

Carbon dioxide sorption properties of Ca-based sorbents promoted with various metals during multiple cycles

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Carbon dioxide (CO₂) sorption properties of a calcium oxide (CaO) sorbent and Ca-based sorbents promoted with various metals such as Zr, Ce, Co and Zn were investigated in a fixed-bed reactor during multiple sorption and regeneration cycles at high temperature conditions (CO₂ absorption at 600°C and regeneration at 850°C). The CeCaI and ZrCaI sorbents showed the excellent CO₂ capture capacity as compared with those of CaO, CoCaI and ZnCaI sorbents. The sorption properties of the CaO sorbent gradually decreased during multiple cycles, due to the sintering by agglomeration of the CaO sorbent and the reduction of surface area and pore volume. However, the CeCaI and ZrCaI sorbents exhibited higher regeneration properties than that of the CaO sorbent during multiple cycles. From these results, it was known that the excellent CO₂ capture capacities and regeneration properties of the CeCaI and ZrCaI sorbents were due to the effect of Ce and Zr promoters which could prevent sintering of the CaO sorbent during multiple cycles.