Modeling of energy performance of the Hydrazine-hydrate-based CO_2 Absorption Process for CO_2 Capture

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The amine scrubbing process has been intensely researched as the most viable option for CO2 capture from coal-fired power plants. Monoethanolamine (MEA) has been considered as a standard solvent for amine scrubbing, but the economy of MEA is limited due to the high regeneration energy. In this study, the hydrazine-hydrate-based CO2 absorption process is proposed and modeled. It is regarded that the hydrazine-hydrate solvent has a great potential for CO2 capture since the hydrazine-hydrate solvent has similar characteristics to the piperazine in terms of heat of absorption, rate of absorption, water content, difference between lean and rich loadings, and viscosity. Moreover, it has a smaller molecular weight. In this study, the modeling of energy performance was established. Experimental data from the wetted wall column was used to get VLE data and calculate liquid film mass transfer coefficient. From VLE data, CO2 absorption capacity and heat of absorption were estimated. Finally, energy performance predicted was compared to other solvents. In addition, C-NMR study was proceeded to investigate the speciation in the liquid phase.