

# WATER TREATMENT CHEMICALS



Chemical	Active Ingredient	Brand/Common Name	Soluble	Injection Method	How They Work	Function	Concentration	Notes
Chlorine Gas	Cl <sub>2</sub>	N/A	Yes	Gas mixes with water to form hypochlorous acid (HOCl) and hydrochloric acid (HCl)	"These oxidizing agents interact with reactive chemical groups on organic matter, causing change to the chemical structure of the organic matter, and death of the pathogen. The oxidizing agent itself is also "seed up" during this process. The concentration of oxidizers will vary as plant pathogens vary in their susceptibility. These oxidizers can affect pathogens, pest, and fertilizer salts. Because all organic matter in the water will absorb and deplete oxidizers, good pre-filtration is essential."	Descalant, Biocide	0.5-2 ppm free chlorine is safe for use with plants.	Hazardous gas requires special handling and equipment
Sodium Hypochlorite	NaOCl	Liquid Bleach	Yes	Liquid solutions are directly injected in water		Descalant, Biocide		Sodium salt of hypochlorous acid
Calcium Hypochlorite	Ca(OCl) <sub>2</sub>	Powdered Bleach	Yes	Granules can be dissolved and injected in water, or applied through a specialized feeder for automatic chlorination.		Descalant, Biocide		Often used as pool cleaner
Ozone	O <sub>3</sub>	N/A	No	Ozone is produced from bottled or atmospheric ozone, then injected into water.		Biocide	Residual effect is from reaction products such as peroxides. 10 g/h/ m <sup>3</sup>	Requires professional design and installation
Hydrogen Peroxide	H <sub>2</sub> O <sub>2</sub> (33-35%)	Food grade hydrogen peroxide	Yes	Directly injected into water		Biocide	1-3 mL/gal with plants. 8 mL/gal to disinfect system	Can be hazardous, requires special handling
Activated Peroxygen	Hydrogen dioxide/ peroxide (H <sub>2</sub> O <sub>2</sub> ) and peroxyacetic acid/ peracetic acid (CH <sub>3</sub> COO-OH)	Zero Tol, SaniDate	Yes	Stabilized solution of H <sub>2</sub> O <sub>2</sub> and peracetic/ peroxyacetic acid is directly injected.		Biocide	27 - 540 ppm H <sub>2</sub> O <sub>2</sub>	Peroxyacetic acid is a more effective biocide than H <sub>2</sub> O <sub>2</sub> alone.
Chlorine Dioxide	ClO <sub>2</sub>	Ultra-Shield, Selectroocide	Yes	Dry product is dissolved in water, injected from stock solution.		Biocide	Continuous injection: 0.25 ppm	Stock solution should be used within 15 days.
Ultraviolet (UV) Radiation	N/A	N/A	N/A	Water is exposed to high levels of UV light.	UV radiation with wavelengths at 180-320 nm will kill or disrupt the DNA of pathogens, with 265 nm being optimum.	Biocide	250 mJ/cm <sup>2</sup> will kill most pathogens.	Often used as low pressure mercury vapor lamps, which require bulb changes to maintain efficacy. Can combine with other agents for a residual effect.
Copper Ionization	Cu <sup>++</sup>	N/A	N/A	Electrical charge passes through copper plates, releasing copper ions into water.	Copper ions are toxic to most pathogens	Biocide	0.5 - 1 ppm for pathogens 1-2 ppm for algae and biofilm	Water pH must be below 7.5

Adapted from: Fisher, P. (Ed.) (2009). *Water Treatment for Pathogens and Algae*. Water Education Alliance for Horticulture.