

History of ClO₂ with EPA:

1967 - EPA registered liquid ClO₂ use as a disinfectant and sanitizer.

1988 - EPA registered gas ClO₂ as a sterilant.

1995 - 5.1% of the water treatment facilities serving more than 100,000 people in the United States reported that chlorine dioxide was used.

Chlorine dioxide is used as a drinking water disinfectant and readily form chlorite (ClO₂) in aqueous environments. (p.70) "Toxicological Profile for Chlorine Dioxide"

https://pubchem.ncbi.nlm.nih.gov/compound/chlorine_dioxide#section=Top

According to EPA, chlorine dioxide is used "in public water-treatment facilities, to make water safe for drinking." When chlorine dioxide is added to drinking water, it helps destroy bacteria, viruses and some types of parasites that can make people sick, such as *Cryptosporidium parvum* and *Giardia lamblia*.

<https://iaspub.epa.gov/tdb/pages/treatment/treatmentOverview.do?treatmentProcessId=-1277754943>

In hospitals and other healthcare environments, chlorine dioxide gas helps to sterilize medical and laboratory equipment, surfaces, rooms and tools. Researchers have found that at appropriate concentrations, chlorine dioxide is both safe and effective at helping to eliminate *Legionella* bacteria in hospital environments. *Legionella pneumophila* bacteria can cause Legionnaires' disease, a potentially deadly type of pneumonia

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3717754/>

Usage/Disposal of ClO₂ with CDC:

USE:

..... Since chlorine dioxide functions via an oxidative reaction rather than a chlorinating reaction, the formation of chlorinated organic compounds is limited. Also, unlike other oxidizing agents, chlorine dioxide does not attack cellulose.....

..... In industrial and municipal waste-water treatment, chlorine dioxide is more effective than chlorine as a biocide over a wide pH range. It is also less corrosive and more compatible with some construction materials. Some municipal water systems use chlorine dioxide to eliminate taste and odor problems from drinking waters (EPA 2002c; Kaczur and Cawfield 1993; Vogt et al. 1986). The advantage of using chlorine dioxide, rather than chlorine or ozone, is that chlorine dioxide does not react with organic matter to form trihalomethanes (THMs); it also does not transform bromide into hypobromite (OBr), which could react with organic matter to form bromoform (CHBr₃) or bromate (BrO₃⁻) (Aieta and Berg 1986; Stevens 1982; WHO 2000). As part of the EPA Information Collection Rule (ICR), 5.1% of the water treatment facilities serving more than 100,000 people in the United States reported that chlorine dioxide was used in 1995 (Hoehn et al. 2000).....

..... Chlorine dioxide has been recognized for its disinfectant properties since the early 1900s. Chlorine dioxide kills microorganisms by disrupting the transport of nutrients across the cell wall. In 1967, EPA first registered the liquid form of chlorine dioxide for use as a disinfectant and sanitizer. Liquid formulations are used as disinfectants in a variety of applications (e.g., on pets and farm animals; in bottling plants; and in food processing [fruit and vegetable washing, meat and poultry disinfection, disinfection of food processing equipment], handling, and storage plants). In industrial processes, chlorine dioxide is used as a disinfectant in water treatment (cooling systems/towers), ammonia plants, pulp mills (slime control, paper machines), oil fields, scrubbing systems, odor-control systems, and the electronics industry. In 1988, EPA registered chlorine dioxide gas as a sterilant. Chlorine dioxide gas is registered for sterilizing manufacturing and laboratory equipment, environmental surfaces, tools, and clean rooms. (EPA 2002c; Kaczur and Cawfield 1993; Vogt et al. 1986).

DISPOSAL:

Chlorine dioxide is a strong oxidizer and will not persist in the open environment for long periods. At concentrations >10%, chlorine dioxide is easily detonated by sunlight (O'Neil et al. 2001). It can remain for short periods of time in clean distribution systems (Kaczur and Cawfield 1993; NRC 1980; Vogt et al. 1986).....

<https://www.atsdr.cdc.gov/toxprofiles/tp160-c5.pdf>

FDA Guideline for ClO₂ usage:

Chlorine dioxide (CAS Reg. No. 10049-04-4) may be safely used in food....

The additive may be used as an antimicrobial agent in water used in poultry processing....

<https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=173.300>

WHO Guidelines for ClO₂ usage:

1.4 Major uses and sources in drinking-water

Chlorine dioxide is used as a disinfectant and for odour and taste control in water and in food sanitation. Dosages for taste and odour reduction or disinfection may be in the range of 0.07– 2 mg/L. Example concentration × time (CT) disinfection values at 20 °C for 2 log and 4 log virus reductions are 2 and 12.5, respectively; and for Giardia, 10 and 15, respectively (USEPA, 1999 a). Acidified sodium chlorite (ASC) is also used in food sanitation.

https://www.who.int/water_sanitation_health/water-quality/guidelines/chemicals/chlorine-dioxide-chlorite-chlorate-background-jan17.pdf