

The Science Behind the Product: How the **SSBrom™** Green Biocide Device Works

MB0411



ProChemTech developed and patented* the **SSBrom** as a safe, cost effective means for making aqueous electrolytic bromine, from the bromide ions in cycled cooling water for control of microorganisms in cooling tower systems. Shown in the picture is a frame mounted **SSBrom** power supply and graphite electrolytic cell assembly that makes up a basic “drop in” **SSBrom**. The only limitation on the technology is that a patented* SofTek™ (soft makeup water) water management program with a minimum cooling water conductivity of 4000 mmhos be in use.

A side stream of cooling water, which has been cycled in a cooling tower to a minimum conductivity level of 4,000 mmhos, will carry a direct electrical current of ten (10) amperes across the graphite electrodes in the electrolytic cell assembly. When this electrical current passes through the cooling water, an electrochemical reaction changes the naturally present bromide and chloride ions in the cooling water into chlorine and bromine. As the chloride ions are always present at a much higher level than the bromide ions, a subsequent reaction occurs where the chlorine changes any remaining bromide ions into bromine, which is the preferred end product. Some of this produced bromine further reacts with the cooling water to form hypobromous acid and hypobromite, also effective biocides. This mixture of bromine, hypobromous acid, and hypobromite is referred to as “electrolytic bromine”.

bromide ion + direct electrical current = bromine

chloride ion + direct electrical current = chlorine

bromide ion + chlorine = bromine + chloride ion

bromine + water = hypobromous acid and hypobromite

bromine + hypobromous acid + hypobromite = electrolytic bromine

A minimum cooling water flow through the electrolytic cell of 5 gpm is required to prevent overheating. At 5 gpm and the minimum device output of 1300 grams bromine per day, the electrolytic cell discharge will have an approximate electrolytic bromine content of 48 mg/l.

Why is this technology “Green?”

- Electrolytic bromine **totally eliminates use of toxic chemical biocides** for control of microorganism growth in cooling towers. The risks associated with toxic chemical biocides during manufacture, transport, storage, use, and blowdown discharge is eliminated.
- Electrolytic bromine is produced within a sidestream of the cooling water only when desired, no risk of accidental spills of any toxic chemical biocides during transport, in inventory, or during use.
- Electrolytic bromine degrades back to harmless bromide ion, no toxic chemical residue in the cooling tower blowdown. Bromide ion is found naturally in sea water at 65 mg/l.
- Resources are conserved as the process uses only a minimal amount of electricity, about 500 watts, during operation. No manufacturing or transportation related carbon footprints as the device has no chemical inputs.
- 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! Again, manufacturing and transportation carbon footprints are minimized.
- The **SSBrom** can be used on systems from 100 to 100,000 gallons water volume.
- SofTek water management programs operate at 8 to 10 cycles of concentration, **minimal fresh makeup water use and subsequent blowdown wasted to sewer.**

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*SSBrom patent 7,927,470, SofTek patent 7,595,000.