

optimizing **COOLING TOWERS**

ROS Lowers Operating Cost for Cooling Towers

- Controls Biological Activity*
- Prevent/Calcium Carbonate scale*
- Prevent/Localized & General Corrosion*
- Improve Heat Transfer Rate*
- Eliminates dual biocide programs*
- Simple to use and monitor*



JENFITCH INC

JC 9450





Environmentally
Safe & Effective

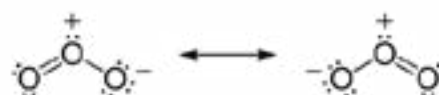
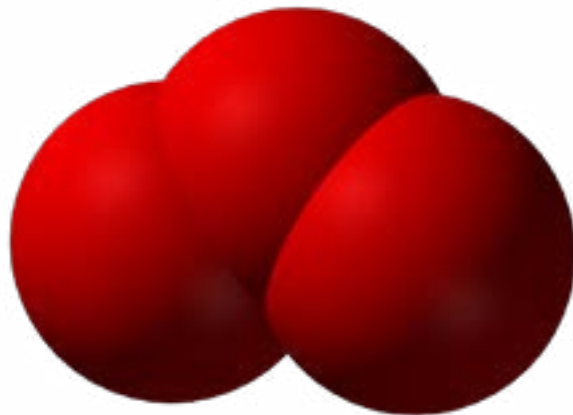
GENERATES REACTIVE OXYGEN SPECIES

JC 9450/JC 9465 - A NEW EMERGING OXIDATIVE TECHNOLOGY

Brief Description

JC 9450/JC 9465 is a new oxidative technology for generating reactive oxygen species (ROS) that simulate an AOP (advance oxidation process) but in a bottle.

By taking a simple oxygen molecule and shifting the valence, we create an unstable oxygen species that evolves into singlet oxygen ion and other molecules similar to what occurs when generating ozone - hydroxyl radical ions.



environmentally safe
a simple low-cost technology

However, this process is done using a simple method combining a low-cost technology in an environmentally safe format at room temperature

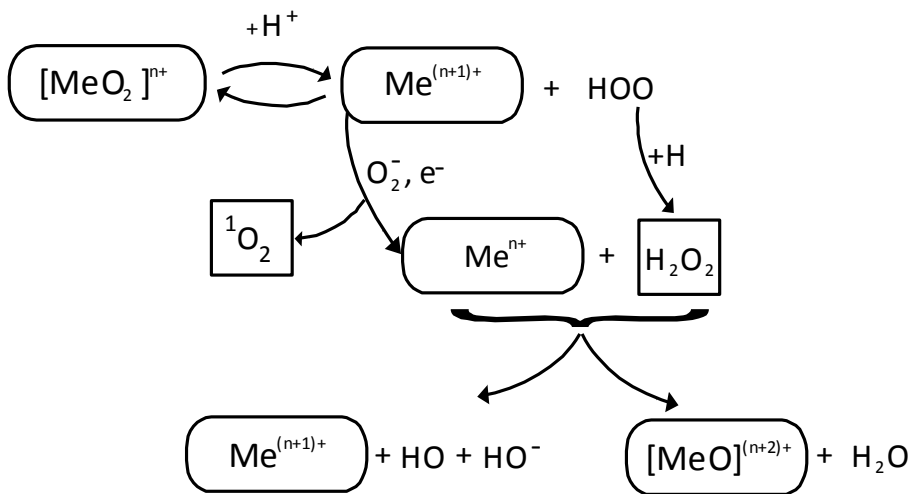


Illustration of chemical reaction using JC9450 in water

About Jenfitch, Inc.

Over 30 years in the industry, Jenfitch offers 100 different types of coagulants and flocculants to meet the new regulatory requirements.

We specialize in developing treatment programs that can treat drinking water and wastewater using JC 9450, a liquid ozone as a replacement for chlorine without the need for the need of an ozone generator. Jenfitch, Inc. is a manufacturing and marketing firm for chemicals used in finding solutions in the 21st century for water and wastewater treatment systems.

