

عنوان مقاله:

Optimizing CO₂/CH₄ Separation Performance of Modified Thin Film Composite Pebax MH ۱۶۵۷ Membrane Using a Statistical Experimental Design Technique

محل انتشار:

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خلاصه مقاله:

In this research, statistically based experimental design (central composite design, CCD) was applied to analyze and optimize the effect of PEG-ran-PPG (۱۰-۵۰ wt%) as a blending polymer and CuBTC (۰-۲۰ wt%) which is a metal organic framework (MOF) as a nano filler on the CO₂ permeance and CO₂/CH₄ ideal selectivity of Pebax MH ۱۶۵۷/polysulfone thin film composite membrane. In fact, the beneficial properties of polymer blending and mixed matrix membranes (MMMs) have been combined. Based on the regression coefficients of the obtained models, the CO₂ permeance was notably influenced by PEG-ran-PPG mass content, while the mass content of CuBTC has the most significant effect on the CO₂/CH₄ ideal selectivity. Experimental and statistical results showed that under the optimum conditions (PEG-ran-PPG: ۳۲.۷۶ wt% and CuBTC: ۲۰ wt%), nearly ۶۲۰% increase in the CO₂ permeance and ۴۳% enhancement in the CO₂/CH₄ ideal selectivity was observed compared to the neat Pebax membranes.

کلمات کلیدی:

CO₂ separation, Pebax, Composite membrane, Central composite design

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