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Hydrothermal Synthesis of ZIF-7 Crystals and Their Composite ZIF-7/CS Membranes for Water/Ethanol Separation

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Abstract : The pervaporation process for solvent and water separation has attracted research attention due to its lower energy consumption compared with conventional distillation processes. The membranes used for the pervaporation approach should exhibit high flux and separation factors. In this study, the ZIF-7 crystal particles were successfully incorporated into chitosan (CS) membranes to form ZIF-7/CS mixed-matrix membranes. The as-prepared ZIF-7/CS mixed-matrix membranes were used to separate mixtures of water/ethanol at 25℃ in the pervaporation process. The mixed-matrix membranes with different ZIF-7 wt% incorporation showed better separation efficiency than the pristine CS membranes because of the smaller pore size of the mixed-matrix membranes. The separation factor and the flux of the ZIF-7/CS membranes clearly exceed the upper limit of the previously reported CS-based and mixed-matrix membranes.

Keywords : pervaporation, chitosan, ZIF-7, memberane separation
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