JC9450
The Next
Generation
Oxidation
Technology



CONTROL THE OXIDATIVE ENERGY IN WATER

RAISING THE OXIDATIVE-REDUCTION POTENTIAL (ORP) TO GREATER THAN +650 MV

Application

JC 9450/JC 9465 was developed to simply be able to control the oxidative energy in water as measured by millivolt (mV). Studies by World Health Organization (WHO) and Ozone Institute have demonstrated that by raising the oxidative-reduction potential (ORP) to greater than +650 mV, we can effectively eliminate harmful microorganisms in less than 10 seconds.

JC 9450/JC 9465 has demonstrated that it can be used in water treatment systems (ie. Potable surface water treatment plants, potable well water system, cooling towers, post-harvest & pre-harvest food processing, oil & gas well simulations, desalination plants, water re-use systems and wastewater treatment plants), to remove and eliminate harmful microorganisms cost effectively.

ORP Level	Coliform count in 100 ml of water
200	300
300	36
400	3
600	0

extreme water solutions for global and local solutions

- *Extreme water solutions for global and local solutions*
- *Effective as a single treatment disinfectant*
- *Eliminates localized and general corrosion*
- *Eliminates scaling forming sites*
- *Improves heat transfer rate*
- *Simple to use and monitor*
- *Improves bacteria control*
- *Algae elimination*
- *Biofilm elimination*



Oxygen radicals make ORP a practical tool for quality control

Mineral Oxidizer for the 21st Century





Oxidizer residuals become healthy micro-nutrients for animals

TECHNOLOGY THAT MATTERS

A LOW-COST TECHNOLOGY THAT CAN MIRROR THE SAME PROPERTIES AS OZONE



Unique Selling Point

First time a low-cost technology that can mirror the same properties as ozone but at 1% of the capital cost and 10% of the operating cost.

eliminate legionella
destroy E.coli and salmonella

JC 9450/9465 can lower the cost of operating a cooling water system by improving heat transfer. This can be accomplished by eliminating plank-tonic and sessile microorgan-

isms. Sessile microorganisms generated a sticky material called extra-polymeric substance (EPS). EPS is a sticky substance that attracts suspended solids and insoluble mineral salts. A biofilm on the heat transfer surface is 300% worse than having calcium carbonate scale. A biofilm can support scaling and corrosion at the same time by providing protection against biocide and dispersants. Biofilm provides a home for anaerobic bacteria to cause localized pitting and generalized corrosion. JC



9450/9465 is a very strong oxidizer that dissolves the EPS and attacks the DNA of the microorganisms. When the ORP (oxidation-reduction potential) is greater than +600 mV, we can observe the elimination on microorganisms in less than 10 seconds. The attack on the DNA does not allow the microorganism to adapt therefore JC 9450/9465 can be used as a single chemical treatment system to control microorganisms vs a conventional dual chemical treatment program.

Oxygen radicals provide more oxidation energy than conventional chlorine treatments

- *Eliminates algae*
- *Eliminates Biofilm*
- *Simple to use and monitor*
- *Effective at controlling scaling*
- *Eliminates zebra and quagga mussels*
- *An Environmentally Safe & Effective Alternative*
- *Effective at controlling localized and generalized corrosion*



COOLING SYSTEM - WATER MANAGEMENT

AN OVERVIEW OF THE APPLICATIONS OF USING JC 9450 IN COOLING TOWERS

Basic Objectives

There are two very basic objectives for any cooling water treatment program: improve heat transfer efficiency and keep operating cost down. Towards these ends, effective cooling water treatment programs must:

KEEP OPERATING COST DOWN IMPROVE HEAT TRANSFER EFFICIENCY

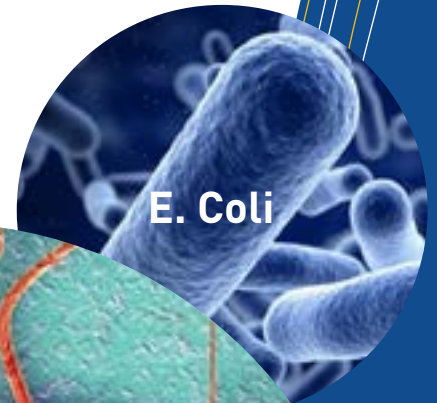
1. Control Biological Activity

Evidence of biological activity in a cooling system is easily detected, as a slimy film develops inside pipes, on cooling tower basins and fill, and on heat exchange surfaces.

