Effects of K_2CO_3 on CO_2 capture capacity of MgO-based sorbents promoted with alkali metal nitrates at middle temperatures and high pressures

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MgO-based sorbents (KMNS and MNS) were prepared by wet-mixing of MgO and alkali metal nitrates with/without K_2CO_3 to verify the effects of the K_2CO_3 on their CO_2 capture capacities. The MgO-based sorbent promoted with 30 wt% K_2CO_3 (KMNS) shows a high CO_2 capture capacity of about 500 mg CO_2/g sorbent at 300 °C and 20 atm. However, the CO2 capture capacity of the KMNS sorbent decreases rapidly from 500 mg CO_2/g sorbent to 60 mg CO_2/g sorbent during 3 cycles. On the other hand, MgO-based sorbent without K_2CO_3 (MNS) showed the CO_2 capture capacity of 260 mg CO_2/g sorbent. In particular, the CO_2 capture capacity of the MNS sorbent maintaines 250 mg CO_2/g sorbent during 3 cycles without deactivation. From these results, we thought that the regeneration property of MgO-based sorbent promoted with alkali metal nitrates is affected by the amount of K_2CO_3 in sorbent. We will discuss the effect of K_2CO_3 on their CO_2 capture capacities and the sorption and regeneration characteristics using TPD, XRD, FE-SEM and BET in detail.