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Effect of Air Gap Distance on the Structure of PVDF Hollow Fiber Membrane Contactors for Physical CO2 Absorption

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Abstract : In this study, porous polyvinylidene fluoride (PVDF) hollow fiber membranes are fabricated via a wet phase-inversion Process and used in the gas–liquid membrane contactor for physical CO2 absorption. Effect of different air gap on the structure and CO2 flux of the membrane was investigated. The hollow fibers were prepared using the wet spinning process using a dope solution containing PVDF/NMP/Licl (18%, 78%, 4%) at the extrusion rate of 4.5ml/min and air gaps of 0, 7, 15cm. Water was used as internal and external coagulants. Membranes were characterized using various techniques such as Field Emission Scanning Electron Microscopy (FESEM), Gas permeation test, Critical Water Entry Pressure (CEPw) to select the best membrane structure for Co2 absorption. The characterization results showed that the prepared membrane at which air gap possess small pore size with high surface porosity and wetting resistance, which are favorable for gas absorption application air gap increased, CEPw had a decrease, but the N2 permeation was decreased. Surface porosity and also Co2 absorption was increased.

Keywords : porous PVDF hollow fiber membrane, CO2 absorption, phase inversion, air gap
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