

The effect of phase inversion promoters on the structure and performance of polyetherimide hollow fiber membrane using in gas-liquid contacting process

Abstract:

Low molecular weight organic compounds were added to the spinning dope as phase inversion promoters and their effects on the structure of polyetherimide (PEI) hollow fibers as well as their performance as membrane contactor were investigated. Water, methanol, ethanol, glycerol and acetic acid were added individually to the solvent NMP to prepare a dope containing 15 wt% PEI, 4 wt% additive, 81 wt% NMP and hollow fiber membranes were fabricated via wet spinning method. The solution containing water as the additive had the lowest thermodynamic stability and highest viscosity, which yielded hollow fiber with a thin skin layer of high porosity and a sublayer with sponge-like structure. The four other polymer solutions were more stable thermodynamically and less viscous. Fast solvent/coagulant exchange yielded thick skin layers of lower porosity and sublayers of finger-like macrovoids. Among all fabricated hollow fibers, adding methanol resulted in the highest absorption flux, which was ascribed to its high porosity and low tortuosity.