# Chlorine Dioxide
# Safety Data Sheet

## Section 1 – Chemical Product and Company Identification

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|---|---|
| Product Identifier: | Chlorine Dioxide 0.1% Aqueous Solution |
| Other Means of Identification: | Chlorine Oxide Solution |
| | Chlorine Peroxide Solution |
| Chemical Family: | Inorganic Compound |
| Formula: | $CLO_2$ |
| Molecular Weight: | 67.45 |
| Recommended Use: | Biocide, Sanitation |
| Company: | Valent Water Technologies, LLC |
| | 1351 Como Drive |
| | Manteca, CA 95337 |
| Emergency Phone Number | 707-766-0411 |

## Section 2 – Hazards Identification

| | |
|---|---|
| GHS Classification: | Skin Irritation: Category 3 |
| | Eye Irritation: Category 2B |
| | Acute Toxicity ï Inhalation: Category 4 |
| Signal Word: | Warning |
| Pictogram: |  |
| Hazard Statements: | Unlikely to cause eye irritation or injury.<br>Unlikely to cause skin irritation or injury<br>Harmful in inhaled |
| Precautionary Statements: | Wash exposed areas thoroughly after handling<br>Wear protective gloves.<br>Avoid breathing fume/gas/mist/vapors/spray.<br>Use only outdoors or in a well-ventilated area.<br>If on skin: Wash with plenty of water.<br>If skin irritation occurs: Get medical attention.<br>If in eyes: Rinse cautiously with water for several minutes. |

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| | Remove contact lenses, if present and easy to do. Continue rinsing.<br>If eye irritation persists: Get medical attention.<br>If inhaled: Remove person to fresh air and keep comfortable for breathing.<br>Call a doctor if you feel unwell.<br>Specific treatment (see First Aid Measures on this SDS).<br>Take off contaminated clothing and wash it before reuse. |
| Unclassified Hazards: | None |
| Ingredients With Unknown Toxicity: | None |

## Section 3 – Composition/Information on Ingredients

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|---|---|
| Hazardous component(s): | |
| Chemical name | Chlorine Dioxide |
| CAS # | 10049-04-4 |
| Molecular formula | ClO2 |
| Concentration | 0.1% (1,000 ppm) |
| Non-hazardous component(s): | |
| Chemical name | Water |
| CAS # | 7732-18-5 |
| Molecular formula | H2O |
| Concentration | > 99.9% (> 999,000 ppm) |

## Section 4 – First Aid Measures

**Eyes**

If symptoms develop, move patient away from the source of exposure and into fresh air. Flush eyes gently with large amounts of water while holding eyelids apart. If symptoms persist or there is any visual difficulty, seek medical attention.

**Skin**

Prolonged contact can be highly irritating to skin. Remove contaminated clothing immediately. Immediately flush exposed skin with large amounts of water. Wash thoroughly with mild soap. Consult a physician if irritation or burning persists. Contaminated clothing must be laundered before re-use. Lower concentrations (<1000) ppm may cause some irritation with very-prolonged exposure.

**Swallowing**

First aid is not normally required when small amounts of the material are ingested. If symptoms develop or if large amounts of material have been ingested, DO NOT induce vomiting. DO NOT give anything by mouth if the patient is unconscious. Drink large quantities of water. Consult a physician

immediately. Neutralization and use of activated charcoal are not recommended

**Inhalation**

If symptoms develop, immediately move individual away from exposure and into fresh air. Seek immediate medical attention; keep person warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen. Monitor the patient closely for delayed development of pulmonary edema, which may occur up to 72 hours after inhalation.

**Most Important Symptoms, Acute and Delayed**

May causes skin and eye irritation. Harmful if inhaled. Immediate Medical Attention Needed Call poison control center or doctor for treatment advice.

**Notes to Physicians**

Probable mucosal damage may contraindicate the use of gastric lavage.

## Section 5 – Fire-Fighting Measures

**NFPA Rating**

Health ï 1

Flammability ï 0

Reactivity ï 0

**Flash Point**

Not applicable

**Auto-ignition Temperature**

Not applicable

**Explosive Limit**

Chlorine dioxide solution is not explosive. Chlorine dioxide gas, which may evolve from chlorine dioxide solution, may spontaneously decompose with a mild energy release at concentrations of 10% in air or greater at standard temperature and pressure (i.e., 76 mm Hg partial pressure). Chlorine dioxide gas may explode with violent force at concentrations of 30% or greater in air at standard temperature and pressure (i.e., 228 mm Hg partial pressure).

**Hazardous Products of Combustion**

May form hydrochloric acid gas, oxygen on combustion or decomposition.

**Fire and Explosion Hazards**

There are no special fire hazards known to be associated with the material.

