

# MATERIAL SAFETY DATA SHEET

CHLORINE, LIQUEFIED GAS

## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Brenntag Canada Inc.  
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WHMIS#: 00010002  
Index: GCD0016/14A  
Effective Date: 2014 January 20  
Date of Revision: 2015 September 09

Website: <http://www.brenntag.ca>

### EMERGENCY TELEPHONE NUMBER (For Emergencies Involving Chemical Spills or Releases)

1 855 273 6824

### PRODUCT IDENTIFICATION

Product Name: Chlorine, Liquefied Gas.  
Chemical Name: Chlorine.  
Synonyms: Not available.  
Chemical Family: Halogen.  
Molecular Formula: Cl<sub>2</sub>.  
Product Use: Bactericide in water treatment. Chemical intermediate.

DO NOT RE-USE EMPTY CONTAINERS. RETURN ALL CONTAINERS TO BRENNTAG CANADA.

### WHMIS Classification / Symbol:

A: Compressed Gas  
C: Oxidizer  
D-1A: Very Toxic (acute effects)  
D-2A: Very Toxic (chronic effects)  
E: Corrosive



READ THE ENTIRE MSDS FOR THE COMPLETE HAZARD EVALUATION OF THIS PRODUCT.

## 2. COMPOSITION, INFORMATION ON INGREDIENTS (Not Intended As Specifications)

| <i>Ingredient</i> | <i>CAS#</i> | <i>ACGIH TLV (TWA)</i> | <i>% Concentration</i> |
|-------------------|-------------|------------------------|------------------------|
| Chlorine          | 7782-50-5   | 0.5 ppm *A4            | 95 - 100               |

A4 = Not classifiable as a human carcinogen. (ACGIH-A4).

## 3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Corrosive! Toxic! May be fatal if inhaled. Causes severe skin and eye burns. Gas is extremely irritating to eyes and respiratory tract. See "Other Health Effects" Section. Strong, offensive odor. Strong oxidizer. Contact with other combustible material can cause fire. Liquefied compressed gas. Contents under pressure. Ruptured containers may rocket.

POTENTIAL HEALTH EFFECTS

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|                       |   |
|-----------------------|---|
| Inhalation:           | Corrosive! Toxic! Product may cause severe irritation of the nose, throat and respiratory tract. Repeated and/or prolonged exposures may cause productive cough, running nose, bronchopneumonia, pulmonary edema (fluid build-up in lungs), and reduction of pulmonary function. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. (3,4) Toxic effects may be delayed. See "Other Health Effects" Section.   |
| Skin Contact:         | Corrosive! Chlorine vapours may cause burning and prickling sensations, reddening and blisters. Direct contact with liquid causes severe local irritation, blistering and burns. Avoid handling when the skin is moist, wet or abraded. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. (3,4) Burns (chemical) can occur if not promptly removed.  |
| Skin Absorption:      | May be absorbed through intact skin. Skin absorption is a secondary concern to the continual destruction of tissue while the product is in contact with the skin.   |
| Eye Contact:          | Extremely corrosive! This product causes corneal scarring and clouding. Glaucoma, cataracts and permanent blindness may occur. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. (3,4)   |
| Ingestion:            | Corrosive! Product is a gas. Ingestion is not a likely route of exposure.   |
| Other Health Effects: | Corrosive effects on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following any exposure is essential.<br><br>May cause frostbite, olfactory fatigue, tooth erosion, cardiovascular effects, shock, central nervous system (CNS) depression, asphyxia and cyanosis. Olfactory fatigue is a term used to describe a condition characterized by the temporary loss of odour perception. CNS depression is characterized by headache, dizziness, drowsiness, nausea, vomiting and incoordination. Severe overexposures may lead to coma and possible death due to respiratory failure. Cyanosis is characterized by navy blue, almost black lips, tongue, and mucous membranes, with skin colour being slate gray. Further manifestation is characterized by headache, weakness, dyspnea, dizziness, stupor, respiratory distress and death due to anoxia. Asphyxia is characterized by increased breathing volume, accelerated pulse rate, muscular incoordination, faulty judgement, emotional instability, fatigue, nausea, vomiting, bewilderment, gasping respiration and unconsciousness.<br><br>Chlorine: Inhalation exposure can result in primary irritation of the respiratory tract, gradual loss of pulmonary function and asthma-like attacks in susceptible individuals. Acute exposure is characterized by the irritation of the respiratory tract causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function. Overexposure may lead to bronchitis, bronchial spasm and pulmonary oedema. Chronic exposure may lead to asthmatic attack in certain individuals, with the following symptoms: chest tightness, wheezing, cough and shortness of breath. (3) |

