543e Novel Solvent Resistant Hydrophilic Hollow Fiber Membranes for Membrane Solvent Back Extraction

Praveen B. Kosaraju and Kamalesh K. Sirkar

Nondispersive membrane solvent extraction is being extensively used and studied for a number of applications including extraction of metals, pollutants and pharmaceutical products because of its well known advantages over conventional solvent extraction. In fact, there are existing large scale commercial applications. Membrane solvent extraction is generally followed by membrane solvent back extraction for regeneration of the organic extraction solvent. The mass transfer rate of solute in membrane-based solvent extraction is controlled by boundary layer resistances and the membrane resistance; the membrane phase resistance can be reduced by preferentially filling the membrane pores with the phase preferred by the solute. In the case of membrane solvent back extraction reactive or otherwise, it is preferred to have the pores of the membrane filled with aqueous phase. Hence there is a need for hydrophilic solvent resistant hollow fiber membranes for efficient back extraction. There are almost no solvent resistant hydrophilic membranes available having the required pore sizes. In the current study, novel solvent resistant hydrophilic membranes have been fabricated using available hollow fibers. The breakthrough pressures for immobilized organic-aqueous interphase at the membrane pore mouth were studied using various solvents. The membrane provided a stable immobilized organic-aqueous interface over a reasonable range of breakthrough pressures. The membranes were characterized by water permeability as well as by scanning electron microscope pictures. Back extraction of phenol from methyl isobutyl ketone into caustic solutions was used as a model system to study the performance of such microporous membranes. Transport rates of phenol were studied and compared with those in hydrophobic microporous polypropylene hollow fiber membranes. The novel solvent resistant hydrophilic membranes provide a new dimension to nondispersive membrane solvent back extraction.