



MATERIAL SAFETY DATA SHEET

Chlorine Dioxide

This MSDS is supplied by PureLine Treatment Systems as a service to clients.

SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PureLine Treatment Systems

707 S. Vermont St
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Phone: 847-963-8465
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Product Name: Chlorine dioxide

Major Update: 3/27/00

Minor Revision: 02/02/2010

CAS#: 10049-04-4

MSDS Code: PureLine – Chlorine Dioxide

Product Use: Pulp bleaching; water treatment; disinfection

Chlorine dioxide is manufactured by the user as required for use on-site.

Equipment and/or raw materials used in its manufacture are made or supplied by PureLine Treatment Systems.

Emergency Contact:

CHEMTREC 800-424-9300 (US/N America) -
703-527-3887 (outside US-collect calls accepted)

SECTION 2 – COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient(s)	% (w/w)	ACGIH	CAS NO.
Chlorine dioxide	0 to 5 Vol% in Air	0.1 ppm - TWA 0.3 ppm - STEL	10049-04-4

WHMIS CLASSIFICATION(S):
C (Oxidizing Material)
D1B (Toxic)
E (Corrosive Material)
F (Dangerously Reactive)

SECTION 3 – HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: A greenish-yellow gas with a pungent odor similar to chlorine. **STRONG OXIDIZER.** Gas and solutions are severe respiratory irritants. May cause pulmonary edema, which may be delayed in onset. ClO₂ gas partial pressures above 10 volume % can decompose spontaneously with a corresponding pressure pulse or “puff”. Decomposes on exposure to sunlight or UV. **CORROSIVE** to the eyes and skin. Can cause damage to vegetation. Read the entire MSDS for a more thorough evaluation of the hazards.

Potential Health Effects:

General: Chlorine dioxide normally exists as a gas at room temperature and the most important route of exposure is inhalation, followed by eye and skin exposures.

Inhalation: Severe respiratory irritant. May cause bronchospasm and pulmonary edema, which may be delayed in onset. May also cause severe headaches. All symptoms may be delayed and long lasting. Long term exposure may cause chronic bronchitis. An LC₅₀ value of 500 ppm/15m³ (rat) is quoted in the literature.

Skin Contact: Gas and solutions are highly irritant.

Skin Absorption: May be absorbed, causing tissue and blood cell damage.

Eye Contact: Severe irritant. Exposure may cause visual disturbance, i.e., seeing halos around lights.

Ingestion: Not applicable except for solutions, in which case the symptoms would be expected to parallel those for inhalation.

Existing Medical Conditions Possibly Aggravated By Exposure: Asthma, bronchitis, emphysema and other lung diseases and chronic nose, sinus or throat, and cardiac conditions.

Exposure Limits: ACGIH 1992-93: TWA 0.1 ppm, STEL 0.3 ppm (0.9 mg/m³).

Irritancy: Severe irritant.

Sensitization: No information is available.

Carcinogenicity: Not listed by IARC or ACGIH.

Mutagenicity: Information not available.

Reproductive Effects: Information not available.

Teratogenicity and Fetotoxicity: Information not available.

Synergistic Materials: May have synergistic effects in conjunction with chlorine, other chlorine oxides and chlorine fluorine compounds.

SECTION 4 – FIRST AID MEASURES

Inhalation: Move the victim to fresh air. If breathing is stopped, commence artificial respiration. Apply artificial respiration if victim is not breathing. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Give Cardiopulmonary Resuscitation (CPR) if there is no pulse AND no breathing. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure. Obtain medical attention IMMEDIATELY.

Skin Contact: Wash immediately using soap or mild detergent and water.

Eye Contact: Flush immediately with plenty of lukewarm water. Continue to wash for ten (10) minutes, lifting eyelids occasionally. Get medical attention.

Ingestion: DO NOT GIVE ANYTHING BY MOUTH OR INDUCE VOMITING IF THE PATIENT IS UNCONSCIOUS. Give large amounts of water to dilute stomach contents. Get medical attention.

Note to Physicians: Following exposure the patient should be kept under medical review for at least 48 hours as delayed pulmonary edema may occur.

