

O₂/N₂ separation characteristics of PES asymmetric hollow fiber membrane

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Membrane technology can be used in O₂ and N₂ generation with low energy consumption. Polyethersulfone (PES) having a high glass transition temperature of 230°C was reported to have high O₂/N₂ selectivity of 6.0. In this study, PES was used as a membrane material and 1-methyl-2-pyrrolidone (NMP) and acetone were employed as a good solvent and non-solvent additive (swelling agent to PES), respectively. Dope solutions were prepared by changing the content of acetone (0, 6.5, 15, 25, 31.5 wt%) in 37 wt% PES solutions. Hollow fiber spinning was performed at 0–10cm of air-gap distances for each dope solution. O₂/N₂ selectivity and permeability were investigated by comparing of hollow fibers coated or not by silicon. O₂/N₂ selectivity increased and permeabilities of O₂ and N₂ decreased with increasing air-gap height due to acetone additions. Optimized PES hollow fibers were obtained with 37/6.5/56.5 wt% PES/acetone/NMP dope solution and 10 cm air gap, which showed 7.3 of O₂/N₂ selectivity and 4.8 GPU of O₂ permeability after silicon coating.