The Regenerable Potassium-Based TiO_2 Sorbents for CO_2 Absorption

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The CO_2 capture capacity and regeneration property were measured in the presence of H_2O in a fixed bed reactor, during multiple cycles at various temperature conditions. Sorbents such as K_2CO_3/AC, K_2CO_3/TiO_2, K_2CO_3/MgO, and K_2CO_3/Al_2O_3 showed excellent CO_2 capture capacity (86, 83, 119, 85 mg CO_2/g sorbent, respectively). In the case of K_2CO_3/AC and K_2CO_3/TiO_2, it was possible to regenerate even within a low temperature range, due to the formation of a $KHCO_3$ crystal structure during CO_2 absorption, unlike K_2CO_3/Al_2O_3 and K_2CO_3/MgO. In particular, the rate of regeneration of the new sorbent (K_2CO_3/TiO_2) was a little more than that of K_2CO_3/AC even at low temperatures. These results indicate that the nature of support plays an important role for CO_2 absorption and regeneration capacities and, in particular, the formation of the $KHCO_3$ crystal structure during CO_2 absorption is an important factor for regeneration, even at the low temperature. Considering that the regeneration capacity was an important factor for a sorbent in addition to the CO_2 capture capacity, K_2CO_3 /TiO_2 could be used as a sorbent that had the potential for CO_2 absorption.