SECTION 5 – FIRE FIGHTING MEASURES

Flash Point & Method	Not applicable.
Flammable Limits (Lower)	Not applicable. See Section 5.
Flammable Limits (Upper)	Not applicable. See Section 5.
Auto Ignition Temperature	Not applicable. See Section 5.
Conditions of Flammability	Chlorine dioxide gas may decompose autocatalytically with a pink/violet flame which may ignite combustible materials. This flame can be extinguished by diluting/cooling with air. Chlorine dioxide does not require air for it to burn.
Hazardous Combustion Products	Chlorine, oxygen, and hydrochloric acid.
Sensitivity to Mechanical Impact	Not applicable.
Static Discharge Sensitivity	Sensitive to electrical discharge or flame.

Fire and Explosion Hazards:

Extinguishing Media: When combustibles are burning in the presence of chlorine dioxide (or other strong oxidizers) water is the only effective extinguishing medium.

Fire Fighting Procedures: Apply water from as far a distance as possible, in flooding quantities as a spray or fog. Remove all flammable and combustible materials from the vicinity, especially oil and grease. Use water with caution.

Fire Fighting Protective Equipment: Use eye protection and impermeable gloves. Use of contact lenses should not be permitted when potentially exposed to this material. Persons in the vicinity of chlorine dioxide gas or solutions should carry a respirator suitable for escape purposes at all times, in case of accidental release of significant amounts of gas.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Spills, Leaks, or Releases: Chlorine dioxide and its aqueous solutions should not be discharged to the general environment. Treating a small chlorine dioxide solution spill with a dilute sodium sulfite or sodium thiosulfate solution is recommended. Treating a spill with sodium hydroxide will convert chlorine dioxide to chlorate and chlorite, stopping release of gas in 15-20 minutes. PROPER PERSONAL PROTECTIVE EQUIPMENT SHOULD BE WORN PRIOR TO TREATMENT.

Deactivating Chemicals: Sodium sulfite or sodium thiosulfate solutions; sodium hydroxide. See Incompatibles in Section 10.

SECTION 7 – HANDLING AND STORAGE

Handling: Equipment manufacturer's recommendations for design, operation and maintenance of chlorine dioxide generation equipment must be followed. Take all precautions to avoid personal contact. Prevent the release of gas into workplace air. Always ensure adequate ventilation in handling areas. Locate safety shower and eyewash station close to chemical handling area. Keep away from incompatibles, heat, sparks, flames and other ignition sources. Locate safety shower and eyewash station fairly close to chemical handling area.

Storage Requirements: Chlorine dioxide gas is not stored. Solutions can be stored in light-proof FRP, polypropylene or polyethylene tanks at concentrations below 8 g/L. These tanks should be provided with adequate air-sweep to ensure that explosive concentrations of chlorine dioxide do not build up.

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

PREVENTIVE MEASURES:

Recommendations listed in this section indicate the type of equipment which will provide protection against over exposure 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: Good ventilation should be provided, so that chlorine dioxide levels are maintained below the TLV at all times.

PERSONAL PROTECTIVE EQUIPMENT:

Protective Equipment: Use eye protection and impermeable gloves. Use of contact lenses should not be permitted when potentially exposed to this material. Persons in the vicinity of chlorine dioxide gas or solutions should carry a respirator suitable for escape purposes at all times, in case of accidental release of significant amounts of gas.

Eye Protection: Use full face-shield and chemical safety goggles when there is potential for contact. Maintain eye wash fountain and quick-drench facilities in work area.

Skin Protection: If contact with gas is possible, then use chemical protective gloves, coveralls, boots and/or other resistant protective clothing. Have a safety shower/eye-wash fountain readily available in the immediate work area. Some operations may require the use of a chemical protective full-body encapsulating suit and respiratory protection.

EXPOSURE GUIDELINES:

Chlorine Dioxide (100%)

ACGIH Time Weighted Average (TLV-TWA) : 0.1 ppm (0.3 mg/m³)
ACGIH Short Term Exposure Limit (STEL) 0.3 ppm (0.9 mg/m³)

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

State	Gas at normal temperatures. Normally used dissolved in aqueous solution in water
Alternate Name(s)	Chlorine Peroxide; "ClO ₂ "
Chemical Name	Chlorine Dioxide
Chemical Family	Inorganic Compound
Molecular Formula	ClO ₂
Molecular Weight	67.45
Appearance	Gas: Greenish-yellow; Solution: Pale to bright yellow
Odor	Similar to chlorine or ozone.
Odor Threshold	Characteristic smell very evident at 0.2 -1 ppm.

