

Linearization of ultrafiltration models: analysis of experimental data from ultrafiltration tests

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ABSTRACT

A great number of models proposed in the literature that describe permeate flux decline with time in ultrafiltration can be linearized to obtain an equation expressed in terms of transmembrane pressure (TMP) divided by permeate flux, $\Delta P^2/J_p^2$, as a function of time. In this work, experimental results from pilot plant ultrafiltration tests are expressed in terms of $\Delta P^2/J_p^2$ vs. time to check their linearity. Regression analysis allowed the determination of the quotient: specific resistance of the gel layer/ gel layer concentration (r_g/C_g). Ultrafiltration tests were performed at constant temperature (25°C) and feed concentration (5 g/L) at different feed flow rates (1–3 m/s) and transmembrane pressures (0.1–0.4 MPa) with monotubular ZrO₂-TiO₂ (molecular weight cut-off: 15 kg/mol) and aqueous solutions of polyethylene glycol (PEG) of 35,000 g/mol.

Keywords: Ultrafiltration; Model; Gel layer resistance; Initial membrane fouling resistance

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