

# ECOSYS

## CHLORINE DIOXIDE

internationally recognized safety,  
efficient, rapid and broad-spectrum  
sanitizer

## HISTORY & REFERENCE

Time	State	Approved Bureau	Usage Range
1982	–	WHO	Drinking Water Disinfection
1985	U.S.A	FDA	Food Processing Equipment Sterilization
1985	EU	European Commission	Drinking water disinfection, food industry, medical, livestock husbandry, aquaculture, environment and public areas disinfection and sterilization
1987	Germany	–	Drinking Water Disinfection
1987	UK	Ministry of Health	Drinking water disinfection, hospital, livestock aquaculture, environment and public areas disinfection and sterilization
1987	U.S.A	EPA	Food processing plants, breweries, restaurants, environmental disinfection; Hospitals, labs and non-empty rigid surface equipment sterilization and removal mildew
1989	U.S.A	EPA	Storage water disinfection; livestock, disinfection and deodorizing
1988	Japan	Ministry of Food Health	Drinking water disinfection
1987	Australia	Ministry of Health	No. 926 food Additives, food Bleacher
1987	China	Ministry of Health	Food industry, medical, pharmaceutical, livestock husbandry, aquaculture, environment and public areas disinfection and sterilization
1996	China	Ministry of Health	Food additives, fruits and vegetables Preservation
2002	U.S.A	FDA	Food processing equipment, pipe, crafts and arts equipment, especially in milk processing plant
2005	China	Ministry of Health	Drinking Water Disinfection



# SPECTRUM OF CHLORINE DIOXIDE

- **Bakteri:**

*Bacillus cereus, Bacillus circulans, Bacillus subtilis, Bifidobacterium animalis, Campylobacter jejuni, Clostridium difficile, Clostridium perfringens, Corynebacterium parvum, Enterobacter cloacae, Enterobacter hafnia, Eschericia coli, E. coli O157:H7, Flavobacterium sp., Fusobacterium nucleatum, Klebsiella pneumonia, Listeria monocytogenes, methicillin-resistance Staphylococcus aureus (MRSA), Mycobacterium bovis (TB), Mycobacterium smegmatis, Mycobacterium kansasii, Pseudomonas aeruginosa, Pseudomonas sp., Salmonella choleraesuis, Salmonella enteridis, Salmonella typhi, Salmonella typhimurium, Salmonella typhosa, Sarcina lutea, Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus faecalis, Streptococcus pyogenes, Yersinia enterocolitica, vancomycin-resistance Enterococcus faecalis (VRE), etc.*

- **Virus:**

*Adenovirus, Bluetongue virus, Canine Parvovirus, Coxsackievirus, Corona virus, Encephalomyocarditis (EMS), Echovirus, Feline calicivirus, Feline parvovirus, Hepatitis A virus, Herpes virus I, Herpes virus II, Human Immunodeficiency Virus Type 1 (HIV-1), Influenza-A virus, Iridovirus, Mouse virus, Mouse hepatitis virus, Minute virus of Mice (MVM), Mouse encephalomyelitis virus, Mouse polio virus (MEV), Newcastle disease virus, Norovirus, Parainfluenza, Pertiviries - Togaviridae, Poliovirus-1, Rotavirus, Rhinovirus type 37, Vaccinia virus, Vesicular stomatitis virus, etc.*

- **Fungus:**

*Aspergillus flavus, Aspergillus niger, Candida albicans, Fonsecaea pedrosoi, Fusarium sp., Mucor sp., Scopulariosis sp., Trichophyton rubrum, Trichophyton mentagrophytes, Sachromyces cerevisiae, etc.*



# THE CLO<sub>2</sub> COMPARES WITH OTHER DISINFECTANT

<i>Characters</i>	<i>CLO<sub>2</sub></i>	<i>Chlor-hexidine</i>	<i>Chlorine / Hypochlorite</i>	<i>Phenol</i>	<i>Aldehyde</i>	<i>NaOH</i>	<i>Alcohol</i>
Resistance to Organic	Good	Ordinary	Poor	General	Good	Good	General
Activity in Hard-water	Yes	Yes	Yes	No	Yes	Yes	Yes
Affect High Temperature	Result is best in 26-60°C	No	Activity decreased below 43°C	Activity increased	Result is best in 26-60°C	No	No
pH Range	No effect	Alkaline	Acidic	Acidic	No effect	Alkaline	No effect
Anion Soap Compatibility	No	Yes	No	Yes	Yes	Yes	No
Activity of Residue	No	Yes	No	Yes	No	Yes	No
Toxicity or Discomfort	No	No	Yes	Yes	Yes	Yes	Yes
Damage to Surface	No	No	Yes	No	Yes	Yes	No
Kill the Bacteria	Most	Part	Most	Most	Yes	Most	Most
Kill the Spores	Yes	Part	Part	No	Yes	Yes	No
Kill the Viruses	Yes	No	Part	Part	Yes	Yes	Part



## ADVANTAGES THAT CHLORINE DIOXIDE TREATMENTS HAVE OVER CHLORINE BASED SYSTEMS

CHLORINE	CHLORINE DIOXIDE
Does not remove biofilm	Will remove biofilm and thus clean tanks and pipes
Produces unwanted by-products including carcinogen	Does not form chlorinated by-products
Is corrosive and unpleasant to handle	Is much less corrosive than chlorine. Does not hydrolyse to form an acid
Already Banned in certain parts of Europe and the USA	Is rapidly replacing chlorine in many of these areas
Is pH dependent and very ineffective above pH 7	Is not pH dependent (<pH 11)
Is ineffective against complex organisms (e.g: Cysts & Protozoa)	A very broad spectrum kill
Limited oxidative effect against various chemical contaminants. Forms chlorinated phenols	Destroys phenols (without forming chlorinated phenols) specific destruction of Hydrogen Sulphides. Destruction of a wide range of chemical contaminants
Neutralisation required before dumping to the foul drain	Because no unwanted by-products are formed, and will have a lower residual after use, no neutralization normally required
Can not be used at temperatures above 40°C due to the release of chlorine gas	Effective at higher temperatures-does not disassociate as rapidly as chlorine
Increased disinfection time and more service work required to combat high bug counts	Cost savings in labour and use efficiency outweighs the additional chemical costs



## Result of water treatment by ClO<sub>2</sub> (1 ppm):

No.	Item	Unit	Standard	Before treat	After treat
1	chroma		≤15	20	<5
2	turbidity		≤5	6.5	0.29
3	PH		6.5-8.5	6.96	6.79
4	Fe	mg/L	≤0.3	0.45	<0.05
5	Mn	mg/L	≤0.1	0.15	<0.07
6	As	mg/L	≤0.01	0.001	<0.001
7	Cd	mg/L	≤0.005	0.0002	<0.0002
8	Cr	mg/L	≤0.05	0.001	<0.001
9	Pb	mg/L	≤0.01	0.0002	<0.0002
10	Hg	mg/L	≤0.001	0.0001	<0.0001
Total metal		mg/L	≤0.076	0.0025	<0.0027