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## 4. FIRST AID MEASURES

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### FIRST AID PROCEDURES

|               |  |
|---------------|--|
| Inhalation:   | Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Oxygen administration may be beneficial in this situation but should only be administered by personnel trained in its use. Obtain medical attention IMMEDIATELY.  |
| Skin Contact: | Flush skin with running water for a minimum of 20 minutes. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. See "Note to Physicians" below.<br><br>When treating frost bite, flush affected areas with water no warmer than 44 Deg. Celsius. Do not use heated water or dry heat and frozen parts should not be rubbed before or after thawing.   |
| Eye Contact:  | Immediately flush eyes with running water for a minimum of 30 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport.<br><br>When treating frost bite, flush affected areas with water no warmer than 44 Deg. Celsius. Do not use heated water or dry heat and frozen parts should not be rubbed before or after thawing.             |
| Ingestion:    | Do not attempt to give anything by mouth to an unconscious person. If victim is alert and not convulsing, rinse mouth out and give 1/2 to 1 glass of water to dilute material. IMMEDIATELY contact local Poison Control Centre. Vomiting should only be induced under the direction of a physician or a poison control centre. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. IMMEDIATELY transport victim to an emergency facility. |

Note to Physicians: Treatment for corrosive chemical contact with skin after initial flushing procedures:

1. Immerse the exposed part immediately in ice water to relieve pain and to prevent swelling and blistering. Place cold packs, ice or wet cloths on the burned area if immersion is not possible.
2. Remove anything that is constrictive, such as rings, bracelets or footwear, before swelling begins.
3. Cover the exposed part with a clean, preferably sterile, lint-free dressing.
4. For severe exposure, immediately seek medical attention and monitor breathing and treat for shock.

Medical conditions that may be aggravated by exposure to this product include neurological, cardiovascular and skin disorders, diseases of the skin, eyes or respiratory tract.

## 5. FIRE-FIGHTING MEASURES

| Flashpoint (°C)                     | Autolgnition Temperature (°C)  | Flammability Limits in Air (%): |                 |
|-------------------------------------|--|---------------------------------|-----------------|
|                                     |  | LEL                             | UEL             |
| Not Flammable.                      | Not applicable.  | Not applicable.                 | Not applicable. |
| Flammability Class (WHMIS):         | Not regulated.   |                                 |                 |
| Hazardous Combustion Products:      | Thermal decomposition products are toxic and may include oxides of chlorine and irritating gases. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4)  |                                 |                 |
| Unusual Fire or Explosion Hazards:  | Although non-combustible in air, chlorine supports the combustion of other materials. Flammable gases and vapours will form explosive mixtures with chlorine. Chlorine cylinders and tonne containers are equipped with fusible plugs. The fusible plugs are designed to melt at temperatures above 70 Deg. Celsius to reduce the internal pressure of the cylinder by releasing Chlorine gas. Expansion of liquid and change of state from liquid to vapour will allow mixture to encompass a large area. If tank is involved in a fire situation, a BLEVE (Boiling Liquid Expanding Vapour Explosion) may result. Ruptured containers may rocket. Where possible, elevate the leak to the highest position such that gas and not liquid escapes. |                                 |                 |
| Sensitivity to Mechanical Impact:   | This product is a strong oxidizer. Strong oxidizers can cause ignition of combustible or oxidizable materials. May decompose violently on contact with metals, or their salts, dusts or other contaminants. Hydrogen gas may be produced on prolonged contact with metals such as aluminum, tin, lead and zinc.  |                                 |                 |
| Rate of Burning:                    | Not expected to be sensitive to mechanical impact.   |                                 |                 |
| Explosive Power:                    | Not available.   |                                 |                 |
| Sensitivity to Static Discharge:    | Not available.   |                                 |                 |
| EXTINGUISHING MEDIA                 |  |                                 |                 |
| Fire Extinguishing Media:           | Use media appropriate for surrounding fire and/or materials.   |                                 |                 |
| FIRE FIGHTING INSTRUCTIONS          |  |                                 |                 |
| Instructions to the Fire Fighters:  | Fire-exposed containers should be kept cool by spraying with water to reduce pressure. Isolate materials that are not involved in the fire and protect personnel. Cool containers with flooding quantities of water until well after the fire is out. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4) Remove containers from fire zone whenever possible. Ventilate low lying areas such as sumps or pits where dense vapours may collect.   |                                 |                 |
| Fire Fighting Protective Equipment: | Use self-contained breathing apparatus and special protective clothing.  |                                 |                 |