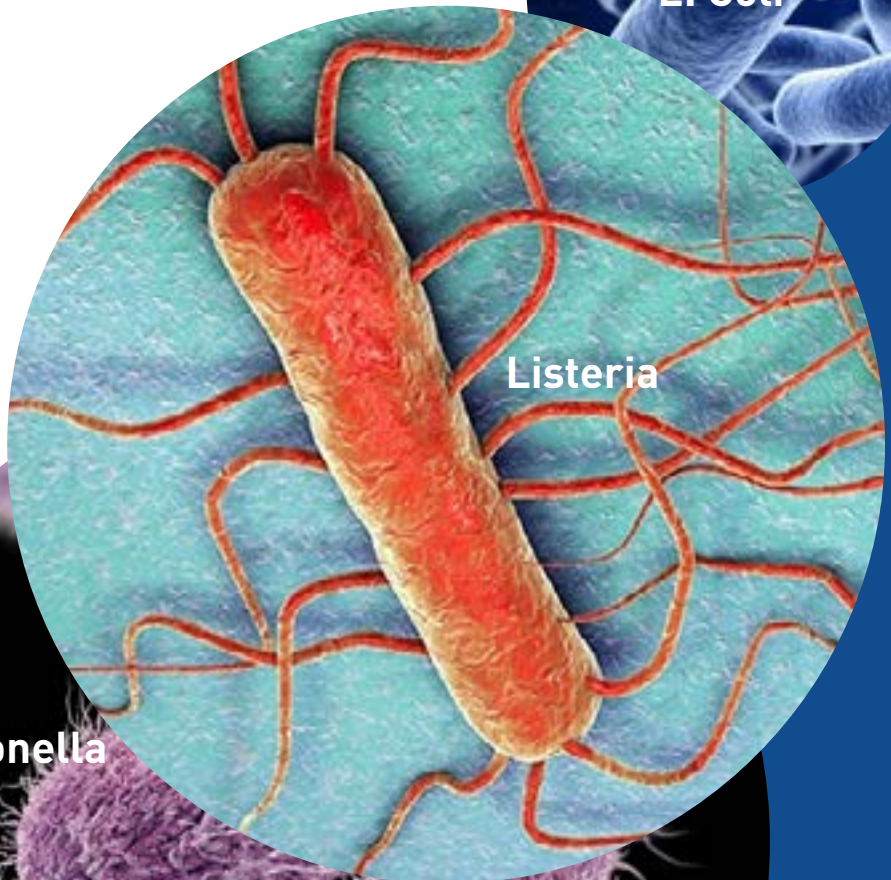
Manufacturers of heat exchange equipment and professional groups such as ASHRAE agree that a minimal fouling factor of .001 can result in a loss of efficiency of as much as 10%.

The JC9450 / JC9465 eliminates such deposits through complete oxidation. Viable micro-organisms are eliminated by its ability to rupture cell walls and oxidize the organic residue. Existing organic deposits are also oxidized and eliminated in the same manner.

