

ABSTRACT:

In this study, integrally skinned asymmetric hollow fiber membranes have been developed from emeraldine base form of polyaniline (PAni) for gas separation. High molecular weight PAni was synthesized in-house to provide the fresh supply of the polymer. The hollow fiber membranes were prepared using dry-jet wet spinning and the effects of air-gap distance on nascent fiber morphology, their gas permeation and mechanical properties were investigated. The spin-line stresses resulted in the molecular orientation of the polymer which had synergistic effect towards improving the gas performance of the PAni hollow fiber membranes. The induced molecular orientation also resulted in improvement in mechanical properties of the hollow fiber membrane. The use of volatile co-solvent, tetrahydrofuran (THF) assisted in the skin layer formation which showed a substantial improvement in the gas permeation performance of the hollow fiber as the time of evaporation was varied. Present PAni based hollow fibers showed a selectivity of 10.2 for O₂/N₂, 105.6 for H₂/N₂ and 7.9 for H₂/CO₂ with the H₂ and O₂ permeance of about 5.0 and 0.49×10^{-6} cm³ (STP)/cm² s cmHg, respectively.