

Preparation of Microporous Polymer Membranes Using Supercritical CO₂

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Microporous polymer membranes have been prepared from polymer-solvent solutions using a supercritical fluid-phase inversion process in which CO₂ acts as a non-solvent. The thin polymer solution in a laboratory dish was located inside a pressure vessel and then the supercritical CO₂ was introduced to extract solvent from the polymer solution and induce the phase separation. The dry flat microporous membranes were obtained without collapse of the structure due to the absence of a liquid-vapor interface. In this work, we tested polystyrene, cellulose acetate, and poly(methyl methacrylate). Experiments were performed at various polymer concentrations, temperatures and pressures. The structure of the resulting polymer membranes was analyzed using scanning electron microscopy. Polymer concentration influenced the mean diameter of the pores. We also tested the membrane formation at pressures between 100 and 200 bar and at temperature between 30 and 60°C.