Synthesis and gas transport properties of new soluble polyimide membranes

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Aromatic polyimides are an interesting class of polymeric materials for the preparation of membranes for gas separation because of their outstanding thermal stability, mechanical and physical properties and superior chemical stability. However, their applications were limited in many fields because the early polyimides were insoluble and intractable. Therefore, considerable research has been undertaken to devise new ways to circumvent these restrictions. In this study, we synthesized the soluble polyimides that prepared by a conventional two-step process involving the formation of polyamic acids followed by chemical dehydration to the polyimides in the presence of dianhydride and diamine in m-cresol. All synthesized polyimides were characteized by nuclear magnetic resonance(NMR) and fourier transform infrared spectroscopy(FT-IR). The thermomechanical properties of the polyimide membranes were observed with differential scanning calorimeter(DSC) and thermogravimetric analyzer(TGA). The gas permeability coefficients(P) and ideal selectivities for N_2, O_2, CO_2 and CH_4 of the prepared polyimides were measured with a time-lag apparatus.