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Implications of critical flux and cake enhanced osmotic pressure (CEOP) on colloidal fouling in reverse osmosis: Modeling approach

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ABSTRACT

This article describes a predictive model to account for the performance of a reverse osmosis (RO) system under the influence of colloidal fouling (using silica particles as model colloids) in terms of transmembrane pressure increase (ΔTMP) in constant flux operation or flux drop (ΔJ_v) in constant pressure operation. The predictive model considers the implications of both the critical flux (J_{crit}) and cake enhanced osmotic pressure (CEOP) phenomenon and is based on the membrane retention, concentration polarization, mass transfer, resistance in series and osmotic pressure model, cake resistance, and critical flux concept.

Keywords: Reverse osmosis; Colloidal fouling; Critical flux; Cake enhanced osmotic pressure (CEOP); Constant flux; Constant transmembrane pressure

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