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Vegetable oil-based polyurethane membrane for gas separation

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Abstract

In this research, vegetable oil was used to prepare new polyurethane membranes. Raw canola oil (CO) was utilized to synthesize a high functionality polyol. The hydroxyl functionality of synthesized polyol was controlled through esterification reaction to obtain a diol for thermoplastic polyurethane synthesis. Polyurethanes were synthesized via bulk two-step polymerization method and membranes were prepared through solution casting and solvent evaporation techniques. The effects of the synthesized canola oil based-diol (COBD), as a copolyol, on phase separation and gas permeation properties of the polyether (polytetramethylene glycol (PTMG)) based polyurethane membranes were evaluated. The obtained results were indicative of the strong tendency of COBD and hard segments to interact with each other and consequently form a new crystalline domain. The gas permeation properties of the prepared membranes were assessed using pure CO₂, CH₄, N₂ and He gases. The special effects of COBD on hard segments, increased the affinity of membranes to absorb gases with larger kinetic

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