## 6. ACCIDENTAL RELEASE MEASURES

Information in this section is for responding to spills, leaks or releases in order to prevent or minimize the adverse effects on persons, property and the environment. There may be specific reporting requirements associated with spills, leaks or releases, which change from region to region.

Containment and Clean-Up Procedures: In all cases of leak or spill contact vendor at Emergency Number shown on the front page of this MSDS. See Section 13, "Deactivating Chemicals".

Wear respirator, protective clothing and gloves. Ruptured containers may rocket. Ventilate enclosed spaces. Where possible, elevate the leak to the highest position of the cylinder, such that gas and not liquid escapes. Apply emergency device. Eliminate all sources of ignition. Move unprotected personnel upwind of leaking container. Call emergency response naming the chemical and the type of container that is leaking. Consider the use of fog-nozzles to control vapours. Do not immerse in water. Notify applicable government authority if release is reportable or could adversely affect the environment. Vapour knock down water is corrosive and toxic, thus it should be diked for containment. Ensure compatible materials are used. For a leaking container: dispose of contents to a safe out-of-doors area or a hood with forced ventilation. Attach appropriate control valve provided with a trap or check valve and a long piece of flexible hose connected to the valve outlet. Discharge the gas at a moderate rate into an adequate amount of approximately 15% aqueous Sodium Hydroxide or other alkali or reducing solution in suitable container. When all the gas is discharged, close the cylinder valve and tag the cylinder as defective. (3)

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## 7. HANDLING AND STORAGE

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### HANDLING

Handling Practices: Use normal "good" industrial hygiene and housekeeping practices. Vapours are heavier than air. Use self-contained breathing apparatus. Secure containers at all times. Fix leaks promptly. Immerse contaminated clothing in water immediately and KEEP WET until discarded or laundered. Avoid moisture contamination. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4) Do not store or transport with food or feed. Keep away from combustibles and incompatible materials.

Ventilation Requirements: See Section 8, "Engineering Controls".

Other Precautions: Use only with adequate ventilation and avoid breathing vapours. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Wash contaminated clothing thoroughly before re-use.

### STORAGE

Storage Temperature (°C): Ideal storage temperature is 10-27 Deg. Celsius. Do not expose sealed containers to temperatures above 51 °C or Below - 29 °C. (3)

Ventilation Requirements: Do not use in poorly ventilated or confined areas without proper respiratory protection. Ventilation should be corrosion proof.

Storage Requirements: Store in a cool, well-ventilated area. Keep away from heat, sparks and flames. Keep containers closed. Do not expose sealed containers to temperatures above 51 °C. Use of a Chlorine gas monitor with local and remote alarms and monitoring is strongly recommended. Secure containers at all times. Fix leaks promptly. Regularly inspect process equipment, piping and detection equipment. Chlorine cylinders and tonne containers are equipped with fusible plugs. The fusible plugs are designed to melt at temperatures above 70 Deg. Celsius to reduce the internal pressure of the cylinder by releasing Chlorine gas.

Special Materials to be Used for Packaging or Containers: Chlorine is stable in steel containers at room temperatures when stored dry. Intense local heat above 200 C on steel walls can cause steel to ignite chlorine. (3) Confirm suitability of any material before using.

