CO_2 absorption and regerenation of dry Potassium-Based Sorbent for CO_2 capture

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Dry potassium-based sorbent was by impregnation with potassium carbonate on support such as Al_2O_3. The CO_2 capture capacity and regerenation property of this sorbent was measured in the presence of H_2O in a fixed bed reactor, during multiple cycle. When both the CO_2 absorption and regeneration were considered as a one-cycle process, the CO_2 capture capacities of sorbent was observed as a function of the cycle number at various regeneration temperatures such as 200, 290, and 350°C. The XRD pattern of the fresh sorbent was calcined at 300°C under nitrogen, showed the K_2CO_3 and $KAl(CO_3)_2(OH)_2$ phases. The CO_2 capture capacity of the sorbent gradually decreased with the cycle number at a regeneration temperature of 200°C. It was found that $KAl(CO_3)_2(OH)_2$ was not converted into the original phase like K_2CO_3 at low regerenation temperature (200°C). However it was maintained during the multiple CO_2 absorption/regerenation at a regerenation temperature over 290°C. It was found that $KAl(CO_3)_2(OH)_2$ phase was completely converted into the K_2CO_3 phase during regerenation at higher temperature than 290 °C.