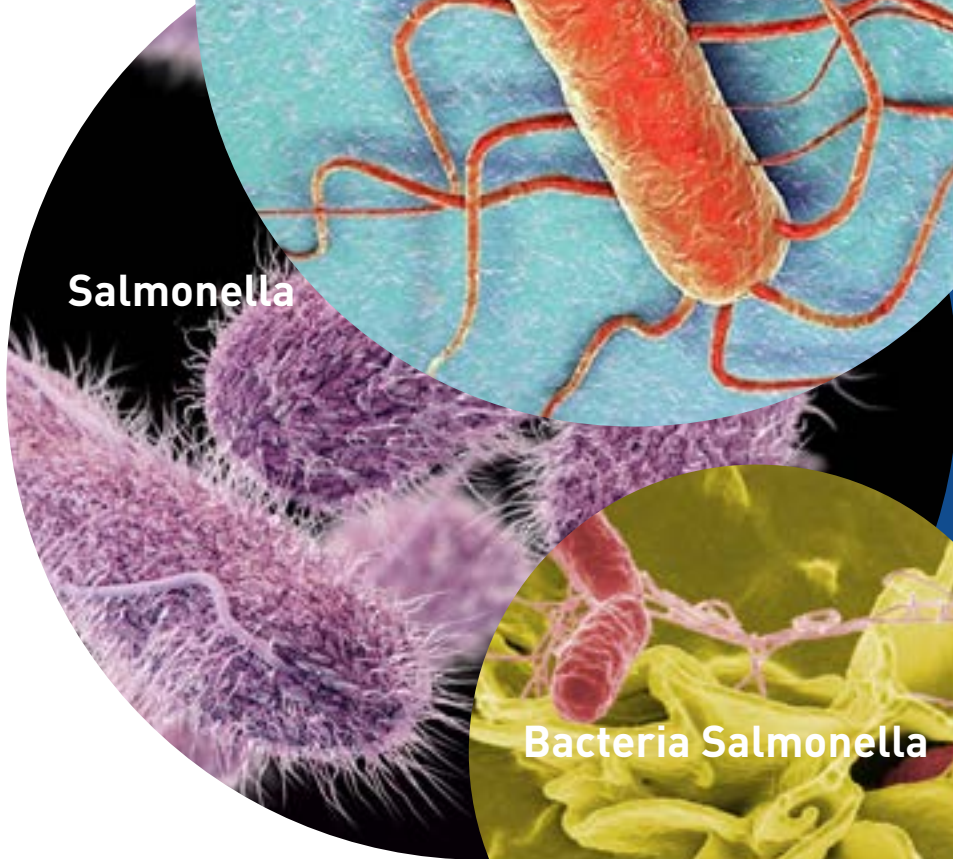
Legionella pneumophila thrives in aquatic systems where it is established within amoeba in a symbiotic relationship. In the built environment, central air conditioning systems in office buildings, hotels, and hospitals are sources of contaminated water where these pathogens can thrive.



