

CO₂ absorption property of Ca-based sorbents promoted with alkali metal

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The CO₂ absorption property of various sorbents such as calcium oxide (CaO, Aldrich) and Ca-based sorbents promoted with alkali metals was investigated in the presence of 9 vol.% water vapor and 10 vol.% CO₂ in a typical fixed-bed reactor at 600°C. Ca-based sorbents were prepared by the impregnation of CaO (Aldrich) with Na₂CO₃ or K₂CO₃. The Ca-based sorbents promoted with alkali metals showed the excellent CO₂ capture capacity as compared with that of CaO (Aldrich) sorbent. The Ca-based sorbent promoted with Na₂CO₃ (NaCaI) formed three phases such as CaCO₃, Na₂Ca(CO₃)₂ and Na₂Ca₂(CO₃)₃ during CO₂ absorption with water vapor, unlike the CaO sorbent formed a CaCO₃ phase. In addition, KCaI sorbent formed three phases such as CaCO₃, K₂Ca(CO₃)₂ and K₂Ca₂(CO₃)₃. From these results, it was known that the excellent CO₂ capture capacity of Ca-based sorbents promoted with alkali metals was due to new products such as Na₂Ca(CO₃)₂, Na₂Ca₂(CO₃)₃, K₂Ca(CO₃)₂ and K₂Ca₂(CO₃)₃. The new KCaI30 and NaCaI30 sorbents developed in this work could be used for CO₂ capture at the high temperature.