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APPLICATION NOTE

INDUSTRY-SPECIFIC APPLICATIONS FOR UV TECHNOLOGY

APPLICATION: Monochloramine Reduction

Aquafine® Ultraviolet Treatment Systems for Monochloramine Reduction

Chloramination is the process of adding chloramines, a group of chemical compounds containing chlorine and ammonia, to drinking water as a means of inactivating microbiological contaminants. Monochloramine is the most widely used chloramine, largely due to the advantages it has over chlorine, including providing longer-lasting residual in pipes while producing fewer by-products.

That said, chloramines have corrosive properties that can damage metal pipes. When chloramines are added to public water supplies, it alters the chemical properties of the water. This, in conjunction with lowered pH and alkalinity, can result in corroded pipes. Over time, exposure to chloramines will also degrade rubber, including O-rings, gaskets, and seals.

While chloramines have less of an aftertaste than some other common water treatment methods, they still leave water with an undesirable metallic or chemical tang. From brewing beer to coffee, chloramines will offset the flavor profile of any beverage to which it is introduced.

For the above reasons, monochloramine reduction is commonly practiced in industrial settings, such as life science (e.g., pharmaceutical) manufacturing facilities, as well as in food and beverage plants.

Monochloramine reduction technologies

Activated carbon

Granular activated carbon (GAC) is commonly used in large water treatment filters for dechlorination by adsorption. Free chlorine removal is the result of residence time in contact with the carbon, rather than filter surface loading. Chloramines are significantly harder to remove than chlorine, requiring an extended period of contact with the activated carbon.

A key concern is that GAC can become home to microbiological growth once the chlorine or chloramine is removed. The organic material that the GAC filters adsorbs acts as sustenance for microbes, which can colonize within the pores of the carbon granules. In cases where the prevention of microbiological contamination is critical, such as in pharmaceutical or semiconductor water treatment systems, steam or hot water filter vessels are used. Downstream technologies can also be used, such as distillation or ultraviolet treatment.

Chemical reaction

Chemical dechlorination reactions occurring from sulfites, bisulfites, or metabisulfites can also reduce chlorine. Chemical reduction prevents a microbiological breeding ground from being introduced upstream of the rest of the water treatment system. However, downstream treatments, such as deionizers, may become overburdened by certain ions (e.g. chloride, sodium, sulfate, etc.) that are introduced or produced through

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MONOCHLORAMINE REDUCTION

chemical reduction.

This method of dechlorination also requires odorous powders and/or liquids. These reducing agents react with oxygen in the air and water, and thus have to be reconstituted frequently due to loss of solution strength.

Finally, these systems usually have a significant footprint occupying valuable factory space, which may be particularly important for skid mounted equipment

A Viable Solution - UV photolysis

Another way to remove chloramine is ultraviolet irradiation. This is a high-intensity method that uses ultraviolet light to dissociate chloramines through absorption.

Multiple factors, such as pH, quantum yield, UV dose, and UV wavelength, affect monochloramine reduction. The literature-reported range for UV dose per log (90%) removal with low-pressure Hg lamps, emitting UV at 253.7 nm, is 3600 to 4000 mJ/cm^2.

The byproducts from monochloramine photolysis are non-hazardous and include primarily nitrate, nitrite, chloride ions, and nitrous oxide (gas). At typical pH and dissolved oxygen levels of natural waters, ammonia formation is insignificant.

Aquafine Monochloramine Reduction Solution

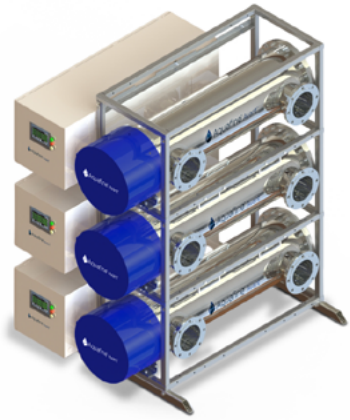
Aquafine, Trojan Technologies' brand of industrial UV water treatment systems, offers a portfolio of robust and flexible UV systems with advanced technology designed to meet the stringent requirements of Pharmaceutical, Food & Beverage, Microelectronics, and other industrial markets.

OptiVenn: State-of-the-art UV series for industrial water treatment

The OptiVenn Series is a family of UV systems with advanced technology for applications in the pharmaceutical, food & beverage, microelectronics and other industrial markets. The OptiVenn Series is used to break down trace chemicals; ozone, chlorine, and total organic carbon, and inactivate *E.coli* and fecal coliform.

Avant: Advanced UV treatment system for ultrapure water applications

Avant's innovation and best in-class components reduce the total cost of ownership and drastically simplify operation and maintenance. Avant is the ideal solution for ultrapure water (UPW) plants in need of revolutionary UV technology.



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