Enhanced boron rejection of a thin-film composite membrane by embedding additives including hydroxyl groups

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ABSTRACT

Herein, (±)-3-amino-1,2-propandiol (APD) and N-methyl-D-glucamine (NMDG), which have hydroxyl groups, were respectively embedded in thin-film composite (TFC) membranes to enhance boron rejection. The membranes prepared with embedding materials (APD or NMDG) that are involved in interfacial polymerization showed an increased degree of crosslinking, which was confirmed by X-ray photoelectron spectrometry, causing a decrease of surface roughness and water flux. However, the APD and NMDG bound to the inside of the active layer enhanced boron rejection of the TFC membrane to 85.5% and 87.7%, respectively, at pH 8 due to tightening of membrane pores by the enhanced degree of crosslinking and complex formation of the additives with boric acid.

Keywords: Boron rejection; Reverse osmosis; Thin-film composite membrane

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