Effect of different additives on the fabrication of hydrophilic polysulfone ultrafiltration membranes

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Polysulfone ultrafiltration membranes have been widely applied, especially for water and wastewater treatment. Polysulfone as membrane material presents several advantages, such as good mechanical properties, high thermal and chemical resistance, processing easiness, and wide availability in the market. However, the hydrophobic nature of the polysulfone membrane leads to a low water flux and increases the proneness to organic fouling. In order to overcome this problem, the effect of different additives and polymer concentration on the performance and morphology of polysulfone flat sheet membranes, prepared by phase inversion process, were investigated in this work. Several experimental sets were performed. The effect of polyvinylpyrrolidone to increase the pore density and membrane permeability was confirmed. Moreover, the effect of lithium chloride to reduce the amount of macrovoids in the membrane and to increase the viscosity of the casting solution was also confirmed. The fabricated membranes were characterized by atomic force microscopy, scanning electron microscopy, and infrared spectroscopy (ATR-IR). Furthermore, water permeability, retention tests to evaluate the molecular weight cut-off, and the real thickness of the prepared membranes as well as viscosity of the casting solutions were measured.

Keywords: Additive; Lithium chloride; Membrane preparation; Phase inversion; Polymeric membrane; Polysulfone; Polyvinylpyrrolidone; Ultrafiltration

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