ABSTRAK

Membran komposit pada substrat nilon berpori, lembaran graphene oxide (GO), dan polivinil alkohol (PVA) yang ditautkan silang dengan berbagai asam dikarboksilat telah berhasil difabrikasi. Penelitian ini bertujuan untuk membandingkan kinerja berbagai asam dikarboksilat sebagai penaut silang dalam mencapai efisiensi desalinasi, permeabilitas, dan stabilitas membran yang tertinggi. Kinerja membran dalam aplikasi desalinasi dievaluasi dengan mengukur fluks air dan penolakan garam selama periode 30 jam. GO berhasil disintesis menggunakan metode Hummers yang dimodifikasi, dan membran dipreparasi melalui filtrasi vakum dengan berbagai penaut silang asam dikarboksilat (asam malat, asam maleat, dan asam oksalat). Membran c-GO/PVA dikarakterisasi menggunakan difraksi sinar-X (XRD), Fourier-transform infrared spectroscopy (FTIR), sudut kontak air, dan scanning electron microscopy (SEM). Hasil eksperimen menunjukkan bahwa penambahan penaut silang meningkatkan stabilitas membran, sementara PVA meningkatkan sifat hidrofilik. Pengujian desalinasi menunjukkan bahwa membran GO murni memiliki fluks air yang tinggi namun rentan terhadap kebocoran dan memiliki penolakan garam terendah. Membran nilon GO/PVA c-Asam Malat menunjukkan stabilitas terbaik, mencapai fluks air sebesar 21,81 kg m^{-2} h^{-1} dan mempertahankan penolakan garam 100% selama 28 jam, menjadikannya kandidat yang menjanjikan untuk aplikasi pervaporasi.

Kata kunci : GO, Polivinil Alkohol, Asam Dikarboksilat, Desalinasi pervaporasi

ABSTRACT

Thin-film composited membranes on porous nylon substrates, graphene oxide (GO) sheets, and polyvinyl alcohol (PVA) crosslinked with various Dicarboxylic Acids have been successfully fabricated. This study aims to compare the performance of different Dicarboxylic Acids as crosslinkers in achieving the highest desalination efficiency, permeability, and membrane stability. Membrane performance in desalination applications was evaluated by measuring water flux and salt rejection over a 30-hour period. GO was successfully synthesized using a modified Hummers method, and the membranes were prepared via vacuum filtration with various dicarboxylic acid crosslinkers (malic acid, maleic acid, and oxalic acid). The c-GO/PVA membranes were characterized using X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), water contact angle, and scanning electron microscopy (SEM). Experimental results demonstrated that the addition of a crosslinker enhanced membrane stability, while PVA increased hydrophilicity. Desalination tests revealed that pure GO membranes exhibited high water flux but were susceptible to leakage and had the lowest salt rejection. The nylon GO/PVA c-Malic Acid membrane exhibited the best stability, achieving a water flux of 21,81 kg m^{-2} h^{-1} and maintaining 100.0% salt rejection for 28 hours, making it a promising candidate for pervaporation applications.

Keywords : GO, Polyvinyl Alcohol, Dicarboxyilic Acid, Pervaporative Desalination