E. Coli



Listeria



Salmonella



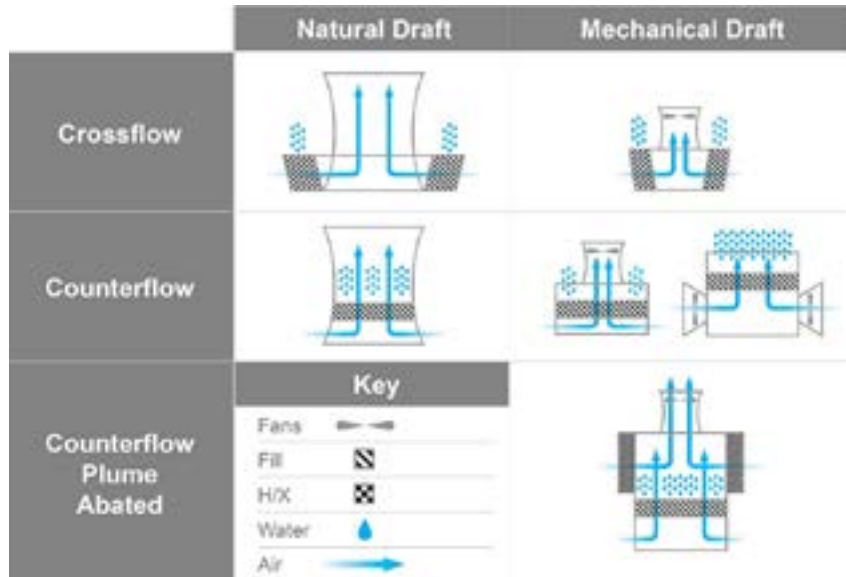
Bacteria Salmonella





COOLING SYSTEM - WATER MANAGEMENT

AN OVERVIEW OF THE APPLICATIONS OF USING JC 9450 IN COOLING TOWERS



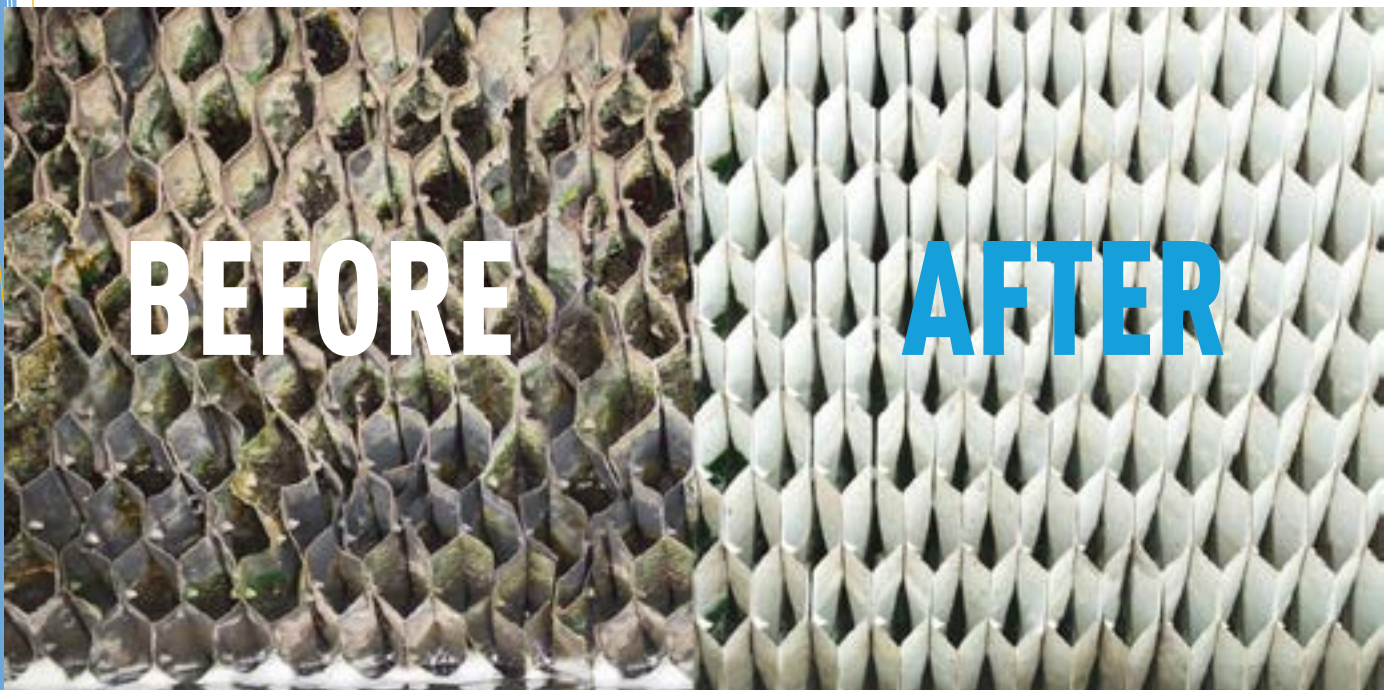
VARIOUS TYPES OF COOLING TOWERS - WHERE AIR MEETS WATER BACTERIA CAN GROW

Cooling towers used in industrial cooling systems as well as evaporative coolers, nebulizers, humidifiers, whirlpool spas, hot water systems, showers, windshield washers, fountains, room-air humidifiers, ice making machines, and misting systems typically found in grocery store produce sections are also sources of contaminated water.

2. Prevent Scale Formation

JC 9450 / JC 9465 prevents scale buildup and removes existing deposits by oxidizing the biological (glue) which binds deposits together on the metal surfaces. Scale buildup robs system efficiency and increases the risk of accelerated under deposit corrosion.

JC 9450 / JC 9465 prevents scale buildup, and removes existing deposits by oxidizing the biological "glue" which binds deposits together and to metal surfaces.



BEFORE

AFTER



COOLING SYSTEM - WATER MANAGEMENT

AN OVERVIEW OF THE APPLICATIONS OF USING JC 9450 IN COOLING TOWERS



3. Inhibit Corrosion of System Metals

Corrosion occurs as a general thinning of metal surfaces due to oxidation, or as a focused area of metal decay due to biological or electrical activity under deposits. The result in each case is a loss of structural integrity in a cooling system. Corrosion is accelerated in an acidic environment, and proliferates beneath biological and mineral deposits.



With the elimination of biological and mineral deposits, JC 9450 / JC 9465 automatically reduces the potential for under deposit corrosion. As the pH of the water treated with JC 9450 / JC 9465 tends to buffer in the alkaline range, general corrosion caused by acid water is also reduced. As an added benefit, JC 9450 / JC 9465 will cause a rapid oxidation of outermost metal surface, hardening it into a layer of Ferroso-Ferric Oxide, or Magnetite.



