Oxygen separation through p84 copolyimide/nanocrystalline cellulose carbon membrane: Impact of heating rates

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ABSTRACT

Separation of oxygen and nitrogen gas was studied by using tubular carbon membranes (TCMs) prepared from polymeric precursors. A coating procedure called dip-coating technique was employed to fabricate the TCMs using P84 copolyimide (PI) and nanocrystalline cellulose (NCC) as the main precursor and additive, respectively. Previous study has proved that properties of PI/NCC can be altered by changing the carbonization parameter, i.e. time, temperature, and environment. PI/NCC deposition on the ceramic tubular support was employed to produce diverse TCMs for gas separation via simple carbonization process. In this study, manipulation of heating rate was done to observe the effect of TCMs on gas permeation by setting the heating rate at 1, 3, 5, and 7C min–1. It was proved that heating rate during PI/NCC-based carbon membrane fabrication played a significant role in gas ideal selectivity test. In addition, heating rate at (3C min–1) showed an improvement in the membrane ideal selectivity but a reduction in the permeability.

KEYWORDS:

Heating rates, Oxygen and nanocrystalline cellulose (NCC), P84 copolyimide (PI), Tubular carbon membrane

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