Long-term evaluation of novel pilot-scale membrane systems for drinking water production

by Soryong Chae (Ph.D)

■ Experimental Results and Discussions (Case study 1):

As shown in Fig. 1, most of turbidity (94.1%), humic substances (78.5%), TOC (41.8%), and total aluminum (90.4%) were removed by the JMS (Jet Mixed Separator) with pre-coagulation. However, total iron (73.2%) that was mostly supplied as coagulant (PSI, polysilicato-iron) was rejected by the RSF (Rapid Sand Filtration). In term of TOC, the removal by the HF-S (0.05 μm, non-homogenous structure) was about 7% higher than by the HF-L (0.1 μm, homogeneous structure).

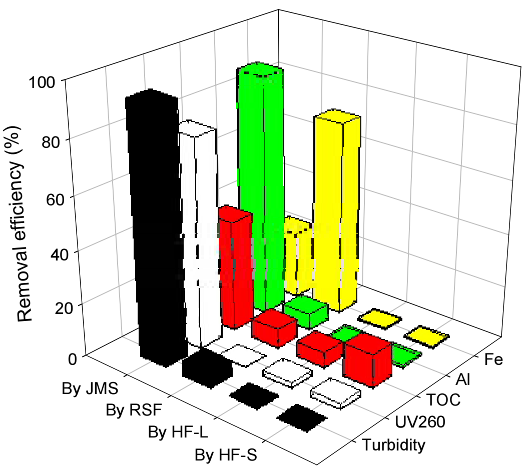

Fig. 1. Removal efficiencies of various pollutants in the membrane system.

Fig. 2 and 3 show that variations of temperature, permeate flux and TMP of the HF-L and the HF-S membrane, respectively. As shown in those figures, in the intial step, the TMP was maintained at about 0.2 Bar until 5 days and then increased gradually as temperature incresed. Finally, it took about 35 and 45 days to reach the TMP of 1.2 Bar in the the HF-L and the HF-S membrane, respectively. Therefore, from this study, it was concluded that the HF-S membrane having dense layer on the skin was more effective to reduce membrane fouling than the HF-L membrane having homogeneous structure although the nominal pore size of the HF-S membrane was smaller than that of the HF-L membrane.

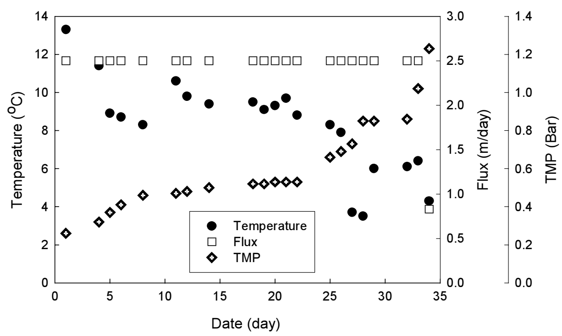

Fig. 2. Variations of flux and TMP in the HF-L membrane (0.1 μm).

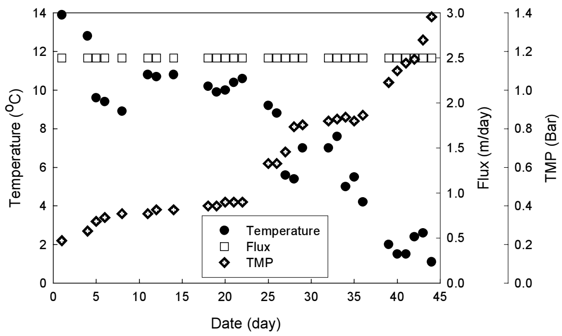

Fig. 3. Variations of flux and TMP in the HF-S membrane (0.05 μm).

■ Further Study (Case study 1):

For the second opearation mode, only the coagulant was changed from PSI to PAC (polyaluminium chloride) under the same condition. Performance study of the membrane filtration system and modeling about effects of temperature and water quality on membrane fouling will be conducted.