Aquaporin proteins are of great interest to the membrane science community because of their unique characteristics of high water permeability and perfect molecular selectivity. Although these characteristics make aquaporins particularly valuable for desalination applications, none of these aquaporin-based membrane designs has been produced at a large scale. In this work, we report on the recently designed and commercially available Aquaporin Inside flat-sheet membrane designed for forward osmosis (FO) by Aquaporin A/S, Lyngby, Denmark. The Aquaporin Inside flat-sheet membrane is the first commercially available thin-film composite (TFC) FO membrane to incorporate aquaporin proteins into its polyamide-based selective layer. The membrane tested, which is a first-generation membrane, achieved water fluxes of 14.0 and 8.8 L m⁻² h⁻¹ with low reverse salt fluxes of 4.6 and 4.0 g m⁻² h⁻¹ in pressure-retarded osmosis (PRO) and FO modes, respectively, using 1.0 M sodium chloride as the draw solution and deionized water as the feed solution. The membrane structural parameter was calculated to be 630 μm, which is similar to those of existing commercial membrane options for FO. The Aquaporin Inside membrane was found to exhibit water and reverse solute flux performances similar to those of other commercially available varieties, although this membrane represents one of the few TFC membranes that is available to the academic community for FO testing at the time of this writing.
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