

Performance Evaluation of Forward Osmosis Module

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Among many desalination methods, desalination using forward osmosis (FO) recently receives the considerable attention. The most distinctive advantage of using the membrane-based desalination methods by FO and RO is no need of thermal resources. Since there are two inlet streams in FO process and one stream should be flowing inside the membrane envelope, the current design of the spiral-wound module cannot be utilised. Therefore the modified spiral-wound module was suggested in the past. In this study, models for the flat sheet membrane modules are developed on the basis of the standard flux equations considering internal/external concentration polarization (ICP/ECP). These mathematical models should be solved iteratively and numerically because of some reasons: The first reason is that the equations are implicit and highly nonlinear due to ICP and ECP terms. Second, there is a cross-current direction of the feed and draw solution in the both modules. Thus, the model should also be constructed in 2-dimension. Furthermore, the structural effects caused by winding a membrane envelope around the central tube in the modified spiral-wound are investigated.