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CO_2通过合成聚合物膜的促进传递

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摘要 Two kinds of fixed carrier membrane materials containing secondary amine and carboxyl groups whichcan be used as carriers of CO2 were prepared. One was poly(N-vinyl-γ-sodium aminobutyrate)(PVSA), whichwas obtained through the hydrolysis of polyvinylpyrrolidone (PVP) synthesized with N-vinylpyrrolidone(NVP) byradical polymerization. The other was poly(N-vinyl-γ-sodium aminobutyrate-co-sodium acrylate)(VSA-SA), whichwas obtained through the hydrolysis of copolymer of N-vinylpyrrolidone and acrylamide(AAm) (NVP-AAm). Thecomposite membranes were developed with PVSA or VSA-SA as active layer and polysulfone (PS) as supportmembranes. The permeation rates of pure CO2 and CH4 gas as well as binary mixtures of CO2/CH4 throughthe composite membranes were measured. The results show that the composite membranes present better CO2permeation rates than other fixed carrier membranes do reported in literature. For example, at 26℃, 1330 Pa of CO2pressure, the PVSA/PS composite membrane displays a CO2 permeation rate of 5.95 × 10-7 cm3.cm-2.s-1.pa-1with CO2/CH4 ideal separation factor of 212.1. At 20℃, 6400Pa of CO2 pressure, the VSA-SA/PS compositemembrane displays a CO2 permeation rate of 4.24 × 10-8 cm3@cm-2.s-1.Pa-1 with CO2/CH4 ideal separationfactor of 429.7. The results with the gas mixtures are not as good as those obtained with pure gas because ofthe coupling effects between CO2 and CH4. The heat cross-linked membrane shows good separation factor due todensification of the polymer.

关键词 facilitated transport carbon dioxide hydrolysis carrier polymeric membrane

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Facilitated Transport of CO_2 Through Synthetic Polymeric Membranes

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Abstract Two kinds of fixed carrier membrane materials containing secondary amine and carboxyl groups whichcan be used as carriers of CO2 were prepared. One was poly(N-vinyl-γ-sodium aminobutyrate)(PVSA), whichwas obtained through the hydrolysis of polyvinylpyrrolidone (PVP) synthesized with N-vinylpyrrolidone(NVP) byradical polymerization. The other was poly(N-vinyl-γ-sodium aminobutyrate-co-sodium acrylate)(VSA-SA), whichwas obtained through the hydrolysis of copolymer of N-vinylpyrrolidone and acrylamide(AAm) (NVP-AAm). Thecomposite membranes were developed with PVSA or VSA-SA as active layer and polysulfone (PS) as supportmembranes. The permeation rates of pure CO2 and CH4 gas as well as binary mixtures of CO2/CH4 throughthe composite membranes were measured. The results show that the composite membranes present better CO2permeation rates than other fixed carrier membranes do reported in literature. For example, at 26℃, 1330 Pa of CO2pressure, the PVSA/PS composite membrane displays a CO2 permeation rate of 5.95 × 10-7 cm3.cm-2.s-1.pa-1with CO2/CH4 ideal separation factor of 212.1. At 20℃, 6400Pa of CO2 pressure, the VSA-SA/PS compositemembrane displays a CO2 permeation rate of 4.24 × 10-8 cm3@cm-2.s-1.Pa-1 with CO2/CH4 ideal separationfactor of 429.7. The results with the gas mixtures are not as good as those obtained with pure gas because ofthe coupling effects between CO2 and CH4. The heat cross-linked membrane shows good separation factor due todensification of the polymer.

Key words facilitated transport; carbon dioxide; hydrolysis; carrier; polymeric membrane

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