FILMTEC™ Membranes

Water Chemistry and Pretreatment: Biofouling prevention of FILMTEC Elements with DBNPA

DBNPA (Section 2.6.5)

Membranes in general are prone to fouling due to several causes, one of which is biofouling caused by bacteria. Biofouling can form a foundation to collect other debris and lead to further problems. Symptoms of a fouled membrane include decreased permeate flow at a constant feed rate, increased pressure necessary to maintain constant permeate flow and decreased salt rejection. In order to prevent biofouling the use of a biocide is recommended. The biocide should be dosed from the beginning of using a new and/or clean membrane. The following are the requirements for a biocide:

- Biocides must be compatible with the membrane.
- They must be fast acting.
- They must be cost effective.
- Biocide must have acceptable transportation, storage, stability and handling characteristics.
- Biocide should not appear in the permeate.
- Biocide must have broad spectrum control; e.g. planktonic and sessile organisms (algae control is seasonal and situational).
- They should be biodegradable.
- They should be compatible with current and upcoming regulations.

A material suited for this application is DBNPA (2,2, dibromo-3-nitrilo-proprionamide), which has the following characteristics:

- Compatible with the membrane
- Fast acting
- Cost effective
- Acceptable transportation, storage, stability and handling characteristics
- Broad spectrum control (e.g., planktonic and sessile organisms); algae control is seasonal and situational
- Biodegradable

There are several DBNPA-based products available. For more information about DBNPA or to find a supplier, refer to the Dow Biocides website at www.dowbiocides.com.

In RO systems operating with biologically active feed water, a biofilm can appear within 3-5 days after inoculation with viable biological organisms. The optimal frequency for sanitization will be site specific and must be determined by the operating characteristics of the RO system. There are two different types of application, slug dosing and continuous feed.

To both sea water and brackish industrial water production, DBNPA active ingredient, can be added to the RO feed water at a rate of up to 20 ppm, based on feed water flow, using an addition cycle of at least 30 minutes.

When used in the production of potable water, dosage limits of 3 ppm for brackish water and 12 ppm for sea water, based on the feed water flow, need to be respected. This is to ensure that the approved SPAC (single product active concentration) of 90 ppb DBNPA is not exceeded in the permeate. When used in potable water production, only the off-line use of DBNPA is supported.

DBNPA (Section 2.6.5) (cont.)

DBNPA should not be added in the presence of sodium bisulfite residuals or other reducing agent residuals which are being added to the feed water of the RO system. If the feed water is expected to contain measurable quantities of sodium bisulfite or other reducing agent residuals, then the addition of reducing agents must be suspended at least 15 minutes prior to the addition of DBNPA in order to avoid decomposition of the active ingredient.

Note that although DBNPA is nonoxidizing, it does give an ORP response in approximately the 400 mV range at concentrations between 0.5 and 3 mg/L. For comparison, chlorine and bromine give a response in the 700 mV range at 1 mg/L, which increases with increasing concentration. This increase in ORP is normal when adding DBNPA and it is recommended the ORP set-point is by-passed during DBNPA addition.

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