



Enhanced boron removal using polyol compounds in seawater reverse osmosis processes

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ABSTRACT

The removal of boron is a very important issue in desalination using seawater reverse osmosis (SWRO). A novel approach using polyol compounds to remove boron is introduced in this study. Polyols are compounds possessing multiple hydroxyl groups and they can combine with uncharged boric acid by generating anionic complexes. As a result, a large molecule is formed and it can be easily rejected by SWRO membrane at seawater pH. Lab-scale SWRO tests were performed to investigate the effect of polyol on the boron removal using different types of polyol (xylitol, glycerol, and D-mannitol). The polyol–boron reaction occurs in seawater condition with low boron concentration and various ion compounds, which leads to two important findings that boron-polyol reaction occurs with low boron and polyol concentrations, and there are no significant inhibitors for the reaction in seawater. The boron-polyol reaction rate is so fast that it can be easily applied to full-scale SWRO processes. The boron removal rate increases at higher polyol concentrations and at larger numbers of hydroxyl groups of polyol.

Keywords: Seawater reverse osmosis (SWRO); Boron removal; Polyol; Hydroxyl group

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