Development of a New Copolymer to Shift Polyvinyl Chloride Membranes from Hydrophobic to Hydrophilic Behavior

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Abstract :

Polyvinyl chloride (PVC) is a popular choice for membrane production due to its strong mechanical and chemical durability, ease of fabrication, and affordability [1]. However, its inherent hydrophobicity limits significantly its application, causing concentration polarization and membrane fouling, which in turn impairs transport performance across various applications [1,2]. To address this issue and improve hydrophilicity, a copolymer of P(VC-*co*-vinyl alcohol (VOH)) was introduced into the membrane matrix at different weight ratio–0% (M_0), 25% (M_1), 50% (M_2), 75% (M_3), and 100% (M_4). The copolymer was synthesized, and its chemical structure was confirmed through nuclear magnetic resonance (NMR), Fourier transform infrared spectroscopy (FTIR), and gel permeation chromatography (GPC). Membranes were fabricated using a solvent evaporation method. Measurements of water contact angle and water uptake revealed a notable improvement of the hydrophilic behavior of the modified membranes as compared to the unmodified PVC membrane (Fig. 1).

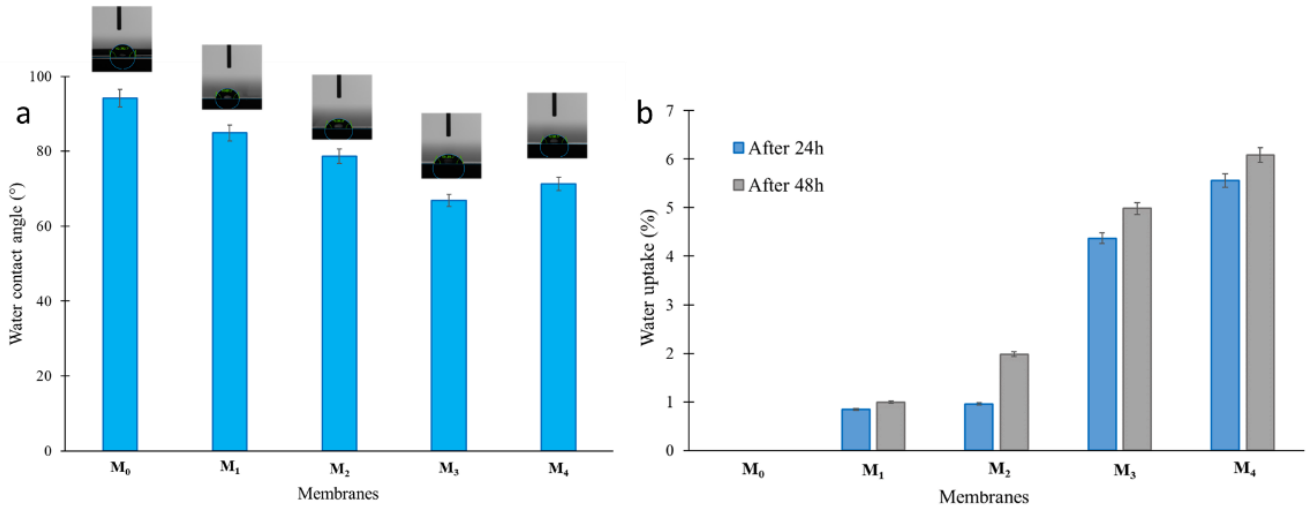

Figure 1: Water contact angle (a) and water uptake (b) of PVC and PVC/PVC-co-PVOH membranes.

References :

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