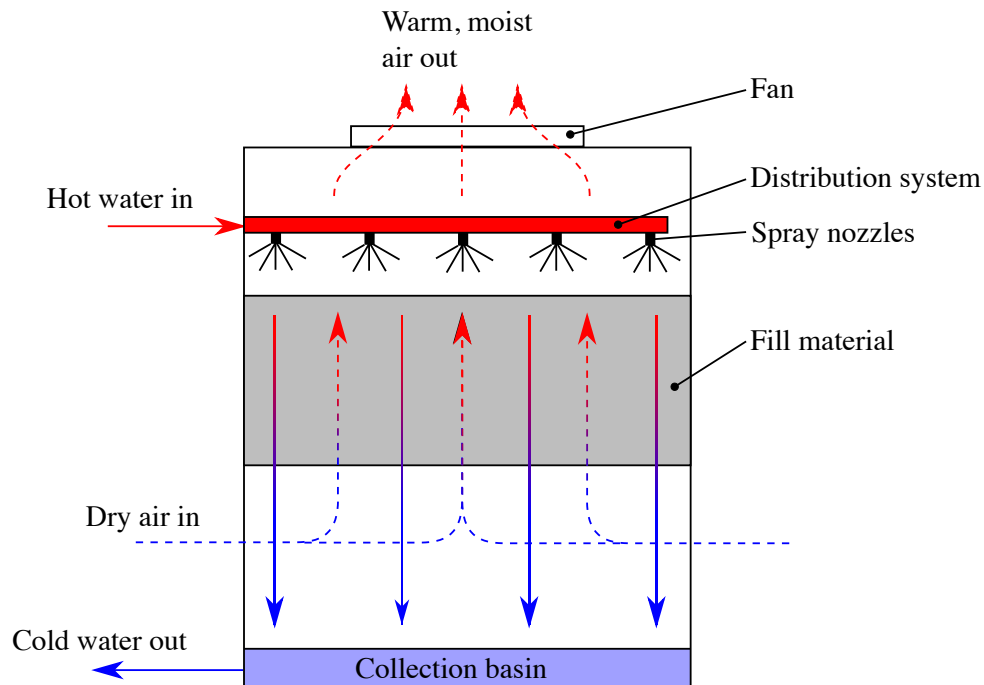


JENFITCH JC9450 IN COOLING TOWERS

FINANCIAL BENEFITS OF USING JC 9450 IN COOLING TOWERS

JC 9450 / JC 9465 Advantages

- 3,125 times more germicidal than chlorine
- Eliminates the use of chemicals (except for pH balancing)
- Ends discharge liabilities and chemical storage record keeping
- Destroys all types of micro-organisms instantly
- Minimizes condenser fouling
- Decomposes organic waste through oxidation
- Removes existing calcium carbonate scale by destroying biomass glue bonding agent
- Low maintenance costs
- The most environmentally friendly oxidant
- No persistent chemicals or disinfectants in bleed - ozone breaks down to oxygen
- Reduces the corrosion rate of metals, including copper heat exchangers
- Saves on energy costs by increasing the heat transfer efficiency of the chiller



JC 9450 / JC 9465 Reduces Costs in the Following Ways:

- 1** Reducing makeup water to the cooling tower by permitting more cycles between blowdowns
- 2** Eliminating the cost and problems in ordering, shipping, handling, storage, and disposal of regular chemicals
- 3** Reducing power consumption by keeping the chiller heat transfer efficiency high through cleaner condenser tubes

Studies by Southern California Edison (SCE), NASA, Jet Propulsion Laboratory (JPL), and IBM have confirmed that ROS is a viable alternative to multi-chemical treatment. Electricity savings of 20% or more were cited by SCE.



