

SAFETY DATA SHEET**Product: DIÓXIDO DE CARBONO – CO₂**

Version: 01

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SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Identification of the product	DIÓXIDO DE CARBONO – CO ₂ .
Recommended uses	É usado comercialmente em algumas bebidas carbonatadas, sprays de pesticidas e extintores de incêndio.
Restrictions on use	Not recommended for other uses.
Company	Proquigel Química S/A.
Address:	Rua Eteno, nº 2198 – Polo Industrial de Camaçari - Camaçari/BA, CEP: 42.816-200, Brazil.
Telephone number	55 (71) 3483-5022.
Company	Proquigel Química S/A.
Address:	Rodovia SE 211, Km 01 – Pedra Branca – Laranjeiras/SE, CEP: 49.170-000, Brazil.
Telephone number	55 (79) 3281-5222
Emergency telephone number	0800 110 8270 Pró-Química

SECTION 2: HAZARDS IDENTIFICATION

Most important hazards	Contains gas under pressure; may explode if heated. May cause drowsiness or dizziness.
Product effects	
Adverse effects to the human health	May cause drowsiness or dizziness.
Environmental effects	Harmful to aquatic life.
Physical and chemical hazards	It is not expected that product presents physical and chemical hazards.
Chemical product-specific hazards	The product is a suffocating gas, that is, it displaces oxygen from the ambient atmosphere so that less oxygen is inhaled into the lungs.
Important symptoms	Direct contact with the liquid can cause frostbite-type burns to the skin

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with hardening of the skin, waxing and pain, and eyes with pain, redness and blindness. May cause suffocation if inhaled. At high concentrations, it can decrease the oxygen concentration and lead to an increased heart rate, increased respiratory rate, shortness of breath, cough, abnormal fatigue, vomiting, loss of consciousness, seizures, and respiratory collapse. It can cause drowsiness or dizziness, headache, confusion, tremors, and yellow vision.

Classification of the chemical product	Gases under pressure – Liquefied gas. Specific target organ toxicity – single exposure – Category 3. Hazardous to the aquatic environment, short-term (acute) – Category 3.
Classification system adopted	Globally Harmonized System of Classification and Labeling of Chemicals (GHS), United Nations, 2019.

Adequate labeling elements

Pictograms	
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 Signal word **WARNING**

Hazard statement(s)
 H280 Contains gas under pressure; may explode if heated.
 H336 May cause drowsiness or dizziness.
 H402 Harmful to aquatic life.

Precautionary statement(s)
 P261 Avoid breathing gas.
 P271 Use only outdoors or in a well-ventilated area.
 P273 Avoid release to the environment.
 P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
 P405 Store locked up.
 P410 + P403 Protect from sunlight. Store in a well-ventilated place.
 P501 Dispose of contents and container according to the current regulations.

 Outline of an anticipated **COMPRESSED GAS HAZARDOUS FOR HUMAN HEALTH AND**

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emergency

HARMFUL FOR THE ENVIRONMENT.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**SUBSTANCE**

Systematic chemical or trivial name Carbon dioxide.

Common or generic name Carbonic acid gas.

CAS Number 124-38-9.

Impurities and stabilizing additives contributing to the hazard Substances in this category contain mainly low molecular weight hydrocarbon molecules, which generate the dominant hazard in petroleum hydrocarbon gases. Their physical and chemical characteristics require that they be kept within strictly closed systems. Unlike refinery gases, petroleum hydrocarbon gases do not contain inorganic compounds (eg., hydrogen sulfide, ammonia, and carbon monoxide).
There are no impurities that contribute to the danger.

SECTION 4: FIRST-AID MEASURES**Exposure routes**

Inhalation Take the victim to a ventilated place and keep him at rest. Check respiratory function. If the victim is breathing heavily, give him oxygen. If necessary, give artificial respiration. Seek medical attention. Take this SDS.

