Chemical Data Sheet

Chemical Name: CHLORINE

Section 1 - Chemical Identifiers

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>UN/NA Number</th>
<th>STCC Number</th>
<th>CHRIS Code</th>
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<tbody>
<tr>
<td>7782-50-5</td>
<td>1017</td>
<td>4920523</td>
<td>CLX</td>
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<td>4920539</td>
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DOT Hazard Label: POISON GAS
CORROSIVE

NFPA 704
Blue - Health Hazard - 4 - Too dangerous to enter - vapor or liquid
Red - Flammability - 0 - Will not burn
Yellow - Reactivity - 0 - Normally stable
White - Special - OX - Oxidizer

General Description
A greenish yellow gas with a pungent suffocating odor. Toxic by inhalation. Slightly soluble in water. Liquefies at -35°C and room pressure. Readily liquefied by pressure applied at room temperature. Density (as a liquid) 13.0 lb / gal. Contact with unconfined liquid can cause frostbite by evaporative cooling. Does not burn but, like oxygen, supports combustion. Long-term inhalation of low concentrations or short-term inhalation of high concentrations has ill effects. Vapors are much heavier than air and tend to settle in low areas. Contact CHEMTREC to activate chlorine response team 800-424-9300. Used to purify water, bleach wood pulp, and to make other chemicals.

Rate of onset: Immediate to hours
Persistence: Minutes to hours
Odor threshold: 3.5 ppm

Source/use/other hazard: Cleaner/disinfectant in many industries; water treatment; WWI war gas; irritating corr fumes heavier than air. (NOAA, 2003)

Section 2 - Hazards

Reactivity Alerts
- Strong Oxidizing Agent
- Water-Reactive

Air & Water Reactions
Water dissolves about twice its volume of chlorine gas, forming a mixture of hydrochloric acid and hypochlorous acids. Will be corrosive due to acidity and oxidizing potential. Slightly soluble in water.

Fire Hazard
May ignite other combustible materials (wood, paper, oil, etc.). Mixture with fuels may cause explosion. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers. Hydrogen and chlorine mixtures (5-95%) are exploded by almost any form of energy (heat, sunlight, sparks, etc.). May combine with water or steam to produce toxic and corrosive fumes of hydrochloric acid. Emits highly toxic fumes when heated. Avoid plastics and rubber. Avoid heat and contact with hydrogen gas or powdered metals. (EPA, 1998)

Health Hazard
Poisonous; may be fatal if inhaled. Contact may cause burns to skin and eyes. Bronchitis or chronic lung conditions. (EPA, 1998)

Reactivity Profile
CHLORINE reacts explosively with or supports the burning of numerous common materials. Ignites steel at 100°C in the presence of soot, rust, carbon, or other catalysts. Ignites dry steel wool at 50°C. Reacts as either a liquid or gas with alcohols (explosion), molten aluminum (explosion), silane (explosion), bromine pentafluoride, carbon disulfide (explosion catalyzed by iron), 1-chloro-2-propyne (excess chlorine causes an explosion), dibutyl phthalate (explosion at 118°C), diethyl ether (ignition), diethyl zinc (ignition), glycerol (explosion at 70-80°C), methane over yellow mercury oxide (explosion), acetylene (explosion initiated by sunlight or heating), ethylene over mercury, mercury(I) oxide, or silver(I) oxide (explosion initiated by heat or light), gasoline (exothermic reaction then detonation), naphtha-sodium hydroxide mixture (violent explosion), zinc chloride (exothermic reaction), wax (explosion), hydrogen (explosion initiated by light), Reacts as either a liquid or gas with carbides of iron, uranium and zirconium, with hydrides of potassium sodium and copper, with tin, aluminum powder, vanadium powder, aluminum foil, brass foil, copper foil, calcium powder, iron wire, manganese powder, potassium, antimony powder, bismuth, germanium, magnesium, sodium, and zinc. Causes ignition and a mild explosion when bubbled through cold methanol. Exploses or ignites if mixed in excess with ammonia and warmed. Causes ignition in contact with hydrazine, hydroxylamine, and calcium nitride. Forms explosive nitrogen trichloride from biuret contaminated with cyanuric acid. Readily forms an explosive N-chloro derivative with aziridine. Ignites or explodes with arsine, phosphine, silane, diborane, stibine, red phosphorus, white phosphorus, boron, active carbon, silicon, arsenic. Ignites sulfides at ambient temperature. Ignites (as a liquid) synthetic and natural rubber. Ignites trialkylboranes and tungsten dioxide. (REACTIVITY, 2003)

Belongs to reactive group(s)
- Inorganic Oxidizing Agents
- Halogenating Agents, Strong

Special Note: This chemical has been or could be used as a WMD.

Section 3 - Response Recommendations

Fire Fighting
Evacuate area endangered by gas. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and full protective clothing. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. If it is necessary to stop the flow of gas, use water spray to direct escaping gas away from those effecting shut-off.