ADVANTAGES OF JC 9450 VS CHLORINE

IT TAKES 12 TIMES THE AMOUNT OF CHLORINE TO EQUAL THE SAME EFFECTIVENESS OF JC 9450

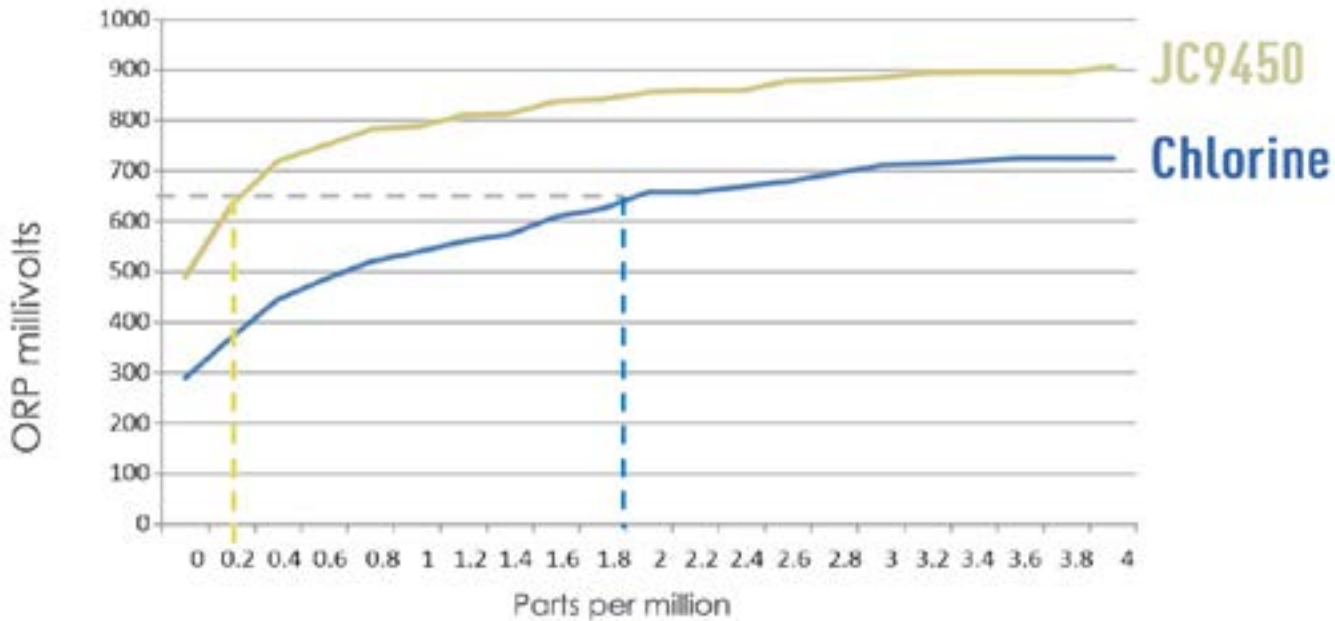


Cost Savings - JC 9450 vs Chlorine

JC 9450 is 12 times more effective as an oxidizer than chlorine. JC 9450 acts like ozone in a liquid form. JC 9450, (liquid ozone) working with an ozone generator and can drastically reduce the electrical expense.



The byproduct of using JC 9450, a liquid ozone, is oxygen and water - there is no need to go to the expense of having to remove chlorine from the treated water before returning it to surface water sources.



Capital Cost Requirements - converting an existing system to JC 9450 / JC 9465

A facility using JC 9450, a (liquid ozone) can be metered into a water stream. This will allow you to trade one disinfectant for another in your water storage tanks. The metering system would be adjusted for the required levels of JC 9450 / JC 9465 (liquid ozone).

Jenfitch JC 9450 can be stored for up to 6 months without the loss of effectiveness, whereas chlorine maintains its 100% effectiveness only for 30 days. The capital costs for conversion to JC 9450 / JC 9465 would not be significant.

Disinfection by-products (DBPs) result from chemical reactions between organic and inorganic matter in water with chemical treatment agents during the water disinfection process.

Chlorination disinfection agents such as chlorine dioxide and chloramines may produce such by-products as Trihalomethanes (THM) ; Halo-acetic acids (HAAs) and chlorite along with "emerging" disinfection by-products (DBPs) halonitromethanes, haloacetonitriles, haloamides, halo-furanones and others.

Jenfitch JC 9450, a (liquid ozone) by-products are oxygen and water. In the presence of bromide, halogen-substitutes disinfection by-products (DBPs) are not formed. It can be beneficial to use sand filter or activated carbon filters to remove organic material after JC 9450 / JC 9465 is applied.





