

## The effect of bore fluid type on the structure and performance of polyetherimide hollow fiber membrane in gas-liquid contacting processes

### Abstract :

The effect of bore fluid type on the structure and performance of polyetherimide hollow fiber membranes in contactor application was investigated. Water was used as phase inversion promoter in spinning dope and water and pure NMP were used as bore fluid. SEM micrographs show that the major parts of both membranes consist of spongelike structure which is related to the high viscosity of spinning dope that reduces the diffusion of coagulant (water) into membrane sublayer and decreases the rate of phase inversion. In the case of water as bore fluid (membrane #M1) there is skin layer on the inner surface of membrane and some drop-shaped voids in the structure of membrane but in the case of pure NMP as bore fluid (membrane #M2), the inner surface of membrane is skinless with big pores and there are fingerlike macrovoids, originating from the inner surface and extending to the vicinity of outer surface which is related to the penetration of bore fluid and dissolving the polymer. Furthermore, membrane #M2 has higher mean pore size and effective surface porosity. The absorption flux of both fabricated membranes was investigated in the case of liquid in lumen side (case #1) and liquid in shell side (case #2) where in case #1, membrane #M1 has higher absorption flux but in case #2, membrane #M2 has higher absorption flux. The different trend in absorption flux confirms that the surface of membrane in contact with the gas phase in a membrane contactor should be skinless with big pores to facilitates the diffusion of solute gas through membrane but the pore size on the surface of membrane in contact with the liquid phase should be adjusted to obtain high absorption flux and low wettability