

CHLORINE

CLX

CAUTIONARY RESPONSE INFORMATION

Common Synonyms	Liquefied compressed gas Greenish yellow Irritating, bleach-like choking odor
	Sinks and boils in water. Poisonous, visible vapor cloud is produced.
<p>Keep people away. AVOID CONTACT WITH LIQUID AND VAPOR. Wear goggles, self-contained breathing apparatus and rubber overclothing (including gloves). Evacuate area in case of large discharge. Stay upwind and use water spray to "knock down" vapor. Notify local health and pollution control agencies. Protect water intakes.</p>	
Fire	Not flammable. May cause fire on contact with combustibles. POISONOUS GASES ARE PRODUCED IN FIRES. Stop flow of gas if possible. Cool exposed containers and protect men effecting shutoff with water. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves).
Exposure	CALL FOR MEDICAL AID. VAPOR POISONOUS IF INHALED. Will burn eyes. Move to fresh air. If breathing has stopped, give artificial respiration (but NOT mouth-to-mouth). If breathing is difficult, give oxygen. IF IN EYES, hold eyelids open and flush with plenty of water. LIQUID Will burn skin and eyes. Will cause frostbite. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. DO NOT RUB AFFECTED AREAS.
Water Pollution	HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.

<p>1. CORRECTIVE RESPONSE ACTIONS</p> <p>Dilute and disperse Stop discharge Do not add water to undissolved material</p>	<p>2. CHEMICAL DESIGNATIONS</p> <p>2.1 CG Compatibility Group: Not listed. 2.2 Formula: Cl₂ 2.3 IMO/UN Designation: 2.0/1017 2.4 DOT ID No.: 1017 2.5 CAS Registry No.: 7782-50-5 2.6 NAERG Guide No.: 124 2.7 Standard Industrial Trade Classification: 52224</p>
<p>3. HEALTH HAZARDS</p> <p>3.1 Personal Protective Equipment: Quick-opening safety shower and eye fountain; respiratory equipment approved for chlorine service. Wear safety goggles at all times when in vicinity of liquid chlorine.</p> <p>3.2 Symptoms Following Exposure: Eye irritation, sneezing, copious salivation, general excitement and restlessness. Irritation may persist for several days. High concentrations cause respiratory distress and violent coughing, often with retching. Death may result from suffocation.</p> <p>3.3 Treatment of Exposure: INHALATION: remove victim from source of exposure; call a doctor; support respiration; administer oxygen. EYES: flush with copious amounts of water for at least 15 min.</p> <p>3.4 TLV-TWA: 0.5 ppm 3.5 TLV-STEL: Not listed. 3.6 TLV-Ceiling: 1 ppm.</p> <p>3.7 Toxicity by Ingestion: Not pertinent; ingestion unlikely (chlorine is a gas above -34.5°C)</p> <p>3.8 Toxicity by Inhalation: Currently not available.</p> <p>3.9 Chronic Toxicity: None</p> <p>3.10 Vapor (Gas) Irritant Characteristics: Vapors cause severe irritation of eyes and throat and can cause eye and lung injury. They cannot be tolerated even at low concentrations.</p> <p>3.11 Liquid or Solid Characteristics: Causes smarting of the skin and first-degree burns on short exposure; may cause secondary burns on long exposure.</p> <p>3.12 Odor Threshold: 3.5 ppm 3.13 IDLH Value: 10 ppm 3.14 OSHA PEL-TWA: Not listed. 3.15 OSHA PEL-STEL: Not listed. 3.16 OSHA PEL-Ceiling: 1 ppm. 3.17 EPA AEGL: Not listed</p>	

4. FIRE HAZARDS

- 4.1 **Flash Point:** Not flammable
- 4.2 **Flammable Limits in Air:** Not flammable
- 4.3 **Fire Extinguishing Agents:** Currently not available
- 4.4 **Fire Extinguishing Agents Not to Be Used:** Not pertinent
- 4.5 **Special Hazards of Combustion Products:** Toxic products are generated when combustibles burn in chlorine.
- 4.6 **Behavior in Fire:** Most combustibles will burn in chlorine, although gas is not flammable.
- 4.7 **Auto Ignition Temperature:** Not flammable
- 4.8 **Electrical Hazards:** Currently not available
- 4.9 **Burning Rate:** Not flammable
- 4.10 **Adiabatic Flame Temperature:** Currently not available
- 4.11 **Stoichiometric Air to Fuel Ratio:** Not Pertinent
- 4.12 **Flame Temperature:** Currently not available
- 4.13 **Combustion Molar Ratio (Reactant to Product):** Not Pertinent
- 4.14 **Minimum Oxygen Concentration for Combustion (MOCC):** Not listed

5. CHEMICAL REACTIVITY

- 5.1 **Reactivity with Water:** Forms a corrosive solution
- 5.2 **Reactivity with Common Materials:** Reacts vigorously with most metals at high temperature. Copper may burn spontaneously.
- 5.3 **Stability During Transport:** Stable
- 5.4 **Neutralizing Agents for Acids and Caustics:** Not pertinent
- 5.5 **Polymerization:** Not pertinent
- 5.6 **Inhibitor of Polymerization:** Not pertinent