**Extinguishing Media**

Water

**Fire Fighting Instructions**

Wear a self-contained breathing apparatus (SCBA) with a full face piece operated in the ñpositive pressure demandò setting. Use SCBA in conjunction with appropriate chemically resistant personal protective gear. Refer also to the personal protective equipment section of this MSDS.

## Section 6 – Accidental Release Measures

### Personal Precautions, Protective Equipment, and Emergency Procedures

If run-off occurs, notify proper authorities of any runoff, as required. Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed.

### Methods and Materials for Containment and Cleaning Up

Large spills: Prevent runoff to sewers, streams, lakes or other bodies of water. Small spills: Absorb liquid on vermiculite, floor absorbent or other absorbent material. Flush area with water. Stop spill at source, dike area around spill to prevent spreading, and pump liquid to salvage tank. Remaining liquid may be taken up on sand, clay, earth, vermiculite, floor absorbent, or other absorbent material and shoveled into containers. Flush with water the area from which the bulk of the spill has been removed.

## Section 7 – Handling and Storage

### Handling

In order to prevent the evolution of chlorine dioxide gas into the breathing zones of workers, agitation of the material should be minimized, and the material should not be stirred, mixed turbulently, sprayed or splashed.

### Storage

The material should be stored indoors, only in the containers in which it is shipped, or in containers authorized by the manufacturer for such storage. Storage temperatures should be maintained above 50°F and below 110°F. The material should not be stored outside or exposed to direct sunlight or freezing temperatures (32°F or below). The material should not be heated to temperatures in excess of 140°F. At temperatures above 140°F, the gas concentration in the headspace of the container may reach high, energetically unstable concentrations.

## Section 8 – Exposure Controls / Personal Protection

The OSHA permissible exposure limit (PEL) for ClO2 gas in air is 0.1 ppm (0.3 mg/m3 ) as an 8-hour time weighted average. NIOSH recommended exposure limits (REL) and ACGIH threshold limit values (TLV) are also 0.1 ppm. NIOSH and ACGIH short-term exposure limits (STEL) are 0.3 ppm (0.83 mg/m3 ) for periods not to exceed 15 minutes. The STEL concentration should not be repeated more than 4 times per day and should be separated by intervals of at least 60 minutes.

### Exposure Guidelines (vapor)

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| OSHA PEL | 0.100 ppm ï TWA |
| ACGIH TLV | 0.100 ppm ï TWA |
| ACGIH TLV | 0.300 ppm - STEL |

### Eye Protection

Wear splash-proof face and eye protection (PVC is preferred) where chlorine dioxide solution may splash or spray. Safety glasses should be in compliance with OSHA regulations.

### Skin Protection

Wear waterproof protective clothing (PVC is preferred) where chlorine dioxide solution may splash or spray. Wear resistant gloves, such as Neoprene, to prevent skin contact, wear impervious clothing and boots. Other protective equipment: eyewash station, emergency shower.

### Respiratory Protection

Exposures in the workplace should be monitored to determine if worker exposure exceeds the facility-specified exposure "action level" or the use of the material produces adverse health effects or symptoms of exposure. Provide adequate ventilation to maintain all work areas at concentrations below 0.1 ppm chlorine dioxide concentration. If the generation of vapors or mists is possible, use local ventilation. Where gas concentration may exceed 0.1 ppm, only a NIOSH/MSHA approved full-face acid gas respirator should be used. Monitoring results must be used to assess the proper level or respiratory protection necessary. Proper engineering and/or administrative controls should be used to reduce worker exposure. The facility's respiratory protection program must meet the requirements established in 29 CFR 1910.134, which includes a program for medical evaluation. A NIOSH/MSHA approved self-contained breathing apparatus, with full face piece, is required for leaks and emergencies where the concentration may exceed 5 ppm.

### Engineering Controls

Provide sufficient mechanical ventilation-- general and/or local exhaust-- to maintain exposure below allowable limits.

## Section 9 – Physical and Chemical Properties

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|---|---|
| **Appearance and odor:** | Yellow-green liquid, with sharp, pungent odor |
| **Odor threshold of gas:** | 0.1 ppm |
| **pH:** | 3.0 or lower (depending on age and temperature) |
| **Freezing Point:** | 0o C (32o F) |
| **Boiling Point:** | 100o C (212o F) |
| **Flash Point:** | Not applicable |
| **Evaporation Rate:** | Not established |
| **Flammability:** | Not applicable |
| **Flammability Limits:** | Not established |
| **Vapor Pressure:** | Not established |
| **Vapor Density:** | Not established |
| **Liquid Specific Gravity:** | 1.0 at 0o C |
| **Solubility:** | Complete |
| **Auto-ignition Temperature:** | Not applicabile |
| **Decomposition Temperature:** | No data |
| **Viscosity** | 0.894 cP (centipoise) at 25 °C |

## Section 10 – Stability and Reactivity

### Reactivity

Material is not reactive under normal conditions of storage and use.