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## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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Recommendations listed in this section indicate the type of equipment, which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

### ENGINEERING CONTROLS

Engineering Controls: Local exhaust ventilation required. Ventilation should be corrosion proof. Make up air should be supplied to balance air that is removed by local or general exhaust ventilation. Ventilate low lying areas such as sumps or pits where dense vapours may collect. Restrict access to storage area. Post warning signs. Consider leak detection and alarm systems.

For personnel entry into confined spaces (i.e. bulk storage tanks) a proper procedure must be followed. It must include consideration of, among other things, ventilation, testing of tank atmosphere, provision and maintenance of SCBA, and emergency rescue. Use the "buddy" system. The second person should be in view and trained and equipped to execute a rescue. (6)

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

**Eye Protection:** Use full face-shield and gas-tight goggles when there is potential for contact. Contact lenses should not be worn when working with this material.

**Skin Protection:** Gloves and protective clothing made from neoprene, viton, butyl rubber or nitrile rubber should be impervious under conditions of use. Prior to use, user should confirm impermeability. Skin protection should be insulated against cold temperatures. Do not use gloves or protective clothing made from leather, polyethylene or PVC. Discard contaminated gloves.

**Respiratory Protection:** DO NOT USE chemical cartridge respirators with oxidizable sorbents (charcoal). Chlorine: Up to 5 ppm, wear a chemical cartridge respirator with Chlorine or acid gas cartridges; up to 10 ppm self-contained breathing apparatus (SCBA). (3,4) Use an air-supplied respirator if concentrations are high or unknown.

If while wearing a respiratory protection, you can smell, taste or otherwise detect anything unusual, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator to face seal is still good. If it is, replace the filter, cartridge or canister. If the seal is no longer good, you may need a new respirator. (6)

Immediately Dangerous to Life and Health (IDLH) value: 10 ppm. (4) The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory equipment. In the event of failure of respiratory protective equipment, every effort should be made to exit immediately. (4)

**Other Personal Protective Equipment:** Wear an impermeable apron and boots. Locate safety shower and eyewash station close to chemical handling area. Take all precautions to avoid personal contact. Use of a Chlorine gas monitor with local and remote alarms and monitoring is strongly recommended.

**EXPOSURE GUIDELINES**

| <b>SUBSTANCE</b> | <b>ACGIH TLV<br/>(STEL)</b> | <b>OSHA PEL</b> |                 | <b>NIOSH REL</b> |                   |
|------------------|-----------------------------|-----------------|-----------------|------------------|-------------------|
|                  |                             | <b>(TWA)</b>    | <b>(STEL)</b>   | <b>(TWA)</b>     | <b>(STEL)</b>     |
| Chlorine         | 1 ppm                       | ---             | 1 ppm (Ceiling) | ---              | 0.5 ppm (Ceiling) |

