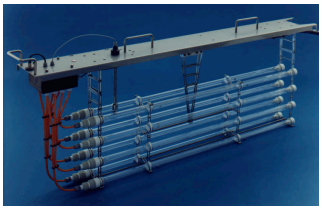
Process Solutions
Water and Process Fluid Purification

UV Technology – It's Not Just for Disinfection Any More!

While many of us are familiar with the use of ultraviolet light for disinfection of high purity water streams, this technology has become increasingly popular for other applications. Using sizing criteria such as flow rate, UV wavelength, water quality, UV dosage requirements and transmission quality, ultraviolet technology is also used for total organic carbon (TOC) reduction, ozone destruction, and more recently has been applied for dechlorination.

In simple terms, ultraviolet light is an energy source which has the ability to penetrate the cell wall of an organism and alter its DNA to prevent it from reproducing. This energy source at 254 nm wavelength is referred to as germicidal wavelength light. UV light applied at this wavelength and appropriate flow rates will provide 99.9% or better destruction of microorganisms. The typical industry standard UV dosage for disinfection is 30,000 μW sec/cm^2 at the end of the lamp life.



For ozone destruction, the UV light catalyzes the decomposition of ozone to oxygen. Ozone is rapidly and completely destroyed at dosage levels as low as 90,000 μW sec/cm^2. The dosage for complete destruction is dependent on the amount of ozone in the feedwater and the treated water requirements of the downstream process.

UV technology is a low-maintenance, cost-effective approach to disinfection, TOC reduction, ozone destruction and dechlorination applications.

For TOC reduction, the UV energy generates hydroxyl radicals within the water by photo-oxidation; these hydroxyl radicals break the TOC bonds to form simpler ionic constituents. An ultraviolet system designed for TOC reduction uses 185 nm wavelength lamps; and the dosage requirement can vary depending on the organics in the stream and their concentration(s). As a rule of thumb, the system will be sized for a minimum of five (5) times the disinfection flow rate.

The UV oxidation of chlorine within water treatment processes is governed by many of the same parameters which influence TOC reduction. The UV dosage required for dechlorination depends on adsorption of the UV energy in the water, the total amount of chlorine present, background level of organics, ratio of free chlorine vs. combined (chloramines) and the targeted effluent chlorine level. The typical UV dosage required for removal of free chlorine can be as much as 30-50 times the dosage required for disinfection; therefore, the systems can become quite large. Still, this technology is gaining wider acceptance for dechlorination, as it offers the following advantages over conventional methods:

- Instantaneous process which does not require mixing, contact tanks, or chemical addition.
- Adds nothing to the water and does not have a residual.
- Does not change water chemistry, pH or TDS.
- Relatively inexpensive from both a capital and operating cost standpoint.
- Eliminates risk of introducing microorganisms or biological contaminants.
- Unlike chemical injection, it cannot be overdosed.
- Requires minimal operator attention or maintenance.

For further information or an evaluation as to whether UV technology has an application for *your* process, consult your ***Process Solutions, Inc.*** sales representative.