### Chemical Stability

The material, as solution, is stable in the dark. On exposure to light, the solution may decompose to an

aqueous solution of chloride and chlorate ions. In regard to vapor (gas) that may evolve from the material, see ñHazardous Decomposition Productsò below.

**Possibility of Hazardous Reactions**

Material does not undergo hazardous polymerization. Conditions to Avoid Storage temperatures should be maintained above 50°F and below 110°F. The material should not be heated to temperatures in excess of 140°F.

**Incompatible Materials**

Avoid exposure to light. Avoid contact with: metals, reducing agents, strong oxidizing agents, sulfur compounds or sulfur-containing components, carbon monoxide, excessive heat, mercury, organic materials, phosphorus.

**Hazardous Decomposition Products**

Gas-phase vapors that evolve from the material may decompose on exposure to light, on contact with incompatible materials (see below), or spontaneously at concentrations above 10% in air at standard temperature and pressure (76mm Hg). On decomposition, material may form: Chlorine, hydrochloric acid gas and oxygen.

## Section 11 – Toxicological Information

Chlorine dioxide gas is a mucous membrane and respiratory tract irritant. Primary routes of exposure include ingestion, skin and eye contact and inhalation of vapors which may evolve from the material.

**Target Organ Effects**

This material may cause mild eye irritation; it is unlikely to cause serious eye irritation or injury.

**Digestive Tract**

This material may cause nausea, vomiting and diarrhea; it is unlikely to cause serious digestive tract injury. Chlorine dioxide given daily in drinking water at 1-100 ppm caused a decrease in blood glutathione, altered the morphology of erythrocytes, and caused osmotic fragility in laboratory animals.

**Respiratory Tract**

The fumes from this material may cause respiratory tract irritation, wheezing and difficulty breathing. In extreme cases, it may cause pulmonary damage and death.

**Developmental/Reproductive Effects**

Available information is insufficient to assess risk to the fetus from maternal exposure to this material during pregnancy. Chlorine dioxide did not cause birth defects in laboratory animals even at very high exposure levels.

**Cancer Effects**

Available information is insufficient to assess cancer risk (i.e., carcinogenicity) associated with exposure to this material. This material is not listed as a carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or the Occupational Safety and Health Administration (OSHA) United States Environmental Protection Agency (EPA) or American Conference of Industrial Hygienists (ACGIH).

**Other Health Effects**

No data available on other possible health effects

## Section 12 – Ecological Information

No data available.

## Section 13 – Disposal Considerations

Disposal of this material should be in accordance with all applicable Federal, State and local rules, regulations and requirements.

## Section 14 – Transport Information

Transport of this material should be in accordance with all applicable Federal, State and local rules, regulations and requirements, including, without limitation, the rules and regulations of the US Department of Transportation, including all applicable packaging and labeling requirements

**DOT Material Name:** Chlorine Dioxide (not hydrate)

**DOT Hazard Class**: Forbidden

## Section 15 – Regulatory Information

**US Federal Regulations**

**EPA FIFRA Information**

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

CAUTION

Causes moderate eye irritation. Avoid contact with eyes, skin, or clothing. Harmful if swallowed, absorbed through the skin, or inhaled. Wash thoroughly with soap and water after handling, and before eating, drinking, chewing gum, using tobacco, or using the toilet.

**TSCA (Toxic Substances Control Act) Status - United States**

The intentional ingredients of this material are listed.

**CERCLA RQ- 40 CFR 302.4(a)**

None listed

**SARA 302 Components - 40 CFR 355 Appendix A**

None

**SARA 313 Components - 40 CFR 372.65**

| Section 313 Components | CAS Number Percent | (%) |
|---|---|---|
| Chlorine dioxide | 10049-04-4 | 0.1 |

( Note: the concentration is below the 1.0% de minimis value)

**OSHA Process Safety Management 29 CFR 1910**

| PSM Component(s) | Condition | TQ (lbs) |
|---|---|---|

| | |
|---|---|
| CHLORINE DIOXIDE | 1000 |

**EPA Accidental Release Prevention 40 CFR 68**

| PSM Component(s) | Condition | TQ (lbs) |
|---|---|---|
| CHLORINE DIOXIDE | Chlorine Oxide (ClO2) | 1000 |

Chlorine Oxide (ClO2)

**International Regulations**

Not determined

**State and Local Regulations**

California Proposition 65: None on list

**Section 16 – Other Information**

**NSF:** Certified to NSF/ANSI Standard 60 and Non-Food Compounds category codes G-5 and G-7. Maximum use rate for potable water ï 670 mg/liter.

The information set forth herein is believed to be accurate. However, NO WARRANTY IS GIVEN AS TO THE ACCURACY OF ANY OF THE INFORMATION, WHETHER ORIGINATED BY THE COMPANY OR BY OTHERS. Recipients of this SDS are advised to confirm, in advance of any need, that the information is current, applicable, and suitable to their circumstances.

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