Electrolytic Bromine

A Cost Effective, Non-Hazardous Biocide for Cooling Water Systems

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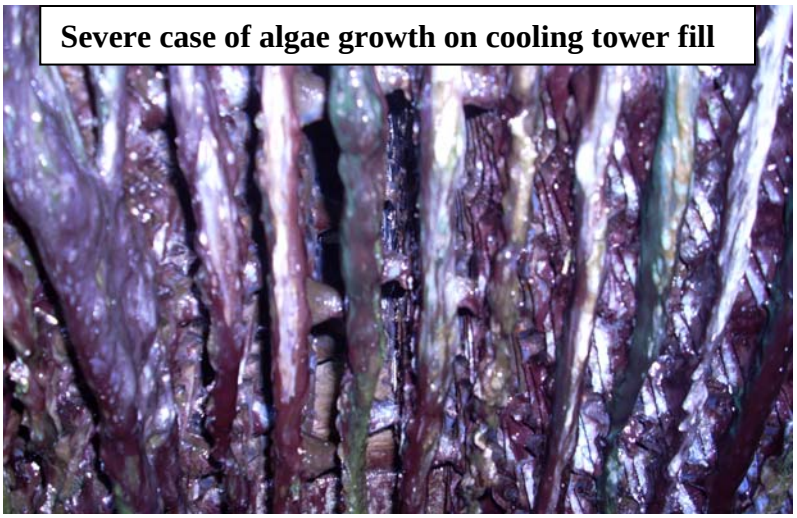

Severe case of algae growth on cooling tower fill

Electrolytic bromine is an oxidizing biocide, which is acknowledged to be the most effective type against Legionnaires' Disease by AWT, OSHA, CTI, and CDC. It is also very effective against biofilm, other bacteria, algae, slime, fungus, and mold typically found in a cooling water system.

In marked contrast to other biocides, electrolytic bromine precursor is not DOT or OSHA hazardous, eliminating safety problems and spill concerns from handling toxic, hazardous chemicals. The precursor for electrolytic bromine is a safe, aqueous solution of sodium bromide and sodium chloride (table salt). A **"green chemistry",** after use, electrolytic bromine degrades back to non-toxic, naturally occurring bromide ion, no persistent toxic chemicals in the cooling tower blowdown.

Electrolytic bromine is a single, cost effective replacement product for all biocides presently used for biological control of cooling water. To demonstrate this, we have taken a 1000 ton (15,000 gal volume) thermal load cooling tower system and compared a typical biocide program as recommended by GE Water Systems and compared it to an electrolytic bromine program based on use of a MiniBrom MB-5 unit.

GE Water Systems Program
Spectrus NX 112 (45% glutaraldehyde) dosed at 100 mg/l three times per week
OX 909 (stabilized bromine) dosed at 50 mg/l daily
annual biocide chemical cost = $12,984

PCT Electrolytic Bromine Program
PCT 3024 precursor dosed to provide 7 mg/l bromine daily
1 - set of replacement electrodes per year
annual chemical and electrode cost = $4,995

annual cost reduction = $7,989

Please note that we typically dose electrolytic bromine three times a week, not daily, so in an actual operating system the electrolytic bromine cost will be substantially lower than shown. A daily dose of bromine was assumed to match the GE Water Systems program.

With a MiniBrom MB-5 unit list price of $3,077 and the annual cost reduction of $7,989, **a MiniBrom 5 installation will pay for itself in less than 5 months.**

ProChemTech has developed low cost electrolytic bromine delivery technology, the patented* MiniBrom tm units, which make use of electrolytic bromine economic for any size of cooling water system. MiniBrom units are designed to be a "drop-in" replacement for existing biocide delivery systems and can be controlled by existing biocide dose timers or chemical feed controllers.

MiniBrom Model 2.5 Unit

MiniBrom Unit Specifications

Model	Output as Br lb/hr	Amp Output	Power use kw-hr	3024 use lb/hr	3023 use lb/hr	diluted solution use gal/hr	number of cell plates
MB 2.5	0.10	25	0.15	1.0	0.43	2.3	2
MB 5	0.21	30	0.36	2.0	0.86	4.5	3

MiniBrom options: - rack mounted on dilution tank
- mixer mounted on dilution drum, 110 vac, 1/20 hp
- dose control timer
- automatic makedown systems
- unit mounted on double containment chemical feed station

Unit dimensions: power supply – 13" X 15" H X 6.25" D
electrolytic cell – 12" X 12" X 7" D

ProChemTech International, Inc.
"Innovation in Water Management"
Apache Junction, AZ, and Brockway, PA
814-265-0959 www.prochemtech.com

* US patent 7,927,470
PCT 3023 - solid salt mix, PCT 3024 - liquid salt solution, both products USEPA registered, only one product is required for MiniBrom operation