Product: CHLORINE - Cl_2

1. IDENTIFICATION

Product Identification: Chlorine - Cl_2

Other ways of identification: -

Recommended uses and restrictions on use: For industrial use only.

Supplier Details:

Katrium Chemical Industries SA

Address: João Paulo Road, 530 – Honorio Gurgel

Zip Code: 21512-002

Rio de Janeiro/RJ – Brazil

Contact telephone number: 55 (21) 2472-9060

Emergency Telephone Number: AMBIPAR RESPONSE - 0800 117 2020

2. HAZARD IDENTIFICATION

GHS classification of the substance or mixture:

Corrosive to metals: Category 1

Gas under pressure: Compressed gas – Acute toxicity – Inhalation: Category 2

Skin corrosion/irritation: Category 2

Serious eye damage/eye irritation: Category 2A

Specific Target Organ Toxicity – Single Exposure: Category 3

Hazardous to the aquatic environment – Acute: Category 1

Dangerous to the aquatic environment – Chronic: Category 1

Classification system used:

ABNT-NBR 14725 standard.

Globally Harmonized System for the Classification and Labeling of Chemicals, UN.

GHS labeling elements, including precautionary statements:

Words of warning: DANGER

Hazard phrase(s):

H270 – May cause or intensify fire, oxidizer

H280 – Contains gas under pressure: may explode if heated

H330 – Fatal if inhaled

H315 – Causes skin irritation

H319 – Causes serious eye irritation

H335 – May cause respiratory irritation.

H400 – Very toxic to aquatic life

H410 – Very toxic to aquatic life with long lasting effects.

Precautionary phrase(s):

P271 – Use only outdoors or in a well-ventilated area.
P284 – If ventilation is inadequate, wear respiratory protective equipment.

P273 – Avoid release to the environment.

Emergency Response:

P370 + P376 - In case of fire: Contain leak if safe to do so.
P304 + P340 - IF INHALED: Remove the person to fresh air and keep at rest in a position comfortable for breathing.
P391 Collect spilled material

Storage:

P406 – Store in a corrosion-resistant container/...with a resistant inner lining.

Other hazards that do not result in a classification:

Chlorine combines with various substances, reacting with most organic elements and compounds, and in some cases, forming explosive mixtures. At high temperatures, it reacts with metals. It forms explosive compounds when reacting with acetylene, ether, ammonia, hydrogen, and finely divided metals.

Other information:

Not available.

3. COMPOSITION AND INFORMATION ON INGREDIENTS

SUBSTANCE: **CHLORINE - Cl_2**

Ingredients, impurities and/or stabilizing additives that contribute to the hazard:

Chlorine - Cl_2 (CAS 7782-50-5): 99.5% min.

Water - H_2O (CAS -): 0.5%

4. FIRST AID MEASURES

Inhalation: Remove the victim from contaminated areas as quickly as possible. Move them to a well-ventilated area. Administer oxygen if the victim has difficulty breathing. Seek medical attention immediately.

Skin contact: Remove contaminated clothing and shoes. Wash the affected area with running water. Consult a doctor immediately.

Eye contact: Flush eyes as soon as possible with running water for 20 minutes, keeping eyelids open. Consult a doctor immediately.

Ingestion: Not applicable. Gaseous product.

Most important symptoms and effects, acute or delayed:

Chlorine is an irritant to the respiratory tract. The effects depend on the concentration and duration of exposure.

Indication of immediate medical attention and special treatments required, if necessary:

Avoid contact with the product when assisting the victim. Treat symptomatically and supportively, according to the clinical picture, with respiratory assistance. In case of skin contact, do not rub the affected area.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: Non-explosive / Non-flammable.

Small proportions: Compatible with fire extinguishers. Large proportions: Water in the form of mist or foam.

Specific hazards arising from the substance or mixture:

Combustion of the chemical or its packaging can form irritating and toxic gases.

Firefighting team protection measures: Wear self-contained breathing apparatus. Avoid contact with the material while fighting the fire. If contact is unavoidable, wear chemical-resistant clothing.

6. CONTROL MEASURES FOR SPILLS OR LEAKS

For non-emergency personnel

If you observe an emergency situation involving a leak, spill, or accidental release, immediately report the accident to those responsible and stay away. If possible, eliminate ignition sources and provide sufficient ventilation to remove contaminants.

For emergency service personnel

Evacuate people from the affected area, isolate the risk area, restrict product leakage by closing valves and turning off pumps, and prevent contact with the environment containing the product by storing it in containment dikes or appropriate containers. Use personal protective equipment as described in section 8.

Environmental precautions:

Water-soluble product. Under normal atmospheric conditions, it is approximately 2.5 times heavier than air. Dry chlorine gas is non-corrosive, but when in contact with water or moisture, it becomes highly corrosive. It pollutes rivers, flora, and the air, and harms fauna. TOXIC AND POISONOUS. Density: 1.424 g/ ^{cm3} .

