Performance of hollow fiber membrane gas-liquid contactors to absorb CO2 using diethanolamine (DEA) as a solvent

Sutrasno Kartohardjono, author

Abstrak

This study uses DEA solution to absorb CO2 from the gas flow through the hollow fiber membrane contactors. This study aims to evaluate the performance of hollow fiber membrane contactors to absorb CO2 gas using DEA solution as solvent through mass transfer and hydrodynamics studies. The use of DEA solution is to reduce the mass transfer resistance in the liquid phase, and on the other side, the large contact area of the membrane surface can cover the disadvantage of membrane contactors; additional mass transfer resistance in the membrane phase. During experiments, CO2 feed flows through the fiber lumens, while the 0.01 M DEA solution flows in the shell side of membrane contactors. Experimental results show that the mass transfer coefficients and fluxes of CO2 increase with an increase in both water and DEA solution flow rates. Increasing the amount of fibers in the contactors will decrease the mass transfer and fluxes at the same DEA solution flow rate. Mass transfer coefficients and CO2 fluxes using DEA solution can achieve 28,000 and 7.6 million times greater than using water as solvent, respectively. Hydrodynamics studies show that the liquid pressure drops in the contactors increase with increasing liquid flow rate and number of fibers in the contactors. The friction between water and the fibers in the contactor was more pronounced at lower velocities, and therefore, the value of the friction factor is also higher at lower velocities.