



MIOX Controls Legionella

MIOX's Mixed Oxidant Solution is More Effective at Removing Biofilm and Legionella from Water

MOS Shows Increased Efficacy against Legionella vs. Common Biocides

MIOX has performed comparative disinfection studies using 3 oxidizing biocides and 3 commonly used non-oxidizing biocides against *Legionella pneumophila*. The organism *Legionella pneumophila* is known to be pathogenic and commonly formed within biofilms. For the efficacy comparison study, model cooling tower waters were used and evaluated at pH 7.0 and 8.5. Because some non-oxidizing biocides take more time to act, a time course up to 18 hours was chosen with samples collected for microbial analysis at 0.5 h, 1 h, 4 h and 18 h.

Figure 1 shows the results at pH 8.5 against Legionella, a pathogen which likes to associate with biofilms. MOS provided better disinfection (>5.5 log inactivation) compared to the other biocides and validated field data whereby bromine chemistry and non-oxidizing biocides are easily replaced with MOS chemistry. Hypochlorite (bleach only) achieved a 4 log inactivation and bromine showed 4 log initially and then decreased in efficacy over time.

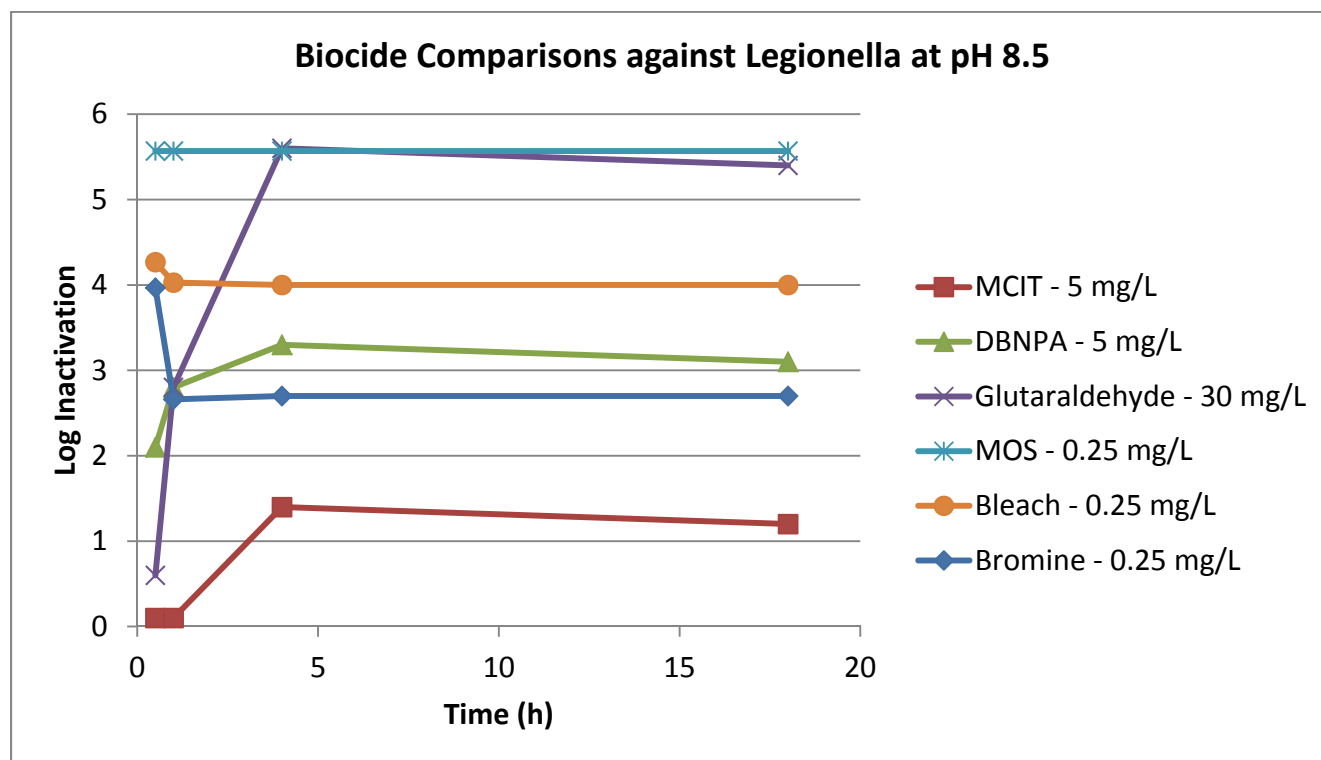


Figure 1: Biocide comparison study demonstrates MOS superiority. *Legionella pneumophila* (ATCC 33152) exposed to 0.25 mg/L MOS, bleach or bromine, 5 mg/L MCIT, 5 mg/L DBNPA and 20 mg/L Glutaraldehyde at pH 8.5. Exposure times were 0.5 h, 1 h, 4 h and 18 h. MCIT = Methylchloroisothiazolinone; DBNPA = 2,2-dibromo-3-nitropropionamide; MOS = Mixed Oxidant Solution; Bleach = delivered hypochlorite; Bromine = Activated sodium bromide. Similar results showing MOS performance is superior to hypochlorite have been achieved during 3rd party testing and in the field.



MOS Shows Increased Biofilm Removal over other Biocides, especially at high pH

There have been two published studies comparing MOS with hypochlorite at various pH values. MOS consistently performs better at higher pH against a variety of organisms, including viruses, oocysts and bacteria. Studies conducted at the University of New Mexico comparing equivalent chlorine concentrations of hypochlorite to MOS showed that after 10 minutes of exposure at a pH of 8.0, MOS achieved total kill against *L. pneumophila* and *P. pseudomonas* while chlorine alone did not. **Figure 2** shows no growth with MOS compared with hypochlorite and the control.

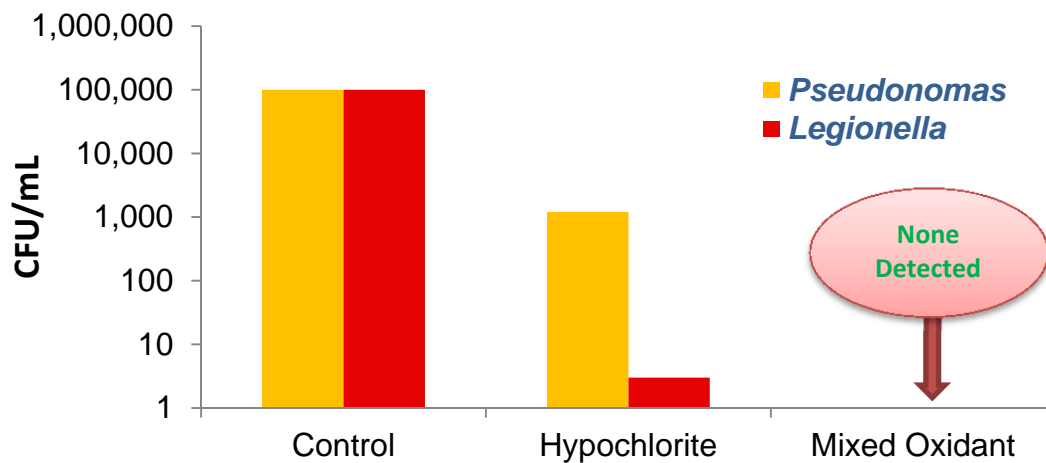


Figure 2: Biocide comparison study demonstrates MOS superiority. *Pseudomonas aeruginosa* and *Legionella pneumophila* were exposed to 2 mg/L MOS or bleach at pH 8.0 for 10 minutes (Barton 1996).

Microorganism	Initial Microorganism Concentration	Mixed Oxidants (2 mg/L)	NaOCl (2 mg/L)
<i>Legionella pneumophila</i>	1 x 10 ⁵	0 CFU/mL	> 2 CFU/mL
<i>Pseudomonas aeruginosa</i>	1 x 10 ⁵	0 CFU/mL	1,200 CFU/mL

Larry Barton, PhD, University of New Mexico "Disinfection of Simulated Cooling Tower Water" - March 4, 1996

