$NaNO_3$-$(Na, Li)_2CO_3$ promoted MgO for post-combustion CO_2 absorbent

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Currently, materials based on MgO are widely investigated for promising intermediate CO_2 absorbents for the following reasons. Decomposition temperature of magnesium carbonate is lower than that of all of the alkali and alkaline earth metal carbonates. In addition, the theoretical CO_2 absorption capacity of MgO is the highest among all of the absorbents investigated so far. However, large lattice energy of MgO makes both CO2 absorption and desorption kinetics slowly. In order to enhance CO_2 absorption and desorption properties of MgO, $NaNO_3$-M_2CO_3 (M=Na, Li) promoted MgO was investigated. Our study proposes that CO_2 absorption occurs through formation of double carbonate and desorption through reverse reaction. In operating condition, phase change occurs in $NaNO_3$ turning it from solid to liquid. Na_2CO_3 and Li_2CO_3 dissolved in liquefied $NaNO_3$ provide CO_3^{2-} seed to MgO making it into carbonate easily. As a result, the reaction kinetics of this absorbent is faster than that of MgO + CO_2.