UN)

14.1. **UN number or ID number**	1013
14.2. **UN proper shipping name**	CARBON DIOXIDE
14.3. **Transport hazard class(es)**	Class: 2.2 Subsidiary Hazard: Not Applicable
14.4. **Packing group**	Not Applicable
14.5. **Environmental hazard**	Not Applicable
14.6. **Special precautions for user**	Special provisions: 378; 392; 406 Limited quantity: 120 ml

Air transport (ICAO-IATA / DGR)

14.1. **UN number**	1013
14.2. **UN proper shipping name**	Carbon dioxide
14.3. **Transport hazard class(es)**	ICAO/IATA Class: 2.2 ICAO / IATA Subsidiary Hazard: Not Applicable ERG Code: 2L
14.4. **Packing group**	Not Applicable
14.5. **Environmental hazard**	Not Applicable
14.6. **Special precautions for user**	Special provisions: A202 Cargo Only Packing Instructions: 200 Cargo Only Maximum Qty / Pack: 150 kg Passenger and Cargo Packing Instructions: 200 Passenger and Cargo Maximum Qty / Pack: 75 kg Passenger and Cargo Limited Quantity Packing Instructions: Forbidden Passenger and Cargo Limited Maximum Qty / Pack: Forbidden

Continued...

Sea transport (IMDG-Code / GGVSee)

14.1. **UN number**	1013
14.2. **UN proper shipping name**	CARBON DIOXIDE
14.3. **Transport hazard class(es)**	IMDG Class: 2.2 IMDG Subsidiary Hazard: Not Applicable
14.4. **Packing group**	Not Applicable
14.5 **Environmental hazard**	Not Applicable
14.6. **Special precautions for user**	EMS Number: F-C, S-V Special provisions: 378 392 406 Limited Quantities: 120 mL

14.7. Maritime transport in bulk according to IMO instruments

14.7.1. Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

14.7.2. Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
carbon dioxide	Not Applicable

14.7.3. Transport in bulk in accordance with the IGC Code

Product name	Ship Type
carbon dioxide	Not Applicable

SECTION 15 Regulatory information

Safety, health and environmental regulations / legislation specific for the substance or mixture

carbon dioxide is found on the following regulatory lists

FEI Equine Prohibited Substances List - Controlled Medication
FEI Equine Prohibited Substances List (EPSL)
South Africa Hazardous Chemical Substances - Recommended Limits
South Africa Occupational Exposure Limits - Restricted Limits for Hazardous Chemical Agents
South Africa Occupational Exposure Limits for Airborne Pollutants

Additional Regulatory Information

Not Applicable

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (carbon dioxide)
China - IECSC	Yes
Colombia - Colombia National Industrial Chemicals Inventory	No (carbon dioxide)
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	All chemical substances in this product have been designated as TSCA Inventory 'Active'

Continued...

National Inventory	Status
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - FBEPH	Yes
UAE - Control List (Banned/Restricted Substances)	No (carbon dioxide)
Legend:	*Yes = All CAS declared ingredients are on the inventory* *No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.*

SECTION 16 Other information

Revision Date	20/06/2022
Initial Date	14/06/2005

SDS Version Summary

Version	Date of Update	Sections Updated
9.1	20/12/2017	Toxicological information - Toxicity and Irritation (Other)
10.1	20/06/2022	Expiration. Review and Update

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

- PC—TWA: Permissible Concentration-Time Weighted Average
- PC—STEL: Permissible Concentration-Short Term Exposure Limit
- IARC: International Agency for Research on Cancer
- ACGIH: American Conference of Governmental Industrial Hygienists
- STEL: Short Term Exposure Limit
- TEEL: Temporary Emergency Exposure Limit。
- IDLH: Immediately Dangerous to Life or Health Concentrations
- ES: Exposure Standard
- OSF: Odour Safety Factor
- NOAEL: No Observed Adverse Effect Level
- LOAEL: Lowest Observed Adverse Effect Level
- TLV: Threshold Limit Value
- LOD: Limit Of Detection
- OTV: Odour Threshold Value
- BCF: BioConcentration Factors
- BEI: Biological Exposure Index
- DNEL: Derived No-Effect Level
- PNEC: Predicted no-effect concentration
- MARPOL: International Convention for the Prevention of Pollution from Ships
- IMSBC: International Maritime Solid Bulk Cargoes Code
- IGC: International Gas Carrier Code
- IBC: International Bulk Chemical Code

- AIIC: Australian Inventory of Industrial Chemicals
- DSL: Domestic Substances List
- NDSL: Non-Domestic Substances List
- IECSC: Inventory of Existing Chemical Substance in China
- EINECS: European INventory of Existing Commercial chemical Substances
- ELINCS: European List of Notified Chemical Substances
- NLP: No-Longer Polymers
- ENCS: Existing and New Chemical Substances Inventory
- KECI: Korea Existing Chemicals Inventory
- NZIoC: New Zealand Inventory of Chemicals
- PICCS: Philippine Inventory of Chemicals and Chemical Substances
- TSCA: Toxic Substances Control Act
- TCSI: Taiwan Chemical Substance Inventory
- INSQ: Inventario Nacional de Sustancias Químicas

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- NCI: National Chemical Inventory
- FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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