Review of seawater natural organic matter fouling and reverse osmosis transport modeling for seawater reverse osmosis desalination

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ABSTRACT

To date, over 80 papers on transport modeling and natural organic matter (NOM) relating to seawater reverse osmosis (SWRO), have been reviewed. As a result of such focus, NOM, one of the main foulants related to reverse osmosis (RO) membranes, has been shown to possess intrinsic chemical complexities and ambiguities, necessitating further investigation. Consequently, since such NOM fouling and transport mechanisms associated with SWRO are not fully understood, a summation of previous studies has been included in the paper in question to systematize information, not only as to RO membrane transport modeling, but NOM fouling characteristics, as well. Accordingly, RO transport models in the review are classified into three categories: diffusion-based, pore, and irreversible thermodynamic models. In addition, specific features, unique assumptions, and applications for each model are examined. The paper consists of the following components towards meaningful understanding of NOM fouling model development during SWRO: 1) SWRO fundamentals as to membranes, 2) NOM fundamentals as to seawater, 3) RO transport modeling theories, 4) conclusion, and 5) future directions of NOM fouling model development.

Keywords: Natural organic matter (NOM); Seawater reverse osmosis (SWRO); Membrane transport models; Fouling mechanism

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