NOM Removal for Drinking Water

In Northern Europe, 90% of the population is served with treated surface or lake water. Because surface waters typically contain natural organic matter (NOM), a complex mixture of organic compounds (i.e. decomposing vegetative materials and animal matter) and color, this water must be treated to produce safe drinking water.

NOM removal from source waters is very important in drinking water treatment because it affects the color, taste and odor properties of water, contributes to disinfection byproduct formation, increases chlorine or disinfectant demand and affects biological regrowth in distribution systems.

Several NOM removal technologies and processes exist and are used today, including:

1. Nanofiltration
2. Coagulation and filtration using sand filters and ultrafiltration or microfiltration
3. Ozonation and biofiltration
4. Sorption processes using ion exchange and activated carbon filtration

Since NOM in most surface waters consist mainly of humic substances (molecular weight of 1,000-10,000 Daltons), it is possible to separate these humic substances directly by nanofiltration (NF), especially if the NOM concentration and color content is high (>30 mg Pt/l) and turbidity is low (<1 NTU).

Small and remote communities in Northern Europe rely on simple and easy to maintain surface water treatment systems, typically less than 3,000 m^3/day (0.8 MGD) and up to 16,000 m^3/day (4.2 MGD). Spiral-wound nanofiltration systems have proven to meet the needs of these communities as they are fairly automated and require little attention from system operators. Most of these small drinking water systems consist of cellulose acetate (CA) membranes with a molecular weight cut-off of 1,000-2,000 Daltons (Da). CA membranes are preferred (over polyamide membranes) due to their chlorine tolerance and non-polar, smooth membrane surface which leads to less fouling. Even though the CA membrane may be less prone to fouling, pretreatment and regular cleanings are recommended to ensure longer membrane life.

A typical NF plant for NOM removal consists of a pretreatment unit using a 50-micron sieve. The pretreated water is then sent to the NF membranes for color removal and organics reduction. Some of the concentrate from the NF membranes is recycled back to the feed in order to increase recovery (typical system recoveries are 70-80%). An alkaline filter (calcium carbonate) is often placed after the NF system to increase the level of calcium and bicarbonate in the typically soft and corrosive water. These systems are operated at a pressure of 4-8 bar (58-116 psi) and a flux of 15-18 lmh (8.8-10.6 gfd) and have proven to last 5 or more years.

To prevent membrane fouling, the membranes are generally cleaned daily using a chemical rinse. Additionally, a more intensive cleaning is performed once or twice a year.

TRISEP® SBNF, a CA membrane with a nominal molecular weight cut-off (MWCO) of 2,000 Da was developed specifically for customers treating surface waters in Northern Europe and is well-suited for removal of organics and color. These SBNF elements are available in 4- and 8-inch sizes and varying feed spacer thicknesses. A specialty element, certified by the Drinking Water Inspectorate (DWI), is also available for use in drinking water applications in the U.K.: 8040-SBNF-DWI element.

Contact

Europe
Germany: +49 611 962 6001
Italy: +39 0721 1796201
info@microdyn-nadir.com

Americas
USA: +1 805 964 8003
sales.mnus@microdyn-nadir.com

Asia
Singapore: +65 6457 7533
China: +86 10 8413 9860
waterchina@mann-hummel.com

FORM NO.: TA-021
REVISION DATE: 02/05/2020

MICRODYNNADIR
A MANN+HUMMEL Company