Polyaniline Gas Separation Membrane from Highly Concentrated NMP Solution

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Fabrication of polyaniline gas separation membrane from highly concentrated NMP solution (>20% w/w) is reported. Six polyaniline emeraldine base (EB) membranes were prepared by following an exactly similar procedure. These dense films are unique in that all prior work has been limited to films prepared from solutions too dilute to be formed into commercial hollow fiber membranes (~ 5%). The transport measurements on these films were made using the time-lag technique and the results indicate gas pair ideal selectivities of $O_2/N_2 > 8$, $H_2/N_2 > 250$, and $CO_2/CH_4 > 50$. The pressure dependence of the EB membranes' permeabilities shows characteristics of a glassy polymer. Permeability of the EB membrane is temperature dependent which suggests that the gas permeation is mainly a diffusion limited process. Diffusion activation energies of He, H_2, CO_2, O_2, N_2 and CH_4 were also calculated from our measurements. A slight variation of the ideal selectivity of gas pairs at different temperature was also observed. The gas solubilities for O_2 and N_2 obtained by pressure-decay measurements are compared to those from the current work.