

Effects of alkali metal carbonates and nitrates of MgO-based sorbents for CO₂ capture at middle temperatures and high pressures

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We investigated the effects of alkali metal carbonates and nitrates on CO₂ capture capacities of MgO-based sorbents at middle temperatures and high pressures. We prepared by wet-mixing of MgO-based sorbents promoted with alkali metal carbonates and nitrates or alkali metal nitrates. The CO₂ capture capacity of MgO-based sorbents with K₂CO₃ and (Na-K)NO₃ was high of approximate 500 mg CO₂/g sorbent at 300°C and 20 atm. However, the CO₂ capture capacity of the sorbent decreased rapidly from 500 mg CO₂/g sorbent to 60 mg CO₂/g sorbent during 3 cycles. On the other hand, the MgO-based sorbents with only (Na-K)NO₃ showed a significant CO₂ capture capacity (680 mg CO₂/g sorbent), which was 70wt% of theoretical CO₂ capture capacity (990 mg CO₂/g sorbent) at 20 atm and the sorbent maintained the CO₂ capture capacity about 300 mg CO₂/g sorbent during 5 cycles. It was thought that K₂CO₃ was contributed to deactivation properties, resulting from the sintering of the sorbents. In this study, we will discuss the mechanism of CO₂ sorption and the effects of alkali metal carbonates and nitrates using TPD, XRD, FE-SEM and BET in detail.