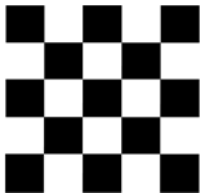


**MATERIAL SAFETY DATA SHEET**

PRODUCT NAME: CHLORINE

**1. Product and Company Identification**



AS PACKAGED  
AND DISTRIBUTED  
BY

**INDIANA OXYGEN COMPANY**  
**6099 WEST CORPORATE WAY**  
**INDIANAPOLIS, INDIANA 46278**  
**PHONE 1-317-290-0003**

**Emergency Contact: Infotrak**  
**1-800-535-5053**

**PRODUCT NAME:** CHLORINE  
**CHEMICAL NAME:** Chlorine  
**COMMON NAMES/SYNONYMS:** Bertholite, Molecular Chlorine  
**TDG (Canada) CLASSIFICATION:** 2.3 (5.1)  
**WHMIS CLASSIFICATION:** A, D1A, D2B, E, C

**PREPARED BY:** Loss Control (908)464-8100/(905)501-1700  
**PREPARATION DATE:** 6/1/95  
**REVIEW DATES:** 06/18/04

**2. Composition, Information on Ingredients**

**EXPOSURE LIMITS<sup>1</sup>:**

INGREDIENT	% VOLUME	PEL-OSHA <sup>2</sup>	TLV-ACGIH <sup>3</sup>	LD <sub>50</sub> or LC <sub>50</sub> Route/Species
Chlorine FORMULA: Cl <sub>2</sub> CAS: 7782-50-5 RTECS #: FO2100000	100.0	1 ppm Ceiling	0.5 ppm TWA 1 ppm STEL	LC <sub>50</sub> : 293 ppm inhalation/rat (1H)

<sup>1</sup> Refer to individual state or provincial regulations, as applicable, for limits which may be more stringent than those listed here.

<sup>2</sup> As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

<sup>3</sup> As stated in the ACGIH 2004 Threshold Limit Values for Chemical Substances and Physical Agents.

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

IDLH: 10 ppm

**3. Hazards Identification**

**EMERGENCY OVERVIEW**

Greenish yellow gas with bleach-like choking odor. Corrosive and poison gas. Contact may cause severe irritation or corrosive burns to the eyes, skin and mucous membranes. Inhalation may result in chemical pneumonitis, retention of body fluid in the lungs (pulmonary edema), and respiratory collapse. Nonflammable. Oxidizer. May react violently with reducing agents. Can accelerate combustion and increase the risk of fire and explosion in flammable and combustible materials. Contents under pressure. Use and store below 125 °F.

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**ROUTE OF ENTRY:**

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion No
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**HEALTH EFFECTS:**

Exposure Limits Yes	Irritant Yes	Sensitization No
Teratogen No	Reproductive Hazard No	Mutagen No
Synergistic Effects Other agents that irritate the respiratory system		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

**EYE EFFECTS:**

Corrosive and irritating to the eyes. Contact with the liquid or vapor causes painful burns and ulcerations. Burns to the eyes result in lesions and possible loss of vision.

**SKIN EFFECTS:**

Corrosive and irritating to the skin and all living tissue. It hydrolyzes very rapidly yielding hydrochloric acid. Skin burns and mucosal irritation are like that from exposure to volatile inorganic acids. Chlorine burns result in severe pain, redness, possible swelling and early necrosis.

**INGESTION EFFECTS:**

Ingestion is unlikely.

**INHALATION EFFECTS:**

Corrosive and irritating to the upper and lower respiratory tract and all mucosal tissue. Symptoms include lacrimation, cough, labored breathing, and excessive salivary and sputum formation. Excessive irritation of the lungs causes acute pneumonitis, pulmonary edema, and respiratory collapse which could be fatal. Residual pulmonary malfunction may also occur. Chemical pneumonitis and pulmonary edema may result from exposure to the lower respiratory tract and deep lung.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** May aggravate pre-existing eye, skin, and respiratory conditions.

**POTENTIAL ENVIRONMENTAL EFFECTS:** Toxic to fish and wildlife. Chlorine is designated as a marine pollutant by DOT. The LC<sub>50</sub> in the fathead minnow has been cited as 0.1 mg/l/96 H and an LC<sub>50</sub> of 0.097 mg/L/30 min has been cited for the *Daphnia magna*.

#### 4. First Aid Measures

**EYES:**

PERSONS WITH POTENTIAL EXPOSURE SHOULD NOT WEAR CONTACT LENSES. Flush contaminated eye(s) with copious quantities of water. Part eyelids to assure complete flushing. Continue for a minimum of 30 minutes. Seek immediate medical attention.