Will not burn, but most combustible materials will burn in chlorine as they do in oxygen; flammable gases will form explosive mixtures with chlorine. Dry chemical, carbon dioxide, water spray, fog or foam. (EPA, 1998)

Non-Fire Response
Keep material out of water sources and sewers. Attempt to stop leak if without undue personnel hazard. Do not apply water to point of leak in tank car or container. Apply water spray or mist to knock down vapors. Vapor knockdown water is corrosive or toxic and should be diked for containment. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Neutralize with dilute caustic soda (NaOH) or soda ash (Na2CO3). Water spill: Add dilute caustic soda (NaOH). If dissolved, in region of 10 ppm or greater concentration, apply
activated carbon at ten times the spilled amount. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. ((c) AAR, 2003)

**Protective Clothing**

Skin: Wear appropriate personal protective clothing to prevent skin from becoming frozen from contact with the liquid or from contact with vessels containing the liquid.

Eyes: Wear appropriate eye protection to prevent eye contact with the liquid that could result in burns or tissue damage from frostbite.

Wash skin: No recommendation is made specifying the need for washing the substance from the skin (either immediately or at the end of the work shift).

Remove: No recommendation is made specifying the need for removing clothing that becomes wet or contaminated.

Change: No recommendation is made specifying the need for the worker to change clothing after the work shift.

Provide: Quick drench facilities and/or eyewash fountains should be provided within the immediate work area for emergency use where there is any possibility of exposure to liquids that are extremely cold or rapidly evaporating. (NIOSH, 2003)

**First Aid**

Warning: Effects may be delayed. Caution is advised. Chlorine is corrosive and may be converted to hydrochloric acid in the lungs.

Signs and Symptoms of Acute Chlorine Exposure: Signs and symptoms of acute exposure to chlorine may include tachycardia (rapid heart rate), hypertension (high blood pressure) followed by hypotension (low blood pressure), and cardiovascular collapse. Pulmonary edema and pneumonia are often seen. The eyes, nose, throat, and chest may sting or burn following exposure to chlorine. Cough with bloody sputum, a feeling of suffocation, dizziness, agitation, anxiety, nausea, and vomiting are common. Dermal exposure may result in sweating, pain, irritation, and blisters.

Emergency Life-Support Procedures: Acute exposure to chlorine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as chlorine-resistant plastic sheeting and disposable bags to assist in preventing spread of contamination.

Inhalation Exposure:
1. Move victims to fresh air. Emergency personnel should avoid self-exposure to chlorine.
2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.
3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
4. Transport to a health care facility.

Dermal/Eye Exposure:
1. Remove victims from exposure. Emergency personnel should avoid self-exposure to chlorine.
2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.
3. Remove contaminated clothing as soon as possible.
4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.
5. Wash exposed skin areas for at least 15 minutes with soap and water.
6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
7. Transport to a health care facility.
Ingestion Exposure: No information is available. (EPA, 1998)

Section 4 - Physical Properties

**Molecular Formula:** Cl₂

Flash Point: data unavailable

Lower Explosive Limit: data unavailable

Upper Explosive Limit: data unavailable

**Auto Ignition Temperature:** Not flammable (USCG, 1999)

**Melting Point:** -150.0 ° F (EPA, 1998)

**Vapor Pressure:** 7600.0 mm Hg at 86.0 ° F (EPA, 1998)

**Vapor Density:** 2.49 (EPA, 1998)

**Specific Gravity:** 1.424 at 59.0 ° F (USCG, 1999)

**Boiling Point:** -30.3 ° F at 760 mm Hg (EPA, 1998)

**Molecular Weight:** 70.91 (EPA, 1998)

**Water Solubility:** 0.7 % (NIOSH, 2003)

**AEGL-1**
0.5 ppm for 10 minutes
0.5 ppm for 30 minutes
0.5 ppm for 60 minutes
0.5 ppm for 4 hours
0.5 ppm for 8 hours

**AEGL-2**
2.8 ppm for 10 minutes
2.8 ppm for 30 minutes
2.0 ppm for 60 minutes
1.0 ppm for 4 hours
0.7 ppm for 8 hours

**AEGL-3**
50.0 ppm for 10 minutes
28.0 ppm for 30 minutes
20.0 ppm for 60 minutes
10.0 ppm for 4 hours
7.1 ppm for 8 hours

(AEGL, 2003)

**ERPG-1**
1.0 ppm

**ERPG-2**
3.0 ppm

**ERPG-3**
20.0 ppm

((c) AIHA, 2003)

TEEL: ERPG supersedes TEEL

**IDLH:** 10.0 ppm (NIOSH, 2003)

**TLV TWA:** 0.5 ppm Not classifiable as a human carcinogen. (ACGIH, 2003)

**TLV STEL:** 1.0 ppm Not classifiable as a human carcinogen. (ACGIH, 2003)

Section 5 - Regulatory Information

**Regulatory Names**

- CHLORINE

**CAA RMP:** Regulated chemical with a Threshold Quantity of 2500 pounds.

**CERCLA:** Regulated chemical with a Reportable Quantity of 10 pounds.

**EPCRA 302 EHS:**
Regulated chemical with a Reportable Quantity of 10 pounds and a Threshold Planning Quantity of 100 pounds.

**TRI (EPCRA 313):** Regulated chemical.

**RCRA chemical code:** none