Skin contact Remove clothing, shoes, and jewelry to avoid obstructing blood circulation. Clothing frozen to the skin should be thawed before removing. Wash exposed skin with plenty of water for at least 15 minutes. Seek medical attention. Take this SDS.

Eye contact: Rinse thoroughly with water for several minutes. If using contact lenses, remove them if it is easy. If eye irritation persists, consult a doctor. Take this SDS.

Ingestion It is not ingested because it is a gas.

Anticipated acute effects and/or anticipated delayed The product is asphyxiating and displaces oxygen from the ambient atmosphere so that less oxygen is inhaled into the lungs. This causes

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effects	less oxygen to pass through the alveolar-capillary membrane to oxygenate the blood. This decreases the oxygen supply to the vital organs and results in anaerobic metabolism. Organ systems with higher aerobic metabolic rates, such as the cardiovascular system and the central nervous system, are among the first to manifest key signs of dysfunction.
Most important symptoms/effects	<p>Direct contact with the liquid can cause frostbite-type burns to the skin with hardening of the skin, waxing and pain, and eyes with pain, redness and blindness. May cause suffocation if inhaled. At high concentrations, it can decrease the oxygen concentration and lead to an increased heart rate, increased respiratory rate, shortness of breath, cough, abnormal fatigue, vomiting, loss of consciousness, seizures, and respiratory collapse. It can cause drowsiness or dizziness, headache, confusion, tremors, and yellow vision.</p> <p>The product is asphyxiating and displaces oxygen from the ambient atmosphere so that less oxygen is inhaled into the lungs. This causes less oxygen to pass through the alveolar-capillary membrane to oxygenate the blood. This decreases the oxygen supply to the vital organs and results in anaerobic metabolism. Organ systems with higher aerobic metabolic rates, such as the cardiovascular system and the central nervous system, are among the first to manifest key signs of dysfunction.</p>
Protection of first aiders and/or special notes to a physician	Avoid contact with the product when helping the victim. Keep the victim at rest and warm. Exposure treatment should be directed at controlling the symptoms and clinical condition of the patient, and providing oxygen.

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing media	<p>Suitable: Compatible with chemical dust and water mist.</p> <p>Not recommended: direct water jets. Do not pour water directly on the point of spillage as it may freeze.</p>
Specific hazards arising from the chemical product	<p>Combustion of the chemical product or its container can form carbon monoxide (CO) and carbon dioxide (CO₂).</p> <p>May explode under the influence of heat. Gas is heavier than air and</p>

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can accumulate in confined spaces causing oxygen deficiency. Broken cylinders can project violently. The build-up of static electricity can ignite any explosive mixture.

Specific extinguishing methods Containers and tanks involved in the fire should be cooled with water laterally.

Special equipment for the protection of firefighters The service team must use positive pressure self-contained breathing apparatus (SCBA) and full protective clothing. Containers and tanks involved in the fire must be cooled with water mist.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions Preventively isolate from sources of ignition. No Smoking. Evacuate the area within a radius of at least 100 meters. Do not touch damaged containers or spilled material without wearing suitable clothing. Avoid inhalation, contact with eyes and skin. Use personal protective equipment as described in section 8.

Protective equipment: Use protective equipment as described in Section 8.

Emergency procedures Wear full PPE with safety glasses, safety gloves, suitable protective clothing and closed shoes. In case of large leaks, where the exposure is great, it is recommended to use a respiratory protection mask with a gas filter.

Environmental precautions Prevent the product from reaching the soil and water courses. Notify the relevant authorities if the product has caused environmental pollution (if it has reached water courses or if it has contaminated the soil or vegetation).

Methods and materials for containment Containment techniques may include bunding, covering of drains and capping procedures.

Methods and materials for cleaning up Stop the gas leak if it can be done without risk. Slowly release the content into the atmosphere. Extinguishing a fire without blocking the leak can cause an explosion. Ventilate area of spill or remove container to well ventilated area. Use water mist to reduce or deflect the vapor cloud. All equipment used to contain the product must be grounded. For the final destination, proceed according to section 13 of this SDS.

