

Modeling of CO<sub>2</sub> capture using hollow fiber membrane modules

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Carbon capture is a separation technology to reduce carbon dioxide (CO<sub>2</sub>) carbon emission from various industrial sectors, which cause serious global warming. There are a number of options for CO<sub>2</sub> capture, such as absorption, adsorption and membrane separation. Among them, gas separation via membranes is considered to be an attractive option due to its low cost and higher energy efficiency compared to other methods. In the membrane gas separation, a partial pressure difference for each permeating component between feed and permeate sides is the main driving force as well as the selectivity of membrane permeances for each component.

In this study, a mathematical model for a single hollow fiber membrane module is developed for post combustion CO<sub>2</sub> capture. Model equations involve component balances and a pressure variation model under the assumption of isothermal conditions. Simulation is carried out under various operating conditions; the CO<sub>2</sub> purity in the permeate stream is sensitive to operating conditions, such as feed composition, pressure and flow directions, (i.e., co-current flow or counter-current flow).