Preparation and Selective Oxygen Permeation Characteristics of Polydimethylsiloxane - Polyurethane IPN's Membrane

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Interpenetrating polymer networks based on polyurethane and polydimethylsiloxane have been prepared by simultaneous polymerization method, and the permeability of N_2/O_2 and pemselectivity of oxygen to nitrogen were evaluated. The polyurethane networks were prepared by reacting NCO group terminated polyurethane prepolymer composed of 2 eq. of TDI and 1eq. of polyol with the mixture of 1,4 - BD and TMP as the crosslinking agent. Polydimethylsiloxane networks were prepared by polymerizing the mixture of octamethylcyclotetrasiloxane, tetraammonium hydroxide and tetraethoxysilane. The prepared IPN's were confirmed by the measurement of Young's modulus and tanδ using dynamic spectrometer. And also the morphology of IPN's determined by electron microscopy was revealed a cellular structure of the average domain sizes to the contents of polydimethylsiloxane phase in the composition varying about 400 - 3000Å. The permeabilities of oxygen and nitrogen were better in the membrane increasing the contents of polydimethylsiloxane than having lower contents of polydimethylsiloxane in the composition. But the IPN's with lower contents of polydimethylsiloxane has the higher selectivity.