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Secondary disaster
prevention measuresDo not dispose of directly into the environment or the sewage system.
Products resulting from fire control can cause contamination.**SECTION 7: HANDLING AND STORAGE****Handling**

Precautions for safe handling

Schedule a first aid action before starting product activity. The use of the product is restricted to professionals. Caution - Avoid exposure - obtain special instructions before use. Handle in a ventilated area or with a general local exhaust / ventilation system. Avoid the release of gases. Water should not be allowed to enter the container. Do not allow feedback to the container. Protect cylinders from physical damage; do not drag, roll, slip or fall. When moving cylinders, even over short distances, use a cart designed to transport cylinders. Leave the valve protection covers in place until the container has been fixed against a wall or bench or placed on a container stand and is ready for use. If the user has any difficulty in operating the cylinder valve, discontinue use and contact the supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported to the supplier immediately. Keep container valve outlets clean and free of contaminants, particularly oil and water. Replace valve caps or valve caps and container caps where they are supplied as soon as the container is disconnected from the equipment. Close the container valve after each use and when empty, even if it is still connected to the equipment. Never try to transfer gases from one cylinder / container to another. Never use a direct flame or electric heating devices to increase the pressure in a container. Do not remove or deface the labels provided by the supplier to identify the contents of the cylinder. Use personal protective equipment as described in section 8.

Technical measures for
prevention of exposure of the
handler

Use personal protective equipment as described in Section 8.

Technical measures for
prevention of fire and

It is not expected that the product presents a fire or explosion hazard.

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explosion

Suitable precautions

Contaminated clothing should be changed and washed before reuse. Remove clothing and protective equipment contaminated before entering eating areas.

Prevention of contact:

Wash hands and face thoroughly after handling and before eating, drinking, smoking, or going to the bathroom.

Storage

Conditions for safe storage

Store in a well-ventilated place, away from sunlight. Keep container closed and away from combustible materials. Inspect cylinders to ensure they are properly labeled (identified) and undamaged. Keep cylinders in an upright position, attached to a wall or other solid structure. Ground all cylinders and containers. Keep as little quantity as possible in storage. Cylinder valves must be tightly closed. This product may react dangerously with some incompatible materials as described in Section 10. The addition of stabilizers and antioxidants is not required to ensure product durability.

Technical measures

Keep away from high temperatures, ignition sources and incompatible materials.

Incompatible substances and mixtures

Oxidizing agents (perchlorates, peroxides, permanganates, chlorates, nitrates, chlorine, bromine and fluorine), reducing agents (lithium, sodium, aluminum and their hydrides), metal carbides, metal salts and strong bases (sodium hydroxide and potassium hydroxide) .

Packaging materials

Recommended material

Recommended packaging: conduits or cylinders.

Unsuitable material

Packaging of other materials.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION**Permissible concentration**

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Occupational exposure limit	Chemical or common name	TLV – TWA (ACGIH, 2012)	PEL – TWA (OSHA, 2006)	REL – TWA (NIOSH, 2010)
	Carbon dioxide	TWA 5000 ppm STEL 30.000 ppm	5.000 ppm ST 30.000 ppm	5.000 ppm

ST: Short-term exposure limit.

Biological limit

Not established.

Engineering controls measures

Promote mechanical ventilation and a direct exhaust system to the outside environment. These measures help reduce product exposure. Keep atmospheric concentrations of the components of the product below the indicated occupational exposure limits.

Pressure systems should be checked periodically for leaks. Oxygen detectors should be used when suffocating gases can be released. Make sure the exposure is below the occupational exposure limits (when available). Consider the work authorization system, for example, for maintenance activities.

Appropriate personal protective equipment

Respiratory protection

The use of a supplied-air semi-facial respirator is recommended. Depending on the inhalation hazard of the product, a risk assessment must be carried out to adequately define respiratory protection in light of the conditions of use of the product.

Hand protection

Wear chemical resistant gloves made of natural rubber or nitrile. The material must be waterproof.

