WTR-AOP

Advanced Oxi-Plus

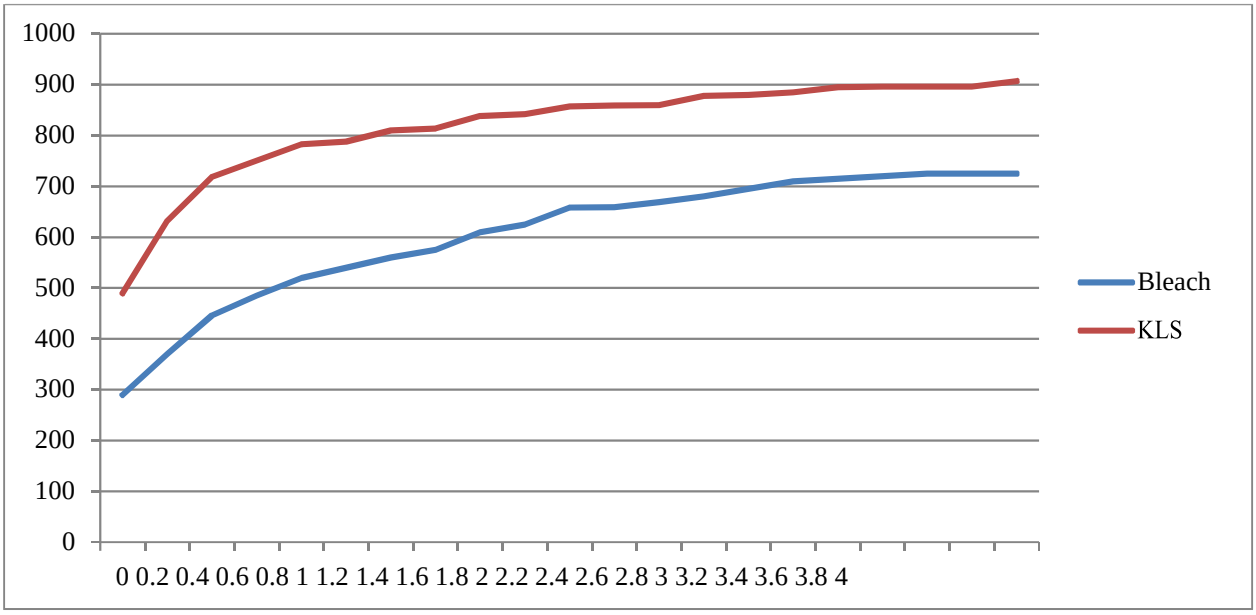
Simple Introduction

WTR Texas LLC

Product Idea: It is well understood that by increasing the utility of active oxygen radicals, the production of toxic disinfection-by-products (DBPs) is greatly reduced as well as the need for the presence of chlorine. KeyLate Solutions LLC has improved the technology of disinfection and oxidation by mimicking nature. Nature utilizes a variety of “reactive oxygen species” (ROS) and utilizes specific minerals and metals to aid in the distribution, management and catalysis of ROS reactions against microbes and organic contaminants. KLS products advance disinfection technology by translating what nature does into simple to use liquid formulations. The result is a disinfection ability for the management of viruses, bacteria, molds and biofilm that is more than ten times that of conventional chlorine treatments, it far exceeds peroxides and it provides a residual protection that conventional chemistries are not capable of.

Oxidation-Reduction (Redox)reactions are characterized by the movement of electrons. That is, one compound gives up electrons and another accepts electrons. This movement of electrons can be measured with a millivolt (mV) reader and the strength of the movement is referred to as “Oxidation-Reduction Potential” (ORP). Well established is that specific ranges of ORP have definitive effects on microorganisms and “Redox sensitive” contaminants. Hence, by maintaining a target ORP, desired disinfection is assured.

A typical curve disclosing the relationship between ORP and ppm of chlorine



The improvement in oxidation energy is accomplished is by mimicking nature in how oxygen radicals are interconverted, how oxygen radicals are managed and how oxygen radical reactions are catalyzed. Hence the generation of a dynamic environment in which oxygen is the active ingredient and the presence of minerals and water play subordinate and supporting roles. A suspension time kill test demonstrates the effectiveness of oxidation energy as a disinfectant.

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Suspension Time Kill Testing: ASTM E 2315:

Test Microorganism	Test Substance	Test Substance Concentration	CFU/ml	Percent Reduction Compared to Control at Time Zero	Tot Kill
E. coli 8739	Control	Control	1.02E+07	N/A	
	WTR-AOP	1 ppm	5.65E+06	44.61%	4,550,220
	Bleach	1 ppm	9.25E+06	9.31%	949,620

Test Microorganism	Test Substance	Test Substance Concentration	CFU/ml	Percent Reduction Compared to Control at Time Zero	Tot Kill
S. enterica 10708	Control	Control	2.46E+07	N/A	
	WTR-AOP	1 ppm	1.45E+07	41.06%	10,100,760
		2 ppm	2.46+07	>99.99%	24,600,000
	Bleach NA Hypochlorite	1 ppm	2.67E+07	0%	0
		2 ppm	2.16E+07	12.4%	3,050,400

Why ROS?

It provides the highest efficiency of oxidation. Oxidation is an aggressive reaction that dramatically changes the physical properties of a target compound.

Of the many elements that will cause oxidation reactions, ROS are the most aggressive agents and gives the added bonus of not producing toxic byproducts.

For pathogen control, the amount of ROS necessary to kill pathogens is much less than other oxidants or disinfectants.

An Environmentally Safe & Effective Alternative

- More than 12 time the reactivity of chlorine
- Delivers oxidation energy controlled and measured by ORP
- Free Oxygen radical generation
- Kills pathogens/microbes
- Eliminates Biofilm
- Detoxifies organics
- Eliminates or dramatically reduces Disinfection By Products (DBP's)
- Residual is Not Toxic: Oxygen and mineral monoxides
- By-products are None-Toxic

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In comparative lab and field Tests, KLS products out-performed:

35% Peroxide	Peroxide + Ammonia Chloride	Peracetic acid	Peroxyacetic acid
27% Peroxide	Isopropyl Alcohol	K/Na Hydroxide	Chlorine Dioxide
Ammonia Chloride	Quaternary Ammonia	Glycol ether	Ethyl Alcohol
Sodium Hypochlorite	Calcium Hypochlorite	Formaldehyde	Glutaraldehyde

Applications

• Potable water treatment • Water taste and odor control • Waste water treatment • Produce wash • Mold spore fumigation • Replacement of toxic FRAC chemistries	• Control of aquatic invasive species • Biocide • Elimination of biofilm • Algaecide • Mulluscocide: Zebra and Quagga mussels	• Elimination of Geosmin & MIB • Precipitation of metals • Elimination of hydrogen sulfide • Breakdown of Urea • Oxidation of cyanide