Organic fouling and osmotic backwashing in PRO

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\textbf{ABSTRACT}

The pressure-retarded osmosis process is the next generation seawater desalination technology and is considered as eco-friendly and economic renewable energy. As such, there are active studies of means of efficient cleaning to restore the membrane performance degraded due to the reversible membrane fouling that inevitably occurs after prolonged operation. This study evaluated the fouling rate by organic alginate, humic, and BSA (bovine serum albumin). Also, we focused on the comparison of cleaning methods which are physical flushing and osmotic backwashing (OB). For the comparison of the cleaning efficiency, we used alginate compound as a model substances representative of natural organic matter. Physical cleaning (PC) is the flushing method by flowing the distilled water on the membrane active and support layer in high velocity to remove the accumulated foulants on the membrane surface. OB is the method of backflow generated by osmosis to remove the accumulated foulants on/in the membrane active and support layer. The comparison indicated that OB resulted in higher membrane performance recovery than PC. To determine the optimum condition for higher membrane performance recovery from OB, the tests were performed at different concentrations of OB and cleaning speeds. The test indicated that the membrane performance recovery efficiency increased when the concentration increased to up to 1.7 M NaCl and when the cleaning speed increased by changing the feed flow rate at the constant concentration of 1.2 M NaCl.

\textit{Keywords:} Physical cleaning; Osmotic backwashing; Membrane performance recovery

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