Desalination and Water Treatment
www.deswater.com
1944-3994/1944-3986 © 2012 Desalination Publications. All rights reserved
doi: 10.1080/19443994.2012.672162

43 (2012) 124–130
April

Taylor & Francis
Taylor & Francis Group

Effect on backwash cleaning efficiency with TDS concentrations of circulated water and backwashing water in SWRO membrane

Jong Woo Nam[a], Jun Young Park[a], Ji Hoon Kim[b], Yong Soo Lee[a], Eui Jong Lee[a], Min Jung Jeon[a], Hyung Soo Kim, Am Jang[a,*]

[a]*Department of Civil, Architectural and Environmental System Engineering, Sungkyunkwan University, Suwon, Republic of Korea*
Tel. +82-31-290-7526; Fax: +82-31-290-7549; email: amjang@skku.edu
[b]*Water & Environment Division, Desalination Group, POSCO E&C, Posco E&C Tower 1, 36, Songdo-Dong, Yeonsu-Gu, Incheon, Republic of Korea*

Received 25 December 2011; Accepted 10 February 2012

ABSTRACT

The osmotic backwash in the seawater reverse osmosis (SWRO) membrane induced by the osmotic pressure of a salt feed solution was investigated. The system was shifted immediately to a backwash process by reducing the operation pressure to zero to allow a net backwash driving force. The backwash process has two distinct stages: first stage—the backwash flux drops sharply at the initial, second stage—the backwash flux reaches equilibrium with time. A backwash cleaning efficiency is affected by some factors such as circulated water concentration, operation pressure, and cross-flow velocity in the SWRO membrane system combined with osmotic backwash. The feed water (or circulated water) concentration is the most influential and the pressure and cross-flow velocity are relatively less significant. In this study, the influence of backwashing water concentration on backwash cleaning efficiency was investigated under various circulated water concentrations. When the circulated water concentration was higher, the backwashing flux became greater and required less time to reach equilibrium; however, the internal concentration polarization occurred in the permeate side more rapidly and the backwash accumulated volume curve could be reversed with time. These results support the necessity of the optimization of the SWRO filtration/osmotic backwash mode between the concentrations of the feed water, the permeated and circulated water, and the time between the filtration and the backwash.

Keywords: Reverse osmosis; Osmotic backwash; Cleaning; Fouling; Concentration polarization

*Corresponding author.

The 4th International Desalination Workshop (IDW4), 16–18 November 2011, Jeju Island, South Korea