The Impact Of Chloramines On High Purity Water Systems

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One of the key functions of pretreatment in most High Purity Water systems is the removal of chlorine from municipal feed water sources. As more municipalities make the switch from chlorine to chloramines for bacteria control, both new and existing systems' designs should be reviewed to ensure that they are capable of handling the more stable, and thus more difficult to remove, chloramine compounds.

Historically chlorine, and now chloramines, has been removed from the water supply by one of two methods: Activated Carbon Filtration, or Chemical Treatment such as sodium meta bi-sulfite injection. A third method, the emerging technology of the Chlorine Destruct Ultraviolet Unit, is gaining popularity in some industry segments such as Pharmaceutical and Biotech.

While each of these technologies has its own unique merits and disadvantages, they all share one common trait: they must be sized properly in order to perform properly (i.e. flow rate, and chlorine/chloramine level of the feed water must both be considered). Undersizing will result in incomplete chlorine/chloramine removal. Oversizing however can result in more than just an unnecessary, added cost. An oversized carbon bed will remove all of the chlorine in the upper portion of the bed, leaving no protection from biological growth in the lower section. Over feeding of bisulfite will actually provide a food source for downstream sulfur-reducing bacterial growth.
Based on our experience to date, the switch to chloramines appears to complicate the sizing of chlorine removal equipment in two ways. First, the Total, or combined chlorine levels are often much higher for chloraminated water: typically 3.0 to 4.0 ppm compared to 1.5 to 2.0 ppm for chlorine alone. Second, the incoming residual level is more prone to large variations with chloramine than with chlorine. Since chlorine residuals in the pretreated feed water for WFI Stills, Ion Exchange resins, Reverse Osmosis membranes, and so forth is usually not an option; some degree of oversizing is almost guaranteed.

Pureflow has been one of the leading proponents of chlorine destruct UV, and has dozens of successful installations with a variety of UV makes and models. We have also piloted combinations of chlorine destruct UV with other technologies such as carbon filters. These hybrid systems offer the best of each technology at a cost that is often less than either one alone. If you are interested in learning more about any of these technologies or would like to participate in a pilot study, please contact the Engineering Department at Pureflow.

A System Design Engineer at Pureflow, Inc., Glenn is experienced in high purity water solutions for the pharmaceutical, microelectronics, power and bottling industries. He has been a practicing engineer for 32 years, the last six designing high purity water systems for Pureflow. Glenn holds a Bachelor of Science in Mechanical Engineering from North Carolina State University.