

Comparison of fouling indices in assessing pre-treatment for seawater reverse osmosis

Korshed Chinu, Saravanamuth Vigneswaran*, Laszlo Erdei, Hokyong K. Shon, Jaya Kandasamy, H.H. Ngo

School of Civil and Environmental Engineering, Faculty of Engineering and Information Technology, University of Technology, Broadway, Sydney, NSW 2007, Australia
email: s.vigneswaran@eng.uts.edu.au

Received 1 June 2009; Accepted 21 December 2009

ABSTRACT

In this study, different processes such as flocculation with ferric chloride (FeCl_3) and deep bed filtration (sand filtration and dual media filtration) as a pre-treatment were used for seawater desalination. The performance of these pre-treatments was determined in terms of silt density index (SDI) and modified fouling index by using microfilter (MF-MFI), ultrafilter (UF-MFI), and nanofilter (NF-MFI) membrane. MFI and SDI indicated that deep bed filtration with in-line flocculation was better pre-treatment than flocculation alone as colloidal particles are removed after this pretreatment. UF-MFI and NF-MFI indicated that these pretreatment cannot remove dissolved organic matter as the fouling reduction was smaller. Detailed molecular weight distribution (MWD) of seawater organic matter was examined after different pretreatments. MWD of the initial seawater mainly ranged from 1510 Da to 130 Da. Deep bed filtration with in-line flocculation removed relatively large molecular weight of organic matter (1510–1180 Da), while the small molecular weights (less than 530 Da) were not removed.

Keywords: Fouling index; Pre-treatment; Seawater desalination; Reverse osmosis

* Corresponding author.