Methods and materials for containment and cleaning:

Wash the affected area, directing the residue to a suitable disposal or collection point. Do not pour water on the spill or the source of the leak. For final disposal, proceed as per Section 13 of this SDS.

Methods and materials for sealing and containment:

Stop the gas escape if possible without risk. Stay downwind. Use water mist to reduce or divert the vapor cloud.

Area isolation:

Restrict access to the transfer area to personnel involved in operations. Isolate the spill area to a minimum radius of 100 meters.

Methods and materials for cleaning:

Collected material must be properly packaged, labeled, and transported in accordance with legal regulations and best practices. If not recovered, the waste must be properly neutralized for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling

Prevention of worker exposure:

Use personal protective equipment as described in section 8.

Fire and explosion prevention:

The substance is not flammable.

Precautions and guidelines for safe handling:

The usual precautions for handling chemicals should be observed. Avoid any direct contact with the material.

Hygiene measures

Appropriate:

Wash your hands before any break and at the end of the work period. Do not eat or smoke during the work period. Remove contaminated clothing immediately.

Inappropriate:

Eat, drink or smoke while handling the product.

Conditions for safe storage, including any incompatibilities

Suitable conditions:

Store in a well-ventilated place, away from sunlight. Keep the container closed. Stabilizers and antioxidants are not necessary to ensure product shelf life. This product may react dangerously with some incompatible materials, as highlighted in Section 10.

Conditions to be avoided, including any incompatibilities

Do not mix with incompatible materials (see "stability and reactivity" section).

Packaging materials

Recommended:

Steel cylinders built according to specific standards.

Unsuitable:

All others that do not meet the above guidelines, depending on the product characteristics and the pressure class required for storage.

Other information:

Keep away from heat, high temperatures, and incompatible materials. If possible, stop the leak using stoppers, sealing tape, or by turning the hole, tear, or dent upward. Collect all material in suitable, properly labeled containers for later treatment and disposal. Waste must be disposed of in accordance with local, state, or federal environmental regulations. For transshipment, find an appropriate location and follow the safety procedures described above.

8. EXPOSURE CONTROL AND PERSONAL PROTECTION

Control parameters

Occupational exposure limits:

The values below are applicable for work environments.

CHLORINE – CL_2

MTE NR 15 – LT: 0.8 ppm (2.3 mg/m^3) up to 48 hours/week

OSHA - PEL - TWA: 0.5 ppm (1.5 mg/m^3)

NIOSH - REL - C: 0.5 ppm (1.45 mg/m^3) [15 minutes]

ACGIH - TLV - TWA: 0.1 ppm (0.29 mg/m^3)

ACGIH - TLV - STEL: 0.4 ppm (1.16 mg/m^3)

Biological indicators:

There are no biological exposure indicators established by Brazilian legislation – NR 07.

Engineering control measures:

Provide mechanical ventilation and a chlorine abatement system. These measures help reduce exposure to the product. Providing emergency showers and eyewash stations in the work area is recommended. Keep airborne concentrations of the substance or mixture below the recommended occupational exposure limits.

Personal protective measures

Eye/face protection : Full Face Chin Mask with chemical cartridge for Chlorine and acid gases

Skin Protection : Level A Encapsulated Coverall / Level B Encapsulated Coverall / Level C Coverall

Respiratory protection : Full Face Mask with chin with chemical cartridge for chlorine and acid gases /

Hand protection : Nylon gloves

Thermal hazards : Avoid contact with liquid and vapor.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state liquefied gas: (at 20 °C and 1013 hPa)

Color: Yellow-green

Odor: Pungent and irritating

Melting point/freezing point: - 101.05 °C

Boiling point or initial boiling point and boiling range: - 34.05 ºC

Flammability: Non-flammable

Lower and upper explosive/flammability limits: Not available

Flash point: Non-flammable

Autoignition temperature: Not available

Decomposition temperature: Not available

pH: 1.5 (0.6 g/L solution at 30 °C).

Kinematic viscosity: Not available

Solubility: 0.7% at 20°C

Partition coefficient – n- octanol /water (log value): Not available

Vapor pressure: Not available

Density and/or relative density: : 3.21 kg/L

Relative vapor density: Not available

Particle characteristics: Not available

10. STABILITY AND REACTIVITY

Reactivity: Not available.

Chemical stability: Stable under normal temperature and pressure conditions.

Possibility of dangerous reactions: Chlorine combines with various substances and can react with most organic elements and compounds, and in some cases, it can form explosive mixtures. At high temperatures, it reacts with metals. It forms explosive compounds when reacting with acetylene, ether, ammonia, hydrogen, and finely divided metals.

Conditions to avoid: High temperatures, ignition sources and contact with incompatible materials.

