Phase change behavior and kinetics of CO_2 absorption into DMBA/DEEA solution in a wetted-wall column

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Phase change behavior and kinetics of CO_2 absorption into DMBA/DEEA solution in a wetted-wall column

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Abstract

Coal-fired flue gas is a major source of greenhouse gas CO_2. Phase-change absorbents can be used to reduce energy consumption associated with regeneration during CO_2 capture. In this study, N,N-dimethylbutylamine (DMBA) and N,N-dimethylbutylamine (DEEA) were mixed to develop phase-change absorbents, and the reaction kinetics of CO_2 absorption in the absorbents were examined. A bubbling device was used to prepare phase-change absorbents with different CO_2 loading levels. The physico-chemical parameters of the absorbents under different conditions were specified, and the changes in the CO_2 loading of the upper and lower layers of the absorption solutions after a liquid–liquid separation were analyzed. A wetted-wall column was subsequently used to investigate the effects of temperature, CO_2 loading, gas flow rate, and DMBA/DEEA composition ratio on CO_2 absorption rate. This study determined that the flow velocity, reaction temperature, and CO_2 loading affected the CO_2 absorption rates to a certain extent. In addition, comparing

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