**9. PHYSICAL AND CHEMICAL PROPERTIES (Not intended as Specifications)**

**Physical State:** Gas.

**Appearance:** Greenish yellow liquified gas.

**Odour:** A sharp, pungent, irritating odour.

**Odour Threshold (ppm):** 0.2 - 0.4 ppm. (3)

**Boiling Range (°C):** -35. (3)

**Melting/Freezing Point (°C):** -101. (3)

**Vapour Pressure (mm Hg at 20° C):** 4 788 - 5 120. (3)

**Vapour Density (Air = 1.0):** 2.47 - 2.67. (3)

**Relative Density (g/cc):** 1.33 - 1.47. (3)

**Bulk Density:** 88.76 lb/ft³ @ 15.6 C.

**Viscosity:** 0.346 mPa @ 20 C. (3)

**Evaporation Rate (Butyl Acetate = 1.0):** Not available.

**Solubility:** Slightly soluble in water.

**% Volatile by Volume:** 100. (3)

**pH:** 1.5 - 2.0 (0.8 % solution). (3)

**Coefficient of Water/Oil Distribution:** Not applicable.

**Volatile Organic Compounds (VOC):** 0 %.

**Flashpoint (°C):** Not Flammable.

**10. STABILITY AND REACTIVITY**

**CHEMICAL STABILITY**

**Under Normal Conditions:** Stable.

**Under Fire Conditions:** Although non-combustible in air, chlorine supports the combustion of other materials.

**Hazardous Polymerization:** Will not occur.

|                                       |   |
|---------------------------------------|---|
| Conditions to Avoid:                  | High temperatures, sparks, open flames and all other sources of ignition. Avoid contact with water. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4) Attacks some types of rubber, plastics and coatings.  |
| Materials to Avoid:                   | <p>This product is a strong oxidizer. Strong oxidizers can cause ignition of combustible or oxidizable materials. May decompose violently on contact with metals, or their salts, dusts or other contaminants. Reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4)</p> <p>Chlorine reacts with combustible, organic or nitrogen compounds (hydrocarbons, cleaning solvents, paints or thinners, oil, grease gasoline, petroleum products, turpentine, alcohols, carbon disulphide, hydrogen acetylene, hydrogen, ether and ammonia). (3,4)</p> <p>Chlorine gas can react explosively with alcohols (e.g. ethanol, methanol), ammonia and compounds, hydrocarbon gases (e.g. acetylene, methane, ethane, ethylene and propylene), acetaldehyde, benzene, diethyl ether; ethyleneimine, hydrogen, antimony trichloride and tetramethylsilane, aziridine, bromine pentafluoride, dioxygen difluoride, oxygen difluoride, fluorine, diborane, dichloro(methyl)arsine, disilyl oxide, ethylphosphine, strong reducing agents, aqueous sulfamic acid, stibine, synthetic rubber, tetraselenium tetranitride and white phosphorus. (4)</p> <p>On contact with chlorine gas, the following ignite: mono and di alkali metal acetylides (e.g. copper acetylides), iron, uranium and zirconium carbides, halocarbons (e.g. dichloromethane), hydroxylamine, metals (e.g. finely powdered aluminum, antimony, brass and copper foil, iron, potassium, sodium, tin and titanium), non-metals (e.g. arsenic, boron, bismuth, active carbon, phosphorous and silicon), diethyl ether, diethyl zinc, metal and non-metal hydrides, phosphorus compounds, sulfides, tellurium, trialkyl boranes and tungsten dioxide. (4)</p> <p>Dry Chlorine gas is corrosive at normal temperatures (20-25 deg C) to some types of stainless steel (e.g. types 347, 348 and 400 series), aluminum alloys (e.g. types 3003 and Cast B-356), types 1075 and 1095 carbon steel, some cast irons (3% nickel) and aluminum bronze. (4)</p> <p>At high temperatures Dry Chlorine is corrosive to most common metals. Wet Chlorine gas is corrosive at normal temperatures to most common metals.</p> |
| Decomposition or Combustion Products: | Thermal decomposition products are toxic and may include oxides of chlorine and irritating gases. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4)   |

## 11. TOXICOLOGICAL INFORMATION

### TOXICOLOGICAL DATA:

| SUBSTANCE                              | LD50 (Oral, Rat)  | LD50 (Dermal, Rabbit) | LC50 (Inhalation, Rat, 4h) |
|--|---|-----------------------|----------------------------|
| Chlorine                               | ---   | ---                   | 147 ppm (1)                |
| Carcinogenicity Data:                  | The ingredient(s) of this product is (are) not classed as carcinogenic by ACGIH, IARC, OSHA or NTP. See "Other Studies Relevant to Material".   |                       |                            |
| Reproductive Data:                     | No adverse reproductive effects are anticipated.  |                       |                            |
| Mutagenicity Data:                     | No adverse mutagenic effects are anticipated.   |                       |                            |
| Teratogenicity Data:                   | No adverse teratogenic effects are anticipated.   |                       |                            |
| Respiratory / Skin Sensitization Data: | None known.   |                       |                            |
| Synergistic Materials:                 | Mortality in Chlorine-Nickel test groups for rainbow trout was found to be higher than that of either nickel or chlorine alone. The relevance to humans is not known. Incidences of respiratory sensitization in platinum refinery workers increased following a spill of chlorine. (3) |                       |                            |

Other Studies Relevant to Material:

