Protect RO membrane assets with Hach's DR1300 FL GAC dechlorination control

The Challenge

In many reverse osmosis (RO) systems, the absence of an oxidant or biocide leads to extreme biofouling, resulting in rapid performance degradation and shortened membrane life. To prevent biofouling, chlorine (Cl_2) is often used because of its ability to eliminate most pathogenic microorganisms.

However, in RO systems membranes are easily damaged by chlorine in the feed water. Chlorine damage to the membrane can lead to lower salt rejection and poor-quality permeate, which will result in expensive membrane replacement and down-time.

To protect RO membranes, it is necessary to keep the chlorine concentration very low. One dechlorination process involves the use of granular activated carbon (GAC). Monitoring the health of a GAC system, as well as very low concentrations of residual chlorine, requires a very sensitive, accurate and, ideally, easy-to-use chlorine test.

Currently, commonly used lab or portable grab sample testing methods may struggle to provide meaningful data. Existing technologies are often not satisfactory for efficient dechlorination control due to insufficient accuracy at very low Cl_2 concentrations, potential sample matrix interferences, test complexity or instability.

DR1300 FL Portable Fluorometer

The Solution

Due to the incompatibility of thin-film RO membranes with chlorine, the feed water must be dechlorinated, e.g. with the use of granular activated carbon. Accurate testing of the residual chlorine concentrations is essential to monitor the efficiency of the dechlorination process and to ensure long membrane life. Hach® developed a new test system for very low free and total chlorine concentrations based on fluorescence technology.

This system is as easy to perform as colorimetric DPD chlorine tests, but with much higher sensitivity, providing highly accurate results to less than 20 ppb Cl_2. Hach's new DR1300 FL is a portable fluorometer, which enables immediate testing of residual chlorine onsite.

The test procedure of Hach's patent pending chlorine fluorescence method is easy – simply fill your water sample and liquid reagents into a vial, start the timer of the instrument, and read the result after 2 minutes.

The Benefits

Chlorine testing is an essential part of maintaining a well-running reverse osmosis system. Regular, accurate chlorine monitoring helps protect reverse osmosis membranes from unwanted oxidation to extend membrane life.

Hach's fluorescence technology for free and total chlorine provides the following benefits:

• Easy-to use, portable system for immediate testing of residual chlorine on-site to avoid chlorine loss in the sample

• Highly accurate free and total chlorine testing at concentrations below 20 ppb to provide higher confidence in the feed water dechlorination process with GAC

• Less chlorine damage to the membrane maintains salt rejection and high quality permeate

• Less chlorine damage for less expensive membrane replacement and less down-time

Instrument

LPV449.98.01002	DR1300 FL Portable Fluorometer w/ Bluetooth

Reagents

34252000	ULR Fluorescence Total Chlorine Test Kit, 3-100 µg/L (ppb), 100 Tests
34251000	ULR Fluorescence Free Chlorine Test Kit, 2-100 µg/L (ppb), 100 Tests
34250000	ULR Fluorescence Sulfite Test Kit, 6-500 µg/L (ppb), 100 Tests

Accessories

LPZ449.99.00001	16 mm Sample Cell Adapter & Cover
LPZ449.99.00002	DR1300 FL Bluetooth Dongle
25639000	16 mm Sample Vials, pk/6
3563500	Sample Vial Holder for 16 mm Fluorescence Test Sample Cell

References:
1. Cliff Gilbert; "Avoiding Testing Errors: Protecting RO Membranes from Chlorine Damage"; Waterworld.com; March 1, 2009
2. Wes Byrne; "Mistakes to Avoid in RO Treatment Systems"; Waterworld.com; Sep 1, 2011
3. Rich Franks, P.E., Alexandra Rubin and Craig Bartels, Ph.D., Hydranautics, Oceanside, CA; Peter Cartwright, P.E., Cartwright Consulting Co., Minneapolis, MN; IWC 19-33: "The Contrarian Use of Chlorine to Control Biofouling in RO Membranes"; July 23, 2020

Hach author:
Carsten Schulz
Product Applications Manager