

Additive effects on CO₂ absorption and regeneration properties of Lithium Orthosilicate-based sorbents at high temperature

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To improve regeneration properties of the Lithium orthosilicate (Li₄SiO₄) sorbent, Li₄SiO₄-based sorbents were prepared by physical mixing Li₂CO₃ with SiO₂ and various metal oxides, such as Al₂O₃, CeO₂, MgO and CaO (LS2Al, LS2Ce, LS2Mg and LS2Ca, respectively). CO₂ capture capacities of Li₄SiO₄-based sorbents were investigated in the fixed-bed reactor during multiple cycles at high temperature (sorption at 550°C and regeneration at 700°C). Regeneration properties of the LS2Ce, LS2Mg and LS2Ca sorbents could be improved by adding metal oxides, even though their CO₂ capture capacities decreased compared with a LS2 sorbent, which was prepared by physical mixing Li₂CO₃ with SiO₂ in the molar ratio of 2:1. In particular, the LS2Al sorbent, which was prepared by adding Al₂O₃, showed high CO₂ capture capacity of 204.0 mg CO₂/g sorbent and its CO₂ capture capacity was maintained during multiple cycles.