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Evaluation of ion exchange pretreatment options to decrease fouling of a reverse osmosis membrane

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ABSTRACT

This research compared pretreatments by anion exchange, cation exchange, and combined ion exchange to a natural groundwater before reverse osmosis (RO) in order to determine which ion exchange process showed the greatest reduction in RO membrane fouling, quantitatively determined by flux decline. It was shown that all ion exchange pretreatments yielded similar rates of flux decline; however, anion exchange pretreated samples yielded overall lower flux meaning it was a less effective pretreatment to reduce fouling. Therefore, the removal of divalent cations, in particular calcium, from a high hardness water by cation exchange showed a greater reduction in fouling of RO compared with the removal of natural organic matter by anion exchange.

Keywords: Ion exchange; Reverse osmosis; Cation exchange; Anion exchange; Membrane fouling; Calcium; Natural organic matter

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