COOLING TOWERS USING JC 9450

Chemical Treatment

Chemical treatment is the application of a wide variety of products (both natural and man-made) for the removal, manipulation, and restructuring of the contaminants within a water stream prior to use.

Chemical treatment is much more difficult to design and regulate than mechanical treatment methods. Usually multiple ingredients are required to address each category of contamination (inorganic, microbiological, and organic) and are dependent on pH of the water for their effectiveness. A third consideration that will impact the effectiveness of chemicals treatments is exposure time (CT), ie residence time for the chemicals to act on the contaminant. This type of treatment can be very effective in an overall treatment program and utilized properly, will address inorganic, microbiological and organic content of the stream.

An accepted practice of changing the molecular structure, and the physical properties of contaminants, is to "oxidize" them. All oxidizers have an order of reactivity, that is, they react with the simplest contaminant first. A general order of reactivity would be: in-organics, vegetative microbes, organics, microbe spores & cysts and viruses.

JC 9450 Liquid Ozone

Mineral Oxychlorides is a chelation of minerals with oxygen in liquid form. The molecule is purposely designed to be weakly bound together such that when it comes in contact with in-organics, microorganisms and organic matter, it readily gives off oxygen atoms that aggressively oxidizes all desired contaminants. The reactivity of mineral oxychlorides is closely matched to ozone but without the problems associated with dissolving a gas in water.

Reagent Name	Formula	Electrochemical Potential (Ev)
Fluorine	F_2	3.06
JC 9450	$M_xO_yCl_z$	2.8-2.9
Hydroxyl Radical	OH-	2.8
Oxygen Ion	O^-	2.42
Ozone	O_3	2.07
Persulfate Anion	$S_2O_8^{2-}$	2.06
Peracetic Acid		1.81
Hydrogen Peroxide	H_2O_2	1.78
Potassium Permanganate	$KMnO_4$	1.7
Chlorine Dioxide	ClO_2	1.57
Hypochlorous Acid	HOCL	1.49
Chlorine Gas	Cl_2	1.36
Hypobromus Acid	HBrO	1.33
Oxygen (molecule)	O_2	1.23
Bromine	Br_2	1.09
Sodium Hypochlorite	NaOCl	0.94
Hydroperoxide Anion	HO_2^-	-0.88
Perhydroxyl Radical	HO_2	-1.7
Superoxide Radical Anion	O_2^-	-2.4

Factors affecting JC 9450 Liquid Ozone's Activity:

1. pH: Must be adjusted to pH of 6.5-9.5. By adjusting the pH, the bicarbonates become carbonates and cease to scavenge oxidants (bicarbonates are oxidant scavengers).
2. Temperature: JC 9450 Liquid Ozone has a greater temperature range of reactivity than alkaline oxidizers
3. Organics: a few mg/l of JC 9450 Liquid Ozone are required to oxidize organic and in-organics. JC 9450 Liquid Ozone will break apart organics into non-toxic constituents.



SUMMARY ABOUT JENFITCH

JENFITCH JC 9450 HAS BEEN APPROVED BY THE NSF60 AND CALIFORNIA WATER BOARD



Oxygen radicals make JC9450 a practical tool for quality control

Reactivity of JC 9450 Liquid Ozone

- Inorganics: A concentration of less than 1.0 mg/l per mg/l of inorganic
- Pathogens: A concentration of 1.0 mg/l per 1,000-10,000 mg/l pathogen
- Organics: A concentration of 1.0-8.0 mg/l per 1.0 mg/l organic
- Residual: The by-products of JC 9450 Liquid Ozone are mineral monoxides that are effective against bacterial recontamination, providing a protective residue that kills bacteria

Benefits of using JC 9450 / JC 9465

- Improve heat transfer
- Reduce scale and corrosion
- Eliminate biofilm
- Simple to use
- Simple to monitor



JC 9450 Liquid Ozone Health Hazards

The US EPA, NIH, OSHA, CDC and HHS list the following hazards for JC 9450 Liquid Ozone:

1. Inhalation: 1000 mg/l may causes sinus irritation and coughing
2. Skin Contact: 100,000 mg/l causes dry skin
3. Ingestion: 1000 mg/l may cause stomach irritation



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Mineral Oxidizer for the 21st Century

