

## Polyvinylidene Fluoride and Polyetherimide Hollow Fiber Membranes for CO<sub>2</sub> Stripping in Membrane Contactor

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### ABSTRACT

Porous polyvinylidene fluoride (PVDF) and polyetherimide (PEI) hollow fiber membranes incorporating polyethylene glycol (PEG) were prepared via spinning process for CO<sub>2</sub> membrane stripping. CO<sub>2</sub> loaded diethanolamine solution was used as liquid absorbent while N<sub>2</sub> was used as a strip gas. The characterization study of the fibers was carried out in terms of permeation test, contact angle measurement and liquid entry pressure (wetting pressure). Performance study via membrane contactor stripping was carried out at specific operating condition. The experimental results showed that PVDF membrane have high gas permeation, effective surface porosity and contact angle despite having lower liquid entry pressure in comparison with PEI membrane. PVDF-PEG membrane showed the highest stripping flux of  $4.0 \times 10^{-2} \text{ mol m}^{-2} \text{ s}^{-1}$  at  $0.7 \text{ ms}^{-1}$  compared to that of PEI membrane. Although the stripping flux for PEI-PEG membranes was slightly lower than PVDF membrane (e.g.  $3.5 \times 10^{-2} \text{ mol m}^{-2} \text{ s}^{-1}$  at liquid velocity of  $0.85 \text{ ms}^{-1}$ ), the membrane wetting pressure of PEI membrane is higher than hydrophobic PVDF membrane. Long term performance of both membranes showed severe flux reduction but started to level-off after 30 h of operation.

**KEYWORDS:** Polyvinylidene fluoride; Polyetherimide; Hollow fiber membrane; Polyethylene glycol; CO<sub>2</sub> stripping; Membrane contactor

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