Chlorine is a corrosive gas and a severe irritant to the upper and lower respiratory tract. The concentrations required to produce specific effects vary greatly and are dependent on many factors, including the duration of exposure, the experimental procedures, the methods used to measure gas concentration, and the animal species tested. Effects are duration- and concentration-related. A single 30-60 minute exposure to 130-1000 ppm has caused death in various animal species. A single exposure of several hours to 10-30 ppm has produced definite harmful effects, including high mortality in rodents. Irritation to the respiratory tract has been noted in mice exposed to 0.8 ppm for 15 minutes. Damage to cells lining the respiratory tract in mice and/or rats was caused by a 6-hour exposure to 9 ppm or a 5-minute exposure to 100 ppm. A 60-minute exposure to 197 ppm caused fluid accumulation in the lungs (pulmonary edema) of mice. Rats exposed for 15 minutes to 1330 ppm had pulmonary edema and bleeding in the lungs and fibrosis of the lungs 45 days after exposure. (4)

Long-term respiratory system effects have been observed following severe short-term exposures to chlorine. One of the disorders observed is called Reactive Airways Dysfunction Syndrome. With this condition, asthma-like symptoms and increased reactivity of the airways is experienced. Limited studies of workers with long-term exposure to levels less than 1 ppm have not shown significant respiratory effects. Studies with limitations suggest that long-term occupational exposure to corrosive gases including chlorine and chlorine dioxide may cause respiratory effects such as wheezing and decreased lung function. These effects probably result from short-term incidents of high exposures ("gassing" episodes) to chlorine and chlorine dioxide. Long-term animal studies confirm that chlorine is a corrosive gas and a severe irritant to the upper and lower respiratory tract. (4)

In long-term exposure studies, exposure of monkeys to up to 2.3 ppm for 1 year or of male and female rats and male mice to up to 2.5 ppm for 2 years did not result in changes to the reproductive organs. Female mice developed a concentration-related increase in ovarian abscesses and of uterine inflammation, however the authors stated that it was unlikely that chlorine induced this inflammatory response. (4)

No evidence of carcinogenicity was observed in mice and rats exposed to up to 2.5 ppm chlorine for 2 years (6 hr/day, 5 d/wk). (4)

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## 12. ECOLOGICAL INFORMATION

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Ecotoxicity:

Highly toxic to aquatic life.

Fish toxicity: critical concentration = 0.3 mg/L  
Aesthetic: critical concentration = 0.5 mg/L  
Plant: critical concentration = 100 mg/L

72-HR LC50 = 0.5 mg/L, Daphnia Magna  
96-HR LC50 = 0.02 mg/L, Daphnia Magna  
96-HR LC50 = 0.08 to 0.18 mg/L, Brook Trout  
96-HR LC50 = 0.07 mg/L, Channel Catfish Fingerlings  
96-HR LC50 = 0.44 to 2.32 mg/L, Bluegill Sunfish  
96-HR LC50 = 1.6 mg/L, Redsid Shiner  
96-HR LC50 = 0.70 mg/L, Blackside Dance

Exposure of Sand-dollar sperm to 0.002 mg/L for 5 minutes resulted in a 50 percent reduction in egg fertilization. Depressed shoot and total plant dry weight and shoot length were reported when the aquatic plant *Myriophyllum spicatum* was continuously exposed to chlorine (as low as 0.05 mg total residual chlorine/L) for 96 hours. Chlorine is considered to be phytotoxic and has bactericidal, algicidal and fungicidal properties. Chlorine does not appear to retard seed germination. (3) This product does not bioaccumulate in aquatic or terrestrial food chains.

Environmental Fate:

Can be dangerous if allowed to enter drinking water intakes at high concentrations.