Incompatible materials: Ammonia, combustible materials, acetylene, ether, ammonia, hydrogen and metals.

Hazardous decomposition products: Toxic and irritating gases and vapors.

11. TOXICOLOGICAL INFORMATION

Acute toxicity: Can be fatal if inhaled in high concentrations. Causes irritation in contact with skin and/or eyes.

Skin corrosion/irritation: Causes skin irritation

Serious eye damage/eye irritation: Causes serious eye irritation

Respiratory or skin sensitization: May cause respiratory irritation

Germ cell mutagenicity: Conclusion: not sufficient for classification

Carcinogenicity: Conclusion: Not sufficient for classification. Not classifiable as carcinogenic. human (Category A4 - ACGIH)

Reproductive toxicity: Conclusion: not sufficient for classification

Specific target organ toxicity – single exposure: May cause respiratory irritation

Specific target organ toxicity - repeated exposure: Conclusion: Not sufficient for classification

Aspiration hazard: May cause respiratory irritation.

Other information: Very toxic to aquatic organisms with long-lasting effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity: Chlorine generates moderate toxicity to aquatic organisms, is not biodegradable and does not bioaccumulate in the body.

Persistence and degradability : Not available

Bioaccumulative potential : Not potentially bioaccumulative

Mobility in soil: Soluble in water – Final destination of the product: Not available

Other adverse effects: Do not allow to enter septic tanks, rivers and rainwater.

13. CONSIDERATIONS ON FINAL DESTINATION

Recommended methods for final disposal

Product: Keep any leftover product in its original, properly sealed packaging. Do not dispose of it in sewage systems, waterways, or wastewater treatment plants.

Used packaging: Keep the container tightly closed and sealed until ready for use. Use the original container.

14. TRANSPORTATION INFORMATION

National and international regulations

LAND: ANTT - National Land Transportation Agency:

Resolution No. 5,998, of November 3, 2022: Updates the Regulation for the Road Transportation of Dangerous Products, approves its Supplementary Instructions, and provides other measures.

UN Number: 1017

Proper shipping name: CHLORINE

Risk number: 268

Main risk class or subclass: 2.3

Packing group: Not applicable

WATERWAY: DPC - Directorate of Ports and Coasts (Transportation in Brazilian waters). Maritime Authority Regulations:

NORMAM 01/DPC: Vessels Used in Navigation on the Open Sea.

NORMAM 02/DPC: Vessels Used in Inland Navigation.

NORMAM 05/DPC: Material Approval.

IMO - International Maritime Organization :

IMDG Code - International Maritime Dangerous Goods Code (International Maritime Dangerous Goods Code).

UN Number: 1017

Proper shipping name: CHLORINE

Risk number: 268

Main risk class or subclass: 2.3

Packing group: Not applicable

inS :

Environmental hazard: It is considered a marine pollutant for transport.

AIR: ANAC - National Civil Aviation Agency: Resolution No. 714, of April 26, 2023. RBAC (Brazilian Civil Aviation Regulation) No. 175:

Transportation of Dangerous Goods on Civil Aircraft.

IS No. 175-001 - Supplementary Instruction.

ICAO (International Civil Aviation Organization):

Doc 9284 AN/905 (Technical Instructions for the Safe Transport of Dangerous Goods by Air).

IATA - International Air Transport Association (International Air Transport Association):

DGR - Dangerous Goods Regulation (Dangerous Goods Regulation).

UN Number: 1017

Proper shipping name: CHLORINE

Risk number: 268

Main risk class or subclass: 2.3

Packing group: Not applicable

Specific precautionary measures and conditions: Not applicable.

15. REGULATORY INFORMATION

Specific safety, health and environmental regulations for the chemical:

BRAZIL – MINISTRY OF LABOR AND EMPLOYMENT – NR 26.

BRAZIL – MINISTRY OF TRANSPORTATION – ANTT.

BRAZIL – ABNT NBR 14725

16. OTHER INFORMATION

Important information, but not specifically described in the previous sections:

This SDS was prepared based on current knowledge of the chemical product and provides information on protection, safety, health and the environment.

Please note that handling any chemical substance requires prior knowledge of its hazards by the user. It is the responsibility of the company using the product to train its employees and contractors regarding the potential risks posed by the product.

References: [ABNT] BRAZILIAN ASSOCIATION OF TECHNICAL STANDARDS NBR 14725.

[BRAZIL] BRAZIL. Ministry of Transport. National Land Transport Agency.

[ECHA] European Union. ECHA European Chemical Agency

Subtitles and abbreviations: ACGIH – American Conference on of Governmental Industrial Hygienists , CAS – Chemical Abstracts Service

[OSHA] - Occupational Safety and Health Administration

[NIOSH] - National Institute for Occupational Safety and Health

[NR] – Regulatory Standard – NR 15 Unhealthy Activities and Operations

[LT] – Tolerance Limit