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Methyl acetate production by coupled esterification-reaction process using synthesized cross-linked PVA/silica nanocomposite membranes

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Abstract

Cross-linked PVA/silica nanocomposite membranes were synthesized via the solution casting technique and used to dehydrate the reaction mixture of methyl acetate through the coupled pervaporation-reaction in a batch mode using fumaric acid as the cross-linking agent. The membranes thus prepared were initially characterized using Fourier transform infrared spectroscopy (FT-IR), scanning electron microscope (SEM), X-Ray Diffraction (XRD), and thermal gravimetric analysis (TGA). The SEM micrographs established the nano-scale distribution of silica nanoparticles in the polymer matrix. Moreover, the XRD results showed that the crystalline regions of the polymer reduced slightly with increasing silica content of the membranes. Investigation of the effects of different experimental variables revealed that acid conversion was increased and water permeance through the membranes was correspondingly enhanced with increasing silica content of the membranes. The optimum acid conversion was

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