Title: Surface modification of polysulfone hollow fiber membrane spun under different air-gap lengths for carbon dioxide absorption in membrane contactor system

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Abstract: Surface modified polysulfone (PSf) hollow fiber membranes (HFMs) using surface modifying macromolecules (SMM) were spun with air-gaps of 0-50cm. Morphological analysis of the prepared fibers were carried out using scanning electron microscopy (SEM) and atomic force microscopy (AFM). The wetting resistances of the membranes were determined by critical water entry pressure (CEPw) and contact angle (CA) measurements. The HMFs were further subjected to CO2 capture by membrane contactor (MC) where water was used as absorbent. The test results indicated that both CEPw and CA showed a maximum value at 15cm air-gap distance. The maximum He permeation was also achieved at 15cm air-gap. The CO2 flux of prepared membranes showed a maximum of 4.79×10-3mol/m2s at the absorbent flow rate of 300ml/min. It was deduced that both He permeation and CO2 absorption flux were governed by the HFM surface porosity. The long-term stability test revealed the reduction of 25% in CO2 flux during the first 55h of operation for the PSf membrane prepared at 15cm air-gap. This study indicated that the surface modified HFMs prepared using an appropriate air-gap could be a promising option to increase membrane performance in MC systems.