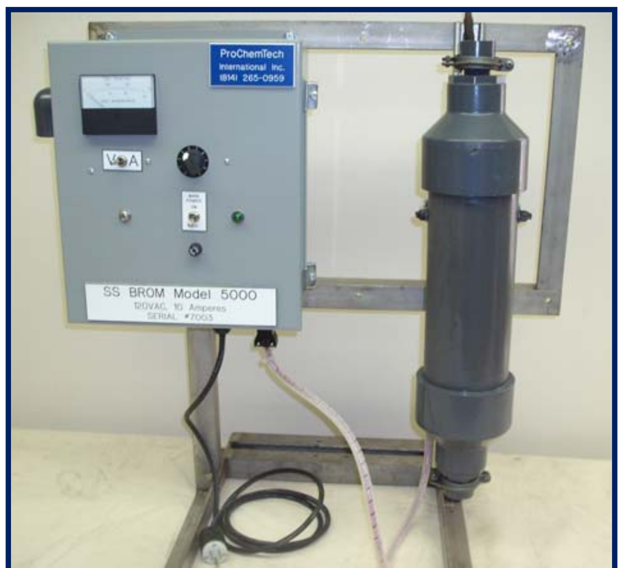
ProChemTech SSBrom tm
The Green Biocide for Cooling Towers

Biocides are **toxic chemicals** dosed to cooling tower systems to control the growth of various organisms such as algae, fungi, mold, and bacteria; including such pathogenic organisms as Legionnaires' Disease. To kill these varied organisms, biocides must be dangerous toxic chemicals, which presents a problem for firms wishing to "go green", or obtain USGBC LEED certification points, on operation of their cooling tower system.

ProChemTech developed the **SSBrom** as a safe, cost effective means for making aqueous electrolytic bromine from the bromide ions in the cooling water to control microorganisms in cooling tower systems. Shown is a frame mounted **SSBrom** power supply and the patent pending graphite electrolytic cell assembly that makes up a basic "drop in" **SSBrom.** The only limitation on the technology is that a SofTek tm [1] water management program with a minimum cooling water conductivity of 4000 mmhos be in use.



The definition of what technology can be considered green is oftentimes a confusing issue with claims made that this or that gadget or product is "green" and should be purchased to solve all types of environmental problems. The best metric for determining if a particular technology is "green" is to compare it to the Twelve Principals of Green Chemistry as discussed in the book "Green Chemistry: Theory and Practice" [2].

Comparing the Twelve Principals of Green Chemistry with **SSBrom** technology, we find the following:

1. Prevent waste rather than treating it or cleaning it up.
The SSBrom makes an effective biocide on-site as needed from components present in the cooling water with no added chemicals or waste products.

2. Incorporate all materials used in the manufacturing process in the final product.
The bromide to electrolytic bromine conversion is very effective with no excess materials for disposal.

3. Use synthetic methods that generate substances with little or no toxicity to people or the environment.
Following generation, electrolytic bromine rapidly converts back to harmless bromide ion with destruction of the targeted biological growth or passage of a few hours.

4. Design chemical products to be effective, but reduce toxicity.
Electrolytic bromine is a very effective biocide which rapidly reverts to non-toxic bromide ion.

5. Phase out solvents and auxiliary substances when possible.
No solvents or auxiliary substances are used in the production or use of electrolytic bromine produced by the SSBrom technology.

6. Use energy efficient processes, at ambient temperature and pressure, to reduce costs and environmental impacts.
The SSBrom process operates at ambient temperature and pressure.

7. Use renewable raw materials for feedstocks.
Bromide ion, found in sea water at 65 mg/l, is an infinite resource that recycles.

8. Reuse chemical intermediates and blocking agents to reduce or eliminate waste.
No other chemicals are used in the SSBrom technology.

9. Select catalysts that carry out a single reaction many times instead of less efficient reagents.
SSBrom technology is electrochemical, no catalysts are used.

10. Use chemicals that readily break down into innocuous substances in the environment.
The electrolytic bromine produced by the SSBrom readily converts back to harmless bromide ion, naturally present in sea water at 65 mg/l.

11. Develop better analytical techniques for real time monitoring to reduce hazardous substances.
Generation of electrolytic bromine by the SSBrom can be controlled in real time by current on-line colorimetric, ion selective electrode, and ORP methods, minimizing production of excess product.

12. Use chemicals with low risk for accidents, explosions, and fires.
Aqueous bromide ion, the raw material, presents no hazard of accident, explosion, or fire. The small amount of hydrogen gas produced in the electrolysis reaction is harmlessly vented via the cooling tower air stream.

Based on this point by point comparison, it is evident that **SSBrom** technology is the only effective microorganism control technology that satisfies all the criteria of the Twelve Principals of Green Chemistry while providing cost effective biological control of cooling tower water.

Real Green Advantages

- Electrolytic bromine degrades back to harmless bromide ion, no toxic chemical residue in the cooling tower blowdown.
- Electrolytic bromine is produced within a sidestream of the cooling water only when desired, no risk of accidental spills of any chemicals during transport, in inventory, or during use.
- USEPA registered, **SSBrom** units are produced in USEPA registered facilities, USEPA #58616-PA-1 and 58616-AZ-1.
- **SSBrom** halogen chemistry is effective against Legionella bacteria.
- **SofTek water management programs using the SSBrom for microbiological control have only one chemical feed, the scale/corrosion inhibitor!**
- The **SSBrom** Model 5000 can be used on systems from 100 to 100,000 gallons water volume.

Product Specifications:

Power Supply - standard plug 110 vac input, fan cooled solid state construction, DC 10 amp output at a maximum voltage of 48 volts adjustable between 20% and 100%, amp and volt meter, fused on primary and secondary, NEC construction with UL approved components housed in a NEMA 12 13"W x 15" H x 6.25' D steel panel box. Unit equipped with automatic timed polarity reversal, on-off power switch with indicator, and voltage adjustment potentiometer. Maximum input power is 700 watts.

Electrolytic Cell- Housing constructed of Schedule 80 PVC, 4" diameter x 21.5" length, a multipolar electrode assembly with seven 2" x 14" high density isostatic graphite electrodes.

Electrolytic Bromine Production - 2,000 grams as bromine/24 hours

Cell Inlet/ Outlet - one (1) inch FNPT

Recommended Cell Flow - minimum of 5 gpm

ProChemTech International, Inc.

"Innovation in Water Management"

Apache Junction, AZ, and Brockway, PA

www.prochemtech.com **814-265-0959**

[1] US patent 7,595,000, Operation of Cooling Towers with Minimal or No Blowdown

[2] Anastas and Warner, "Green Chemistry: Theory and Practice", Oxford University Press, NY, NY, 1998