Ultrafilter cleaning and sanitization in ultrapure water systems

The question was raised regarding the use of sodium hydroxide (NaOH) to sanitize and/or depyrogenate UF modules. In response, it is still somewhat common practice to use 0.1 N or stronger sodium hydroxide (caustic soda) to treat filtration devices. However, this must be done with caution. Especially when ion exchange is involved.

The use of sodium hydroxide presents several problems when used in a water purification system. First, a high purity or reagent grade NaOH must be used so sparingly soluble material does not remain in or on the UF membrane. Residue from granular NaOH can stick to a membrane surface causing an increase in rinse-up time to 18.0 MΩ × cm after treatment. Systems that use NaOH to treat UF modules normally require up to 8 hours for the sanitization period. This is needed to get the caustic out of the system after treatment. Caustic is slimy and is difficult to rinse out of filters.

Second, NaOH freezes at about 12–13 °C. If the feed water to a system is close to the freezing point of the caustic, the caustic will begin to crystallize in the water. This will make it difficult to almost impossible to get the material out of a system. Lower concentrations of caustic have a lower freezing point temperature. However, when granulated material is used, such as in the Millipore systems, the concentration of caustic can be relatively high in the solution next to the granules as the caustic dissolves. Millipore requires three grams of NaOH for the sanitization period. Millipore has two sanitization cycles consisting of a 7-hour and 8-hour cycle. Millipore also requires over 25 liters of feed water to be available for the treatment cycles.

Third, the caustic soda used must not contact the ion exchange resins in a system. If this occurs, the anion resin could begin to regenerate causing an exchange imbalance. Further, any magnesium stripped from the cation resin or found in the feed water can react with the caustic forming magnesium hydroxide. Magnesium hydroxide (sheet rock) will precipitate into a white particle that will foul the remaining resin bed. Therefore, an isolation valve is needed to prevent any re-circulation of the caustic.

The arium 611 UF and VF modules use a dilute Sodium Hypochlorite solution to sanitize the UF modules. This is based on recommendations from the UF supplier. Any Hypochlorite that is returned to the inlet cartridge pack (pack 1) cleans the re-circulation tubing. The activated carbon and catalysts in pack 1 removes any residual chlorine. This provides greater treatment of the internal components of the system and the ion exchange resins are protected from oxidation. **Activated carbon will not remove caustic.**

The arium 611 is sanitized in a more professional and safer way than the systems from our competitors.

Sartorius AG
Weender Landstrasse 94–108
37075 Goettingen, Germany

Phone +49.551.308.0
Fax +49.551.308.3289

www.sartorius.com/arium

USA +1.800.3687178
UK +44.1372.737100
France +33.1.69192100
Italy +39.055.505671
Spain +34.91.3588566
Japan +81.3.33295533

Specifications subject to change without notice.
Printed in Germany on paper that has been bleached without any use of chlorine.
W/sart-000 · G
Publication No.: SLG2021-e01041
Order No.: 85030-514-90