Eye protection

Safety goggles.

Skin and body protection

Suitable safety clothing and closed shoes. The material used should be waterproof.

Special precautions

Not established.

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SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Gas, colorless.
Odour	Odorless.
pH	Not available.
Melting point/freezing point	- 56,6°C.
Boiling point, initial boiling, and boiling range	- 78,5°C.
Flashpoint	Not flammable.
Upper/lower flammability or explosive limits	Not applicable.
Vapour pressure	4.83 x 10 ⁴ mmHg a 25°C.
Vapour density	1.53 a 78.2°C (air = 1).
Relative density	1.335 a 20°C.
Solubility(ies)	Miscible in hydrocarbons and most organic liquids. Slightly soluble in water.
n-octanol/water partition coefficient	Log kow: 0.830.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Odour threshold	Not available.
Evaporation rate	Not available.
Flammability	Not flammable.
Viscosity	Not available.
Other information	Critical temperature: 31°C. Density: 1,977 g / L.

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SECTION 10: STABILITY AND REACTIVITY

Chemical stability	Stable product under normal conditions of temperature and pressure. Liquid carbon dioxide can attack plastics, rubber, and coatings.
Hazardous reactions	Reacts with the dust of various metals, such as magnesium, zirconium, titanium, and chromium, which can ignite or explode when suspended in carbon dioxide. Forms carbonic acid in water.
Conditions to avoid	Elevated temperatures. Ignition sources and contact with incompatible materials.
Incompatible materials	Oxidizing agents (perchlorates, peroxides, permanganates, chlorates, nitrates, chlorine, bromine and fluorine), reducing agents (lithium, sodium, aluminum and their hydrides), metal carbides, metal salts and strong bases (sodium hydroxide and potassium hydroxide) .
Hazardous decomposition products	Combustion of the chemical or its packaging can form carbon monoxide and carbon dioxide.

SECTION 11: TOXICOLOGICAL INFORMATION

Acute toxicity	The product is not expected to be toxic to the oral, dermal and inhalation routes. LC ₅₀ (inhalation, rats, 4h): 167857 ppm.
Skin irritation/corrosion	Direct contact with the liquid can cause frostbite-type burns to the skin with hardening of the skin, waxing and pain.
Eye damage/irritation	Direct contact with the liquid can cause frostbite-type burns to the eyes with pain, redness, and blindness.
Respiratory or skin sensitization	The product is not expected to cause respiratory or skin sensitization.
Reproductive cell mutagenicity	The product is not expected to cause germ cell mutagenicity.
Carcinogenicity	The product is not expected to have a carcinogenic potential.
Reproductive toxicity	The product is not expected to cause reproductive toxicity.
Specific target organ toxicity	Carbon dioxide is suffocating. At high concentrations, it can decrease

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– single exposure	<p>the oxygen concentration and lead to an increased heart rate, increased respiratory rate, shortness of breath, cough, abnormal fatigue, vomiting, loss of consciousness, seizures, and respiratory collapse. It can cause drowsiness or dizziness, headache, confusion, tremors, and yellow vision.</p> <p>The product is asphyxiating and displaces oxygen from the ambient atmosphere so that less oxygen is inhaled into the lungs. This causes less oxygen to pass through the alveolar-capillary membrane to oxygenate the blood. This decreases the oxygen supply to the vital organs and results in anaerobic metabolism. Organ systems with higher aerobic metabolic rates, such as the cardiovascular system and the central nervous system, are among the first to manifest key signs of dysfunction.</p>
Specific target organ toxicity – repeated exposure	The product is not expected to cause target organ toxicity through repeated exposure.
Aspiration hazard	It is not expected that the product presents aspiration hazard.
Toxicokinetics, metabolism and distribution	Carbon dioxide is suffocating. At high concentrations, it can decrease the oxygen concentration and lead to an increased heart rate, increased respiratory rate, shortness of breath, cough, abnormal fatigue, vomiting, loss of consciousness, seizures, and respiratory collapse.