pH	Not applicable
Coefficient of Water/Oil Distribution	Not available
Vapor Pressure	Not applicable
Vapor Density (Air = 1)	2.4 (air = 1) (for 100% ClO ₂)
Boiling Point	11 °
Freezing Point	-59 °
Solubility (Water)	8 g/L @ 15 °C (practical limit for stable solution)
Bulk Density	Not applicable
Specific Gravity	Not applicable
Evaporation Rate	Not applicable

SECTION 10 – STABILITY AND REACTIVITY

Hazardous Decomposition Products: Chlorine (Cl₂), oxygen (O₂), and hydrochloric acid (HCl).

Chemical Stability: Chlorine dioxide is a reactive, unstable gas. At ClO₂ partial pressures above about 76 mm Hg (10 Vol%) in air it can decompose spontaneously with a corresponding pressure pulse or “puff” that may be more violent and explosive at higher ClO₂ partial pressures. At partial pressures above 190 mm Hg, explosion relief may be inadequate and rupture of the vessel may occur. These explosions can ignite combustible materials.

Incompatibility with other Substances: Chlorine dioxide is a powerful oxidizing agent that is incompatible with combustible materials, oxidizable organic vapors, hydrogen sulfide, or metallic dusts. Fire may occur.

Reactivity Conditions: Highly reactive on contact with incompatible materials and will decompose upon exposure to sunlight, ultraviolet light, or heat.

Hazardous Polymerization: Will not occur.

SECTION 11 – TOXICOLOGICAL INFORMATION

TOXICOLOGICAL DATA :

Product: Chlorine dioxide

LD₅₀	LC₅₀
292 mg/kg (rat, oral)	Not Available

Mutagenicity: No human data available.

Reproductive Effects: No human data available.

Teratogenicity and Fetotoxicity: No evidence

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicological Information: No data available.

Persistence and Degradation: No data available. No expected persistence.

SECTION 13 – DISPOSAL CONSIDERATIONS

Review federal, state and local government requirements prior to disposal.

WASTE CONTROL PROCEDURES: Contained plant-settling ponds or drains containing organic matter will normally provide an environment in which residual chlorine dioxide will be reduced to harmless compounds quickly.

Do not dispose of waste with normal garbage, or to sewer systems.

Whatever cannot be saved for recovery or recycling, including containers should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options.

RCRA: Test waste material for corrosivity, D002, prior to disposal.

SECTION 14 – TRANSPORT INFORMATION

	DOT
Shipping Name	Not Applicable - - shipment FORBIDDEN
Hazard Class/Division	-----
Identification No. Packing Group:	-----

SHIPPING INFORMATION: Chlorine dioxide may not be shipped as gas or solution.

SECTION 15 – REGULATORY INFORMATION

USA CLASSIFICATION:

Other Regulations/Legislation which apply to this product:
TSCA Status: Y

SARA Regulations sections 313 and 40 CFR 372:

CERCLA Section 103 (40CFR302.4): N
 SARA Section 302 (40CFR355.3): N
 SARA Section 304: (40CFR355.4): N
 SARA Section 313: (40CFR372.65): N
 OSHA Process Safety (29CFR1910.119): Y 1000 lbs TQ
 California Proposition: N

SARA Hazard categories:

Acute Hazard: Y
 Chronic Hazard: N
 Fire Hazard: Y
 Reactivity Hazard: Y
 Sudden Release Hazard: Y

Other Regulations/Legislation which apply to this product:

WHMIS CLASSIFICATION (S): C (Oxidizing Material)
 D1B (Toxic)
 E (Corrosive Material)
 F (Dangerously Reactive)

SECTION 16 – OTHER INFORMATION

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 PURELINE TREATMENT SYSTEMS will not be liable for any damages, losses, injuries or consequential damages that may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years.

**National Fire Protection Association (NFPA) Rating
 Hazardous Materials Identification System (HMIS) Rating**

	NFPA	HMIS
HEALTH	3	
FIRE	3	
REACTIVITY	3	

4 = Extreme/Severe
 3 = High/Serious
 2 = Moderate
 1 = Slight
 0 = Minimum
 W = Water Reactive

REFERENCES:

PREPARATION INFORMATION:

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PH:760-431-1200 or 949-285-1666

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Each recipient should carefully review the information, data and recommendations in the specific context of the intended use.