**SKIN:**

Flush affected area with copious quantities of water while removing contaminated clothing. Seek immediate medical attention.

**INGESTION:**

None required.

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**INHALATION:**

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. If breathing is difficult, administer oxygen. Unconscious persons should be moved to an uncontaminated area and given artificial resuscitation and supplemental oxygen. Assure that mucus or vomited material does not obstruct the airway by use of positional drainage. Delayed pulmonary edema may occur. Keep the patient under medical observation for at least 24 hours.

**5. Fire Fighting Measures**

Conditions of Flammability: Not flammable		
Flash point: None	Method: Not Applicable	Autoignition Temperature: None
LEL(%): None		UEL(%): None
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

**FIRE AND EXPLOSION HAZARDS:**

Strong oxidizer. Most combustible materials burn in chlorine as they do in oxygen producing irritating and poisonous gases. Flame impingement upon steel chlorine container will result in iron/chlorine fire causing rupture of the container. Cylinder may vent rapidly or rupture violently from pressure when involved in a fire situation.

**EXTINGUISHING MEDIA:**

Use media suitable for surrounding materials. If it can be done without risk, stop the flow of chlorine which is accelerating the fire.

**FIRE FIGHTING INSTRUCTIONS:**

Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear with additional chemical protective clothing to prevent exposure to chlorine. Use water spray to keep fire exposed containers cool. Continue to cool fire exposed cylinders until well after flames are extinguished. Control runoff and isolate discharged material for proper disposal.

**6. Accidental Release Measures**

Evacuate all personnel from affected area. Deny entry to unauthorized and unprotected individuals. Extinguish all ignition sources. No smoking, sparks, flames, or flares in hazard area. Appropriate protective equipment is essential to prevent exposure (See Section 8). Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. Ventilate enclosed areas. A leak near incompatible, flammable or combustible materials may create a fire or explosion hazard. Consult a HAZMAT specialist and the appropriate emergency telephone number in Section 1 or your closest BOC location. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs.

**7. Handling and Storage**

**Electrical classification:** Nonhazardous.

Most metals corrode rapidly with wet chlorine. Systems must be kept dry. Lead, gold, tantalum and Hastelloy are most resistant to wet chlorine.

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Do not inhale. Prevent contact with skin and eyes. Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure piping or systems. Do not heat cylinder by any means to increase rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into cylinder. Do not insert any object (i.e.: screwdriver) into valve cap openings as this can damage the valve causing leakage.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated areas of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full & empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Separate from combustibles, organic, and easily oxidizable materials. Isolate from acetylene, ammonia, hydrogen, hydrocarbons, ether, turpentine, finely divided metals, and other incompatible materials. Oxidizer - Post "NO SMOKING OR OPEN FLAMES" signs in storage and use areas. There should be no sources of ignition in areas where this product is being used or stored. Outside or detached storage is preferred.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

For additional storage recommendations, consult Compressed Gas Association's Pamphlet P-1.

## **8. Exposure Controls, Personal Protection**

### **ENGINEERING CONTROLS:**

Hood with forced ventilation may be used for small quantities. Use local exhaust ventilation in combination with enclosed processes as needed to prevent accumulation above the exposure limit. Exhaust gas should be vented to a gas treatment system.

### **EYE/FACE PROTECTION:**

Gas-tight safety goggles and full faceshield or full-face respirator.

### **SKIN PROTECTION:**

Protective gloves or fully encapsulated vapor protective clothing. (Butyl rubber, neoprene, and Teflon ® provide adequate protection for exposures to chlorine greater than 8 hours.)

### **RESPIRATORY PROTECTION:**

For emergency release use a positive pressure NIOSH approved air-supplying respirator systems (SCBA or airline/escape bottle) using a full-face mask and at a minimum Grade D air.

For normal conditions below fifty times the exposure limit but where engineering can not control exposures below the applicable limits, than appropriately selected air-purifying respirators with full-face mask can be used.

### **OTHER/GENERAL PROTECTION:**

Safety shoes, safety shower, eyewash "fountain"

## 9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure at 70 °F	: 100.2	psia
Vapor density at STP (Air = 1)	: 2.47	
Evaporation point	: Not Available	
Boiling point	: -29.3	°F
	: -34.1	°C
Freezing point	: -149.8	°F
	: -101	°C
pH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H <sub>2</sub> O)	: Very Soluble	
Odor threshold	: Not Available	
Odor and appearance	: Greenish-yellow gas with sharp suffocating odor. Liquid is amber colored.	

