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Do We Have To Sacrifice Performance To Be Green?

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The global use of membranes is widespread in municipal, industrial, and wastewater applications with reverse osmosis (RO) proving to be a highly effective and reliable method of advanced water treatment. Reuse applications have been particularly challenging for water treatment chemical companies as these highly variable feedwaters can contain any imaginable constituent, resulting in a wide array of site specific foulants.

By its nature, RO system flow paths result in diminishing feedwater flow rates along the collective series of elements which concentrates soluble minerals, microbes, and organic matter and eventually leads to membrane fouling. As particles come out of solution and settle on membrane surfaces, they form a barrier layer that reduces permeate quality and flow and increases the pressure required to pass water through the membrane. Fouling is inevitable, but proper cleaning can effectively restore permeate flow, increase rejection and reduce delta pressures so that treatment facilities continue to produce the desired water quantity and quality.

The demand for chemical solutions has generated a number of industry suppliers, each with varying levels of expertise in membrane separations and subsequent product offerings ranging from low cost generics to sophisticated formulated chemistries.

Continued advancements in membrane technologies and the unique challenges presented by water reuse feedwaters stymies the less sophisticated chemical vendors as RO membranes are applied to increasingly difficult feedwaters and the resulting foulants become more complex. In addition, there is now intense industry pressure to provide eco-friendly cleaning products to satisfy strict plant discharge restrictions with the expectation that the “green” formulations will be as effective as traditional products.

The eco trend has revealed several industry shortcomings including the fact that there is currently no recognized definition of what constitutes a “green” product for membrane applications. As a result, qualified chemical vendors strive to satisfy site-specific or regional restrictions instead of a sanctioned certification. There is also very little published data on “green” product efficacy which has left many to question whether the performance of environmentally friendly products can ever be definitively compared to proven formulations.

Avista Technologies addressed this challenge with extensive in-house testing. The company was established in 1999 and develops specialty chemicals specifically for reverse osmosis (RO) and microfiltration/ultrafiltration (MF/UF) membranes. An array of laboratory and troubleshooting services is also available to help improve membrane system performance. In the course of our work, we evaluated a variety of cleaners distributed throughout the industry and promoted as "green". Extensive trials on fouled membranes concluded that those formulations failed to provide the cleaning efficacy required by the industry to meet projected O&M costs and productive membrane life expectations.

Dan Comstock, Vice President of Research at Avista noted that "the challenge is to substitute regulated ingredients with eco-friendly alternatives that work as well or better and achieve a target price that is acceptable to a cost sensitive customer base. But the demand for green chemicals resulted in a hasty supply of ineffective products throughout the industry. Many chemical formulators simply removed the regulated ingredients from their products without testing alternatives or the performance consequences. Ironically, membrane foulants are becoming more complex at the same time some chemical vendors are simplifying their formulations and the decline in performance is not surprising. "

When faced with strict new discharge regulations, system end users applied those cleaners and found that the performance was nominal at best and, in some cases, put their membrane at risk. "If the formulator doesn't test the new compound for membrane compatibility and product efficacy, then the end user becomes the beta tester, for better or worse " said Jack Mueller, Director of Product Development at Avista. "What makes us unique is we decided early on that we wouldn't rush to satisfy the industry demand for "green" cleaners until our products proved they could meet or exceed the performance of our other formulations. We pride ourselves on developing long term relationships with our customers and we weren't going to sacrifice that for a questionable, short term fix."

Mr. Comstock added that "the key to creating an effective green membrane cleaning product is finding synergy among an array of environmentally friendly ingredients". Regulatory pressure has prompted global chemical manufactures to develop eco-friendly raw materials, but very few of these are membrane compatible. The key is having the desire and ability to test the multitude of raw materials in order to establish not only membrane compatibility but also an advantageous synergy with other ingredients in the blends. Avista's extensive investment in laboratory equipment and technical capabilities has allowed them to pursue these time consuming studies.

"Developing effective green products is challenging and requires extensive trials " said Mr. Mueller. "We'd formulate a product that was effective and met our client's regulatory criteria, but continued internal testing showed that long term use might have an adverse effect on the membrane. That was unacceptable so we'd go back to square one."

Dave Walker, President of Avista confirmed that "failure is not an option for us and that mantra differentiates Avista. The testing initiated by our technical group was arduous but it led to a line of

cleaners that we now provide with complete confidence, knowing they are membrane compatible and effective enough to go head to head with our other products."

Avista conducts membrane compatibility studies throughout the formulary process to screen each of the raw materials at every phase of development. We then test compatibility of the finished compound to see if it has any detrimental effects on the membrane. These studies provide customers with peace of mind, knowing that the product is eco-friendly and will clean the membrane time after time without risk of damage.

Mr. Mueller observed that "clients send us fouled membranes and we use a variety of analytical procedures to specifically identify what constituents are on the membrane surface. We then run foulant specific cleaning trials on the membranes to identify the product or combination of products that will give us the best results in restoring membrane performance. If the customer is subject to any discharge restrictions or if specific ingredients are not allowed, we now have a line of effective green cleaners to offer." These formulations prove we can achieve high performance and eco-friendly compliance without sacrificing one for the other.

Avista's green cleaner line includes: AvistaClean® P611, RoClean L404 and RoClean P111C. The Vitec® 8000 series is a line of environmentally friendly antiscalants and dispersants.

For more information or to inquire about Avista Technologies, please contact Cheddy Tobias at 760-744-0536. For more information on Avista, visit http://www.avistatech.com.

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