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## 13. DISPOSAL CONSIDERATIONS

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Deactivating Chemicals:

Chlorine gas will disperse to the atmosphere leaving no residue. Gaseous material can be absorbed in alkaline solutions of Caustic Soda, Soda Ash or Hydrated Lime. When absorbing Chlorine in alkaline solutions, the reaction is exothermic. Ensure the absorption is controlled as to heat and reaction. (3)

Since hypochlorites are formed, solutions must be treated with reducing agents such as sodium sulphite before disposal. Do not immerse container in caustic solution. Liquid and/or solid residues from neutralization must be disposed of in a permitted waste management facility. (3)

Hypochlorites: Carefully neutralize by adding hydrogen peroxide: one US pint of 35 % hydrogen peroxide solution per pound of hypochlorite to be neutralized. Dilute the neutralized residue with water. (3)

|                            |   |
|----------------------------|---|
| Waste Disposal Methods:    | This information applies to the material as manufactured. Reevaluation of the product may be required by the user at the time of disposal since the product uses, transformations, mixtures and processes may influence waste classification. Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial and federal regulations. Do not dispose of waste with normal garbage, or to sewer systems. |
| Safe Handling of Residues: | See "Waste Disposal Methods".   |
| Disposal of Packaging:     | Empty containers retain product residue (liquid and/or vapour) and can be dangerous. See Section 13, "Deactivating Chemicals". Do not expose such containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death. Return empty containers. DO NOT REFILL COMPRESSED GAS CONTAINERS. RETURN TO BRENNTAG CANADA FOR CARE AND MANAGEMENT.   |

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## 14. TRANSPORTATION INFORMATION

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### CANADIAN TDG ACT SHIPPING DESCRIPTION:

UN1017, CHLORINE, Class 2.3(5.1)(8).

Label(s): Toxic Gases, Oxidizing Substances, Corrosive. Placard: Toxic Gases.

ERAP Index: 500. Exemptions: None known.

Special Documentation Addition: toxic by inhalation

Marine: P ( Marine Pollutant ).

Please consult the North American Emergency Response Guidebook, via the UN#, for guidance in addressing spills.

### US DOT CLASSIFICATION (49CFR 172.101, 172.102):

UN1017, CHLORINE, Class 2.3(5.1)(8).

Label(s): Poison Gas, Oxidizer, Corrosive. Placard: Poison Gas.

CERCLA-RQ: 10 lb / 4.54 kg Exemptions: Not applicable.

Special Documentation Addition: Chlorine, Poison - Inhalation Hazard, Zone B.

Marine: P ( Marine Pollutant ).

IMO: Marine Pollutant: Chlorine.

Please consult the North American Emergency Response Guidebook, via the UN#, for guidance in addressing spills.

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## 15. REGULATORY INFORMATION

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### CANADA

CEPA - NSNR: This material is included on the DSL under the CEPA.

CEPA - NPRI: This material is on the NPRI list of substances.

Controlled Products Regulations Classification (WHMIS):

A: Compressed Gas

C: Oxidizer

D-1A: Very Toxic (acute effects)

D-2A: Very Toxic (chronic effects)

E: Corrosive

### USA

Environmental Protection Act: This material is included on the TSCA Inventory.

OSHA HCS (29CFR 1910.1200): Compressed Gas. Oxidizer. Highly Toxic. Chronic Effects. Corrosive.

NFPA: 4 Health, 0 Fire, 0 Reactivity (3)

HMIS: 4 Health, 0 Fire, 0 Reactivity (3)

### INTERNATIONAL

The following component or components of this product appear on the European Inventory of Existing Commercial Chemical Substances:  
Chlorine.

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## 16. OTHER INFORMATION

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## REFERENCES

1. RTECS-Registry of Toxic Effects of Chemical Substances, Canadian Centre for Occupational Health and Safety RTECS database.
2. Clayton, G.D. and Clayton, F.E., Eds., Patty's Industrial Hygiene and Toxicology, 3rd ed., Vol. IIA,B,C, John Wiley and Sons, New York, 1981.
3. Supplier's Material Safety Data Sheet(s).
4. CHEMINFO chemical profile, Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.
5. Guide to Occupational Exposure Values, 2011, American Conference of Governmental Industrial Hygienists, Cincinnati, 2011.
6. Regulatory Affairs Group, Brenntag Canada Inc.
7. The British Columbia Drug and Poison Information Centre, Poison Managements Manual, Canadian Pharmaceutical Association, Ottawa, 1981.

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The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and Brenntag Canada Inc. will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years.

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To obtain revised copies of this or other Material Safety Data Sheets, contact your nearest Brenntag Canada Regional office.

British Columbia: 20333-102B Avenue, Langley, BC, V1M 3H1  
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