Carbonation and Regeneration Characteristics of a Potassium-Based, Dry Sorbent for CO_2 Capture in a Bubbling Fluidized Bed Reactor

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A bubbling fluidized bed reactor was used to study CO_2 capture from flue gas using a potassium-based, dry sorbent, sorbKX40. A dry sorbent, sorbKX40, manufactured by the Korea Electric Power Research Institute, consists of K_2CO_3 for absorption and supporters for mechanical strength. The effects of carbonation temperature, regeneration temperature and initial H_2O contents on CO_2 capture characteristics were closely examined in flue gas conditions. At the beginning of the carbonation, 100 % CO_2 removal was achieved at 60 °C and residence time of 2 seconds with H_2O pretreatment. Lower temperature (60-80 °C) for carbonation and higher temperature (150-300 °C) for regeneration were favored. The carbonated and regenerated sorbent samples were analyzed by XRD and BET to confirm the extent of the reaction. The results obtained in this study can be used as basic data for designing and operating a large scale CO_2 capture process with two fluidized bed reactors.