A preliminary study on the volume reduction of pre-treatment sludge in seawater desalination by forward osmosis

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\begin{abstract}
Forward Osmosis (FO) can be applied to recover water from the pre-treatment sludge of seawater reverse osmosis process. This study investigated the effect of the concentration of two draw solutions (MgCl\textsubscript{2} and NaCl) in the reduction of Fe(OH)\textsubscript{3} sludge volume and the effect of cross flow velocity on flux through FO membrane. Higher the concentration of NaCl and MgCl\textsubscript{2} higher the water flux observed. However, the percentage increase was not significant due to the occurrence of internal concentration polarisation. MgCl\textsubscript{2} draws marginally increased water flux than NaCl, when the conditions of feed and draw solutions were similar. Increase in cross flow velocity (from 0.25 to 1.0 m/s) marginally changed the flux with both draw solutions as higher cross flow velocities were unproductive to beat the external CP effect along the membrane surface. However, at 1 m/s, highest fluxes were obtained for both draw solutions.

\textbf{Keywords:} Concentration polarisation; Desalination; Forward osmosis; Pre-treatment; Sludge
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