

Modeling by Application of the Nernst-Planck Equation and Film Theory for Predicting of Chromium Salts through Nanofiltration Membrane

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Abstract : The objective of this study is to propose a model for the prediction of the mechanism transfer of the trivalent ions through a nanofiltration membrane (NF) by introduction of the polarization concentration phenomenon and to study its influence on the retention of salts. This model is the combination of the Nernst-Planck equation and the equations of the film theory. This model is characterized by two transfer parameters: Reflection coefficient s and solute permeability P_s which are estimated numerically. The thickness of the boundary layer, δ , solute concentration at the membrane surface, C_m , and concentration profile in the polarization layer have also been estimated. The mathematical formulation suggested was established. The retentions of trivalent salts are estimated and compared with the experimental results. A comparison between the results with and without phenomena of polarization of concentration is made and the thickness of boundary layer alimentation side was given. Experimental and calculated results are shown to be in good agreement. The model is then success fully extended to experimental data reported in the literature.

Keywords : nanofiltration, concentration polarisation, chromium salts, mass transfer

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