Preparation and application of positively charged quaternized chitosan/PEI composite nanofiltration membranes

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\textbf{ABSTRACT}

Membrane processes are gaining importance in water applications as a result of the advances in membrane technology and the increasing requirements on water quality. In this work, 2-hydroxypropyltrimethyl ammonium chloride chitosan with positively charged character and good membrane-forming ability was utilized to fabricate the functional layer of the composite nanofiltration (NF) membrane. Reinforced polyetherimide ultrafiltration membrane was used as the support layer for its excellent thermal and solvent resistance. Effects of polymer concentration, reaction time, cross-linking agent concentration, and cross-linking temperature on membrane performance were studied in detail. When the composite membrane was prepared under optimized conditions and tested at 0.3 MPa and 20$^\circ$C, the flux of the composite NF membrane was about 10.9 L/m$^2$h and the MgCl$_2$ rejection of it was about 83.1\%. The surface morphologies of the composite membrane and substrate membrane were observed by scanning electron microscopy. The composite membrane showed a classical positively charged membrane character which had higher rejection to multivalent cations.

\textit{Keywords}: Nanofiltration membrane; Dip-coating; Positively charged membrane; Quaternized chitosan

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