Fabrication and enhancement of gas separation of Cellulose acetate film by blending technique with palladium acetate

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Abstract

Herein, we demonstrate successful fabrication of cellulose acetate (CA)/(PdOAc)2 blend membranes for the gas-permeation performance of H2, CO2, and CH4 gases. Pristine CA and CA/(PdOAc)2 blend membranes with various concentrations (0.5, 0.75 and 1 wt %) of (PdOAc)2 were prepared via vapor induced phase separation (VIPS) method. The membranes were investigated through various techniques such as ATR-IR spectroscopy to study the interaction between the CA and (PdOAc)2. Followed by morphological study by FESEM which showcased homogeneous blending between CA and (PdOAc)2. XRD patterns revealed the characteristic peaks denoting (PdOAc)2 and the change in crystallinity of the membranes upon blending. The alteration in mechanical strength of the blends due to incorporation of (PdOAc)2 into CA matrix was deliberated by tensile strength analysis. Gas experiments showcased permeability in the descending order of H2>CO2>CH4, with a selectivity of 2.02, 68.5 and 34 for H2/CO2, H2/CH4 and CO2/CH4 separation respectively for the optimum membrane.

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