

Influence of draw solution concentration, operation mode, and flow direction on flux behavior in forward osmosis in a spiral wound module.

배창성, 양대륙†
고려대학교
(dryang@korea.ac.kr†)

Forward osmosis (FO) is a concentration-driven membrane process that water molecules migrate by diffusion into a more concentrated solution through a semi-permeable membrane. This study has investigated flux behavior and internal concentration polarization (ICP) with asymmetric FO membranes in a 4040 modified spiral wound module for sea water desalination, Hydration Technologies, Albany, OR. The feed and draw solution were both composed of NaCl. The feed solution concentration ranged from 0 (deionized water) to 0.6 M, while the draw solution ranged from 0.6 to 1.2 M. Operation modes were 2 types, membrane active layer facing to feed solution (AL-FS) and draw solution (AL-DS). Flow direction of feed and draw solution in the modified Spiral FO module were normal and cross direction based on characteristic cross current of the module. As a result, water flux values were from about 9.0 to 4.0 L/(m² hr), and the values are higher in AL-DS than AL-FS. However, tendency of higher ICP are shown in AL-DS with solutions contain a number of components. Furthermore, cross flow direction in the module is more effective than normal flow direction in terms of performance.