

Clarification for RO Pretreatment – Clear as Mud??

If you're operating a reverse osmosis system on a surface water supply, you already know that colloidal and silt fouling are major contributors to loss in performance of membrane separation systems. While there are effective cleaners for these types of foulants, it is far more economical to reduce the concentrations of these materials before they ever reach the membrane system.

A myth exists that coagulants, particularly organic coagulants, will chemically foul RO membranes. Both field experience and extensive lab testing have conclusively demonstrated that coagulants do not foul membranes *when dosed properly*. Rather, it is overfeeding of pretreatment chemicals and the application of incompatible mixtures of chemicals that usually cause chemical fouling of RO membranes. There are 2 basic types of coagulants:

- 1) Metal salts that include alum, ferric chloride, and ferric sulfate, which when added to water produce positively-charged metal/water species.
- 2) Organic molecules, formulated to contain positive charge groups.

As particles approach the surface of a media (such as a multimedia bed), short-range electrostatic forces start to influence particle movement. Most naturally occurring particles (including filter media) possess negative charges or zeta potentials. Negative charges on both the particles and filter media repel each other; however, when added to the feedwater, coagulants neutralize the negative charges on both the particles and the media, resulting in the filter's ability to hold the particles.

It is important that coagulants be fed at their optimum dosage. Overfeeding, especially with organic coagulants, results in positive charges on both the media and particles. This has the same detrimental effect on clarification and filtration as negative charges.

For direct filtration applications (raw water turbidities <10 NTU), coagulants can be injected in-line directly ahead of multimedia filters. When raw water turbidity is >10 NTU, clarifiers generally precede multimedia filters. These are large mixing and settling chambers designed to remove most of the particles in the raw water, reducing the solids loading on the filters downstream. For RO pretreatment, the goal is to reduce the turbidity to **<0.2 NTU**. In most cases, this is impossible to achieve with multimedia filters without the use of

Avista Technologies offers a selection of four coagulant formulations. All are compatible with thin film reverse osmosis membranes; however, these and other coagulants may not be compatible with all antiscalants. In RO pretreatment applications, it is critical to use only coagulants which are compatible with the antiscalant, which may mean converting to a coagulant-compatible formulation. For further information or a process evaluation, contact us at **513-791-3338**.

