

## Behaviors of commercialized seawater reverse osmosis membranes under harsh organic fouling conditions

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### ABSTRACT

Reverse osmosis performance is often limited by membrane fouling, which reduces the permeate flux and membrane life-span, requires costly pretreatment, higher operating pressure, and frequent chemical cleaning; results in increased water cost. Organic fouling is inevitable in seawater reverse osmosis (SWRO) desalination plants because certain amount of humic substances — organic foulants — naturally exists in seawater. In this study, the effect of harsh organic fouling condition on performance of four commercialized SWRO membranes was compared. The performance here was defined as flux, salt rejection and boron rejection. The performance variation pattern was similar for all tested membranes. Contact angles of clean and fouled membranes were measured and analyzed to gain insight into the fouling mechanism. The results provided the clue to investigate the interaction of humic acid and membrane surfaces, how important are membrane surface properties in the interaction.

*Keywords:* Organic fouling; Reverse osmosis membranes; Desalination; Surface properties; Flux decline

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