Desalination and Water Treatment
www.deswater.com

doi: 10.5004/dwt.2020.25083

184 (2020) 94–129
April

Progress of fitting models describing transport phenomena within nanofiltration membranes: a review

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Received 26 May 2019; Accepted 25 October 2019

ABSTRACT

Nanofiltration membranes have been widely used in various separation and purification applications such as industrial wastewater treatment, food, and pharmaceutical industries. During the last three decades, several mathematical models have been progressing to illustrate the transport phenomena and both the expression of water and solute fluxes in such a process. This paper looks into the aims and the limitations of the most used models by the research community, which gives a better understanding of these phenomena according to the complexity of this process. In this review, 24 mathematical models were presented from (Solution–diffusion models, irreversible thermodynamics models, extended Nernst–Planck equation and the Maxwell–Stefan model) those who give an overview contribution in this such study regarding the frequently problems (multi-ions solution, charged/uncharged solutes, pore geometry, membrane charge, and concentration polarization), each model present in this review was discussed in the terms of assumptions, advantages and disadvantages noticed.

Keywords: Nanofiltration; Mathematical models; Solution–diffusion models; Irreversible thermodynamic models; Extended Nernst–Planck models

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