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ABSTRACT

The inherent hydrophilic nature of chitosan has gained significant attention with respect to its application in water treatment processes. This study was aimed to synthesize chitosan–glycerol (CSG) membranes for microfiltration (MF) applications in wastewater treatment via the solution casting and solvent evaporation technique. CSG membranes were prepared in the ratios 2:1, 3:1, and 4:1 and were cross-linked with phosphoric acid in the presence of ethanol. The synthesized membranes were characterized by tensile strength, swelling, Fourier transform infrared spectroscopy-attenuated total reflectance and Scanning electron microscopy studies to investigate their structural properties. The porosifier glycerol had a great influence on the tensile strength and elongation than the cross-linker. The pore size distribution of the membranes ranged from 28.1 to 51.6 Å with BET surface areas of 13.8–23.8 m² g⁻¹. Water permeation studies were conducted using a cross-flow MF module in batch analyses. The results indicated that 2:1 CSG membranes effectively removed over 95% of bacteria notably, Escherichia coli from wastewater. Various blocking mechanisms were investigated and are discussed in detail utilizing various fouling models such as standard, intermediate, complete, and cake formation, of which

Keywords: Chitosan; Glycerol; Membrane; Water treatment; Microfiltration; Pore blocking

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