6. WATER POLLUTION

- 6.1 **Aquatic Toxicity:** 0.08 ppm/168 hr/trout/TL₅₀/fresh water
10 ppm/1 hr/tunicates/killed/salt water
- 6.2 **Waterfowl Toxicity:** Currently not available
- 6.3 **Biological Oxygen Demand (BOD):** None
- 6.4 **Food Chain Concentration Potential:** None
- 6.5 **GESAMP Hazard Profile:** Bioaccumulation: 0
Damage to living resources: 4
Human Oral hazard: N/A
Human Contact hazard: II
Reduction of amenities: XX

7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** Research purity; ultra high purity; high purity
- 7.2 **Storage Temperature:** Ambient
- 7.3 **Inert Atmosphere:** No requirement
- 7.4 **Venting:** Safety relief (300 psi)
- 7.5 **IMO Pollution Category:** Currently not available
- 7.6 **Ship Type:** Currently not available
- 7.7 **Barge Hull Type:** 1

8. HAZARD CLASSIFICATIONS

- 8.1 **49 CFR Category:** Poison Gas
- 8.2 **49 CFR Class:** 2.3
- 8.3 **49 CFR Package Group:** Not pertinent
- 8.4 **Marine Pollutant:** Yes
- 8.5 **NFPA Hazard Classification:**

Category	Classification
Health Hazard (Blue).....	3
Flammability (Red).....	0
Instability (Yellow).....	0
Special (White).....	OX
- 8.6 **EPA Reportable Quantity:** Not listed.
- 8.7 **EPA Pollution Category:** Not listed.
- 8.8 **RCRA Waste Number:** Not listed
- 8.9 **EPA FWPCA List:** Not listed

9. PHYSICAL & CHEMICAL PROPERTIES

- 9.1 **Physical State at 15° C and 1 atm:** Gas
- 9.2 **Molecular Weight:** 70.91
- 9.3 **Boiling Point at 1 atm:** -29.4°F = -34.1°C = 239.1°K
- 9.4 **Freezing Point:** -150°F = -101°C = 172°K
- 9.5 **Critical Temperature:** 291.2°F = 144°C = 417.2°K
- 9.6 **Critical Pressure:** 1118 psia = 76.05 atm = 7.704 MN/m²
- 9.7 **Specific Gravity:** 1.424 at 15°C (liquid)
- 9.8 **Liquid Surface Tension:** 26.55 dynes/cm at -35.3°C
- 9.9 **Liquid Water Interfacial Tension:** Not pertinent
- 9.10 **Vapor (Gas) Specific Gravity:** 2.4
- 9.11 **Ratio of Specific Heats of Vapor (Gas):** 1.325
- 9.12 **Latent Heat of Vaporization:** 124 Btu/lb = 68.7 cal/g = 2.87 X 10⁵ J/kg
- 9.13 **Heat of Combustion:** Not pertinent
- 9.14 **Heat of Decomposition:** Not pertinent
- 9.15 **Heat of Solution:** Not pertinent
- 9.16 **Heat of Polymerization:** Not pertinent
- 9.17 **Heat of Fusion:** 22.8 cal/g
- 9.18 **Limiting Value:** Currently not available
- 9.19 **Reid Vapor Pressure:** 155 psia

NOTES

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9.20 SATURATED LIQUID DENSITY		9.21 LIQUID HEAT CAPACITY		9.22 LIQUID THERMAL CONDUCTIVITY		9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit inch per hour-square foot-F	Temperature (degrees F)	Centipoise
-35 -30	97.179 96.730		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T

9.24 SOLUBILITY IN WATER		9.25 SATURATED VAPOR PRESSURE		9.26 SATURATED VAPOR DENSITY		9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
77	0.650	-55	7.491	-55	0.12230	0	0.112
		-50	8.580	-50	0.13840	25	0.113
		-45	9.795	-45	0.15600	50	0.114
		-40	11.150	-40	0.17550	75	0.114
		-35	12.650	-35	0.19670	100	0.115
		-30	14.310	-30	0.22000	125	0.116
		-25	16.140	-25	0.24530	150	0.116
		-20	18.150	-20	0.27280	175	0.117
		-15	20.370	-15	0.30260	200	0.118
		-10	22.790	-10	0.33490	225	0.118
		-5	25.450	-5	0.36970	250	0.119
		0	28.340	0	0.40720	275	0.119
		5	31.490	5	0.44760	300	0.120
		10	34.910	10	0.49090	325	0.120
		15	38.610	15	0.53730	350	0.120
		20	42.620	20	0.58700	375	0.121
		25	46.950	25	0.63990	400	0.121
		30	51.620	30	0.69640	425	0.121
		35	56.650	35	0.75650	450	0.122
		40	62.050	40	0.82030	475	0.122
		45	67.839	45	0.88790	500	0.122
		50	74.040	50	0.95960	525	0.122
						550	0.122
						575	0.122
						600	0.122