ORGANIC SOLVENT NANOFILTRATION WITH NOVEL POLYMERIC MEMBRANES

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A very large variety of membranes polymeric or otherwise have been investigated over the last two decades for organic solvent nanofiltration (OSN). The materials and structures used to make OSN membranes include among others the following: poly (dimethylsiloxane) (PDMS); mixed matrix membranes (MMMs) of PDMS with zeolites and other fillers; asymmetric integrally skinned polyimide (PI) membrane crosslinked with aromatic or aliphatic diamines; polyaniline; polypyrrole; interfacially polymerized polyamide with or without functionalized carbon nanotubes; carbon-based membranes including graphene. Most of the studies involved polymeric membranes. One of the weaknesses of most polymeric membranes is their varying tendencies for swelling with demanding organic solvents aprotic or otherwise; this gets reflected in the solute rejection behaviors of such polymers. Diamine-crosslinked PI membranes show excellent resistance to organic solvents but have some swelling in the presence of water. To this end we have started studying membranes from particular classes of fluoropolymers which are extremely inert. Initially these membranes were studied for pervaporation-based selective removal from organic-organic mixtures and aqueous-organic mixtures. Next they were studied with various solvents for OSN over a considerable pressure range. We report preliminary results of solvent flux and solute rejection for such membranes. These studies were made with dense flat membranes of different thicknesses supported on appropriate porous supports.