SECTION 12: ECOLOGICAL INFORMATION**Environmental effects, behavior, and fate of the product**

Ecotoxicity	harmful for aquatic organisms. LC ₅₀ (<i>Oncorhynchus mykiss</i> , 96h): 35 mg / L.
Persistence and degradability	The product is not expected to show persistence, it is expected to degrade rapidly. Biodegradability: high in 14.4 days.
Bioaccumulative potential	Presents low bioaccumulative potential in aquatic organisms. BCF: 1.33. Log _{kw} : 0.830.
Mobility in soil	High soil mobility is expected.

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Koc: 12.9.

Other adverse effects

No other effects are known.

SECTION 13: DISPOSAL CONSIDERATIONS

Methods of disposal to the chemical product, product waste and/or contaminated container and/or packaging

Must be disposed of as hazardous waste in compliance with local regulations. The treatment and disposal should be evaluated for each specific product. Keep the product remains in its original and properly closed. Disposal should be performed as established for the product. Do not reuse empty containers. These may contain product residues and should be kept closed and sent for proper disposal as established for the product.

SECTION 14: TRANSPORT INFORMATION**International regulations****Land**

UN – “United Nations”

Recommendations on the TRANSPORT OF DANGEROUS GOODS. Model Regulations

UN number

1013

UN proper shipping name

CARBON DIOXIDE

Transport hazard class(es)

2.2

Subsidiary risk

N.A.

Packing group

N.A.

Sea

IMO – International Maritime Organization

International Maritime Dangerous Goods Code (IMDG Code)

UN number

1013

UN proper shipping name

CARBON DIOXIDE

Transport hazard class(es)

2.2

Subsidiary risk

N.A.

Packing group

N.A.

Environmental hazards

The product is not considered a marine pollutant.

EmS

F-C, S-V.

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Air	IATA – International Air Transport Association Dangerous Goods Regulation (DGR)
UN number	1013
UN proper shipping name	CARBON DIOXIDE
Transport hazard class(es)	2.2
Packing group	N.A.
Transport in bulk according to MARPOL 73/78, Annex II, and the IBC Code	Consult regulations: - International Maritime Organization. MARPOL: Articles, protocols, annexes, unified interpretations of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, consolidated edition. IMO, London, 2006. - International Maritime Organization. IBC code: International code for the construction and equipment of shipping carrying dangerous chemicals in bulk: With Standards and guidelines relevant to the code. IMO, London, 2007.
Special precautions	There is no need of special precautions.

SECTION 15: REGULATORY INFORMATION

Convention concerning Safety in the use of Chemicals at Work (Convention 170) - International Labour Organization, 1990.

International Organization for Standardization - ISO 11014:2009.

SECTION 16: OTHER INFORMATION

This SDS was prepared based on current knowledge about the proper product handling and under normal conditions of use, in accordance with the application specified on the packaging. Any other use of the product involving their combination with other materials, and use various forms of those indicated, are the responsibility of the user. Warns that the handling of any chemical substance requires the prior knowledge of its hazards for the user. In the workplace it is for the user company's product promotes training of its collaborators about the possible risks arising from exposure to the chemical.

SDS elaborated in February, 2021.

Abbreviations:

ACGIH – American Conference of Governmental Industrial Hygienists

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BCF – Bioconcentration Factor**CAS** – Chemical Abstracts Service**C** – Ceiling**LC₅₀** – Lethal Concentration 50%**LD₅₀** – Lethal Dose 50%**ERPG** - Emergency Response Planning Guidelines**LEL** – Lower Explosive Limit**UEL** – Upper Explosive Limit**NIOSH** – National Institute of Occupational Safety and Health**OSHA** – Occupational Safety & Health Administration**PEL** – Permissible Exposure Limit**REL** – Recommended Exposure Limit**STEL** – Short Term Exposure Limit**TLV** – Threshold Limit Value**TWA** – Time Weighted Average**Bibliographic references:**

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