

CT Disinfection Credits

Technical Information

The broad spectrum disinfection properties of chlorine dioxide deliver lower CT values under normal circumstances than traditional chlorine treatment. Chlorine dioxide offers utilities a simple solution to help a plant comply with United States Environmental Protection Agency (U.S. EPA) regulations and achieve primary disinfection requirements, without compromising regulatory compliance.

- Broad spectrum antimicrobial activity
- Effective over a wide pH range
- 2.6 times the oxidizing capacity of chlorine
- Does not chlorinate or form halogenated disinfection by-products (DBPs)
- Selective chemistry; no reaction with ammonia
- Easily implemented and fed to system
- Not temperature-sensitive
- Residuals easily analyzed
- Bacteria, protozoa, and virus inactivation
- Cost-effective alternative

The Surface Water Treatment Rule (SWTR), originally published in 1989, requires potable water utilities serving greater than 10,000 people to calculate CT values for the four EPA-approved disinfectants: ozone, chlorine dioxide, chlorine, and chloramines, to ensure a minimum inactivation of a particular pathogen in surface waters is achieved. CT is the product of disinfectant residual concentration “C” in mg/L and contact time “T” in minutes to achieve a 3 log reduction of *Giardia* and a 4 log reduction of viruses.

Regulations, such as the Stage One and Stage Two Disinfectant and Disinfection By-Product (DBP) Rules limiting trihalomethane (THM) and haloacetic acid (HAA) levels, have severely curtailed the use of traditional chlorine treatment, resulting in the need to re-evaluate disinfection treatment strategies.

Easy Solution

Traditional chlorine treatment limitations include lack of adequate retention time, elevated pH system water, and achieving CT compliance, which can result in elevated halogenated disinfection by-product problems. Chlorine dioxide has a lower CT value than chlorine (resulting in less detention time), is not pH sensitive at typical water production, and is not a halogen, when applied appropriately, so it won't chlorinate organics to form THMs or HAAs. Chlorine dioxide is a viable alternative to traditional chlorine treatment for systems that are struggling to balance the CT compliance under the SWTR versus the disinfection by-product of the Stage One and Two DBP Rules.

Versatile Disinfectant

Chlorine dioxide is a versatile disinfectant that can be used as a primary disinfectant in potable water, as it reduces or controls bacteria, viruses, cysts, and algae, while being effective over wide temperature and pH ranges, under normal conditions or some type of similar hedge. Using chlorine dioxide will help optimize overall treatment efficiencies, including improved coagulation, reduced turbidities, improved particulate removals, increased CT values, and lower THM and HAA levels.

Chlorine dioxide, when used as a primary disinfectant in potable water treatment, is a powerful oxidant with CT values second only to ozone in biocidal efficacy, but normally without the high capital expenditures or ozonation by-products. Using chlorine dioxide minimizes the formation of chlorinated or brominated disinfection by-products, such as THMs or HAAs. A reduction by-product of chlorine dioxide is chlorite ion, which is regulated under the Stage One and Stage Two DBP Rules at 1.0 mg/L maximum contaminant level (MCL). At typical dosage rates, chlorine dioxide can be used successfully to achieve CT compliance, without exceeding the MCL.



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Low Capital/Easily Implemented

Chlorine dioxide cannot be compressed and shipped in a container and must be generated on-site. An ADOX™ on-site generator produces chlorine dioxide solution under vacuum and delivers the solution to the point of application. Chlorine dioxide is fed similarly to existing chlorine disinfection treatment systems, often using the existing feed piping.

The ADOX™ generators use ERCOPure™ BCD sodium chlorite as the precursor solution to chlorine dioxide, which is available from International Dioxide. There are numerous types of affordable generators that can be deployed to meet your treatment needs.

Additional Uses

Chlorine dioxide's broad spectrum capabilities enable it to be used in a variety of potable water applications:

- o Iron and Manganese Control
- o Color and Algae Control
- o Taste and Odor Control
- o Cryptosporidium Control
- o THM and HAA Control
- o Nitrification Control
- o Zebra Mussel Control

Approvals

The use of chlorine dioxide is approved by the U.S. EPA's Office of Ground Water and Drinking Water. The ERCOPure™BCD sodium chlorite precursor solutions carry U.S. EPA registrations and are ANSI/NSF Standard 60 Drinking Water Additive certified.

Information Available

International Dioxide, a division of ERCO Worldwide, has specialized in chlorine dioxide technologies for over 70 years, and is a leading supplier of sodium chlorite solutions and generator technology for a wide variety of markets. For additional information please contact the sales office at 1-800-477-6071 or online at idiclo2.com.

CT Values in Water at 10C (50F), pH 6-9, and 1 mg/L dose

Disinfectant	Viruses 4-log (99.99%)	*Giardia 3-log (99.9%)	pH Efficacy
Ozone	1.0	1.43	Little influence
ClO ₂	25.1	23	Efficacy slightly increases with pH
Chlorine	6	104	Efficacy decreases considerably with the increase of pH
Chloramines	1491	1850	Little influence

Guidance Manual for Filtration and Disinfection Compliance Requirements, Appendix E (U.S. EPA, 2003, edition) * Data point is at pH 7

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International Dioxide™

AN ERCO WORLDWIDE COMPANY
International Dioxide

40 Whitecap Drive
North Kingstown, RI 02852
1-800-477-6071

idiclo2.com

International Dioxide, Inc.
FF 000XX



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