



Bisulfite Dechlorination Control

Bisulfite dechlorination control with Hach's DR1300 FL to protect RO membrane assets



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 due to 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 the membranes, it is necessary to keep the chlorine concentration very low. Sodium bisulfite is often used to reduce the chlorine going into the RO. Correct dosage of sodium bisulfite is critical. Bisulfite also reacts with dissolved oxygen in the water which leads to an increased anaerobic biological growth with the potential to rapidly foul the systems. Since chlorine/hypochlorite can also change its concentration depending on its age, it can be challenging to get the correct bisulfite concentration injected relative to the chlorine concentration.

This also means that monitoring the bisulfite is difficult. Traditional analytical methods for sulfite are limited in terms of range, accuracy, precision, and ease of use. Excessive bisulfite decreases pH, which will cause the ORP reading to increase, even if no chlorine is present. The control system will respond by adding even more bisulfite, eventually followed by biofouling. Thus, an accurate system to analyse bisulfite independent from pH is required.

In addition, residual chlorine monitoring requires a very sensitive, accurate and easy-to-use chlorine test. Due to insufficient accuracy at very low Cl_2 concentrations, potential sample matrix interferences or a cumbersome use model, existing technologies, such as colorimetric DPD methods or amperometric titration, are often not satisfactory for efficient dechlorination control.



DR1300 FL Portable Fluorometer

The Solution

Accurate testing of bisulfite and residual chlorine 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 & total chlorine concentrations (2-100 ppb), as well for bisulfite (6-500 ppb), based on fluorescence technology.

The method is as easy to perform as Hach's colorimetric tests but with much higher sensitivity, providing highly accurate results to less than 20 ppb Cl₂ and in the full range of 6-500 ppb of bisulfite. Hach's new DR1300 FL is a portable fluorometer, which enables immediate testing of residual chlorine and bisulfite onsite.

The test procedure of Hach's patent pending fluorescence methods is easy – simply fill your water sample and liquid reagents into a vial, start the timer of the instrument, and read the result after 2-15 minutes depending on the test.

The Benefits

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

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

- Easy-to use, portable system for immediate testing of residual chlorine and bisulfite onsite to avoid loss of the analyte in the sample
- Accurate bisulfite testing will help to add the right amount of bisulfite and to avoid critical pH interference known to occur with ORP testing
- Highly accurate free and total chlorine testing at concentrations below 20 ppb will provide higher confidence in the feed water dechlorination process
- Less chlorine damage to the membrane maintains salt rejection and high-quality permeate
- Less chlorine damage results in less frequent membrane replacement and less downtime



Instrument

LPV449.98.01002	DR1300 FL Portable Fluorometer w/ Bluetooth
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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

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