CO_2 absorption properties of KNO_3-MgO absorbent synthesized by combustion method at intermediate temperature

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Carbon capture and storage (CCS) is one of the most promising technologies that can mitigate global CO_2 emissions. Alkali metal nitrate promoted MgO absorbents are well known for CO_2 capture at intermediate temperature (200-500°C). In this study, KNO_3 promoted MgO absorbent was synthesized by combustion method assisted with polyvinyl alcohol (PVA) and its CO_2 capture properties were analyzed. PVA was dissolved with KNO_3 and $Mg(NO_3)_2$ in water as a complexing agent for metal cations and burnt to ashes by torch after drying process. Following calcination process removed carbon sources entirely, only MgO and potassium species were remained. This synthesis includes coordination between hydroxyl group of PVA and metal cations, which derives interesting reaction kinetics for CO_2 absorption. Temperature swing absorption (TSA) shows that this absorbent has several reaction steps as temperature increases under CO_2 condition and this trend was observed in isothermal CO_2 absorption test as well. CO_2 absorption properties of the absorbent were further studied by cycle test.