



Permeabilities of solvents through epoxy membranes prepared via chemically induced phase separation

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Received 3 September 2010; Accepted 3 January 2011

ABSTRACT

Epoxy membranes were prepared from epoxy resin, D.E.R. 331, and cured with 2,4,6-tris-(dimethylaminomethyl) phenol (DMP-30) in diisobutyl ketone (DIBK). It was found that either the surface or bulk morphology of the cured polymers was dependent on the solvent fraction in the reactive solution. SEM showed the surface pore size of the epoxy membranes was approximately 0.12 to 1.46 μm . It was observed that the overall porosity increases from approximately 0.38 to 0.54 by increasing the concentration of DIBK from 32 to 40 vol.% in the curing solution. Furthermore, the epoxy membranes possessing connected channels were formed via chemically induced phase separation (CIPS). The connected structure of the epoxy membrane was further confirmed by a permeation test. The permeability of the solvent was approximately 7–5700 $\text{l}/\text{m}^2 \cdot \text{hr bar}$, which was dependent on the porous structure, and cyclohexane had the highest permeability compared to the other solvents. The glass transition temperature of the cured epoxy membrane was higher than 110°C, and good thermal stability was confirmed by thermogravimetric analysis (TGA).

Keywords: Epoxy membrane; Phase separation; Porosity; Morphology; Permeability; Thermal stability

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