## 10. Stability and Reactivity

**STABILITY:** Stable

**INCOMPATIBLE MATERIALS:** Strong oxidizer. Will react with organic and other oxidizable materials. Reacts explosively or forms explosive compounds with many common substances including acetylene, ether, turpentine, ammonia, fuel gas, hydrogen and finely divided metals. Reacts with water to form corrosive acidic solution.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Hydrochloric acid on contact with water.

**HAZARDOUS POLYMERIZATION:** Will not occur.

## 11. Toxicological Information

**INHALATION:** Inhalation of chlorine concentrations as low as 1 ppm may cause nose, throat and conjunctiva irritation. Irritation becomes more pronounced at concentrations of 1.3 ppm and above with coughing and labored breathing. Death may occur after a few breaths at 1000 ppm. Delayed effects following high exposure may include bronchitis, edema, and pneumonia.

**SKIN AND EYE:** Extremely irritating to the skin, eyes, and mucous membranes. Can cause corrosive burns. May cause corrosion of the teeth. Prolonged exposure to low concentrations may cause chloracne.

**OTHER:**

Repeated contact with low concentrations may cause dermatitis.

Equivocal evidence of carcinogenicity for chlorine was noted in an IARC review and a 2-year drinking water study in F344/N rats and B6C3F1 mice by the NTP. Literature references suggest the possibility of mutagenic and teratogenic effects from hypochlorites (a hydrolysis product of chlorine).

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## 12. Ecological Information

Product does not contain Class I or Class II ozone depleting substances. Chlorine is highly toxic to all forms of aquatic life (See Section 3). There is no potential for bioaccumulation or bioconcentration. Chlorine is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. Listed as a hazardous air pollutant (HAP) and a marine pollutant. Chlorine is listed as an extremely hazardous substance (EHS) subject to state and local reporting under Section 304 of SARA Title III (EPCRA) with a Threshold Planning Quantity (TPQ) of 100 pounds. The CERCLA reportable quantity (RQ) for chlorine is 10 pounds.

## 13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

## 14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Chlorine	Chlorine
HAZARD CLASS:	2.3 (8)	2.3 (8)
IDENTIFICATION NUMBER:	UN 1017	UN 1017
SHIPPING LABEL:	POISON GAS, CORROSIVE	TOXIC GAS, CORROSIVE

**Additional Marking Requirement:** "Inhalation Hazard"

If net weight of product  $\geq$  10 pounds, the container must be also marked with the letters "RQ".  
"Marine Pollutant" – For vessel transportation the Marine Pollutant Mark shall be placed in association with the hazard warning labels, or in the absence of any labels, in association with the marked proper shipping name.

**Additional Shipping Paper Description Requirement:** "Poison-Inhalation Hazard, Zone B"

If net weight of product  $\geq$  10 pounds, the shipping papers must be also marked with the letters "RQ".  
The words "Marine Pollutant" shall be entered in association with the basic description for a material which is a marine pollutant.

## 15. Regulatory Information

### SARA TITLE III NOTIFICATIONS AND INFORMATION

#### SARA TITLE III - HAZARD CLASSES:

Acute Health Hazard  
Chronic Health Hazard  
Fire Hazard  
Sudden Release of Pressure Hazard  
Reactivity Hazard

PRODUCT NAME: CHLORINE

**SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:**

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT BY VOLUME
7782-50-5	CHLORINE	100.0

This information must be included on all MSDSs that are copied and distributed for this material.

**U.S. TSCA/Canadian DSL:** All ingredients are listed on the U.S. Toxic Substances Control Act (TSCA) inventory or exempt from listing and on the Canadian Domestic Substance List (DSL).

**California Proposition 65:** This product does not contain ingredient(s) known to the State of California to cause cancer or reproductive toxicity.

**Canadian Controlled Products Regulations (CPR):** This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

**16. Other Information**

NFPA HAZARD CODES	HMIS HAZARD CODES	RATINGS SYSTEM
Health: 4	Health: 3	0 = No Hazard
Flammability: 0	Flammability: 0	1 = Slight Hazard
Instability: 0	Physical Hazard: 2	2 = Moderate Hazard
OXIDIZER		3 = Serious Hazard
		4 = Severe Hazard

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2004, *CGA Recommended Hazard Ratings for Compressed Gases, 2<sup>nd</sup> Edition*.

ACGIH	American Conference of Governmental Industrial Hygienists
DOT	Department of Transportation
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
STEL	Short Term Exposure Limit
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value
WHMIS	Workplace Hazardous Materials Information System

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

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