



The performance of contact flocculation–filtration as pretreatment of seawater reverse osmosis

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ABSTRACT

Deep bed filtration has traditionally been used as a pretreatment in seawater desalination. The performance of contact flocculation–filtration (CFF) as pretreatment of seawater reverse osmosis (SWRO) was evaluated in terms of pressure drop through the filter and removal of organics and turbidity. The average turbidity, total suspended solids, and dissolved organic carbon (DOC) of raw seawater were 0.92 NTU, 3.6, and 1.12 mg/L, respectively. The performances of CFF were experimentally evaluated with different flocculant doses (0.5–3.0 mg Fe³⁺/L) and rapid mixing times (1.7–14.4 s). Here rapid mixing was performed in a spiral flocculation unit which consisted of a PVC tube of length 0.5 m and internal diameters of 0.16 and 0.40 cm. The experimental results show that the filtration rate of 10.0 m/h led to an extensive increase in both head loss (pressure drop) and turbidity as compared to those at filtration rates of 5.0 and 7.5 m/h. The head loss also significantly decreased when the flocculant dose was reduced from 3 to 0.5 mg Fe³⁺/L. However, the organic matter (26% of DOC) removal was lower at a lower dose of ferric chloride (1.0 mg/L as Fe³⁺). The removal efficiency of DOC at low concentration of ferric was improved considerably through the improvement of rapid mixing. The application of CFF process also led to a significant decrease in ultrafilter-modified fouling index (UF-MFI).

Keywords: Contact flocculation–filtration; Organic matter; Pretreatment; Seawater

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