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Two-step synthesis of ca-based mgo hybrid adsorbent for pontential CO_2capturing application (Book Chapter)

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Abstract

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Carbon capture and storage (CCS) is one of the method in reducing carbon dioxide (CO_2) emissions into the atmosphere. CO_2 capturing using calcium oxide (CaO) solid sorbents has been considered as an advanced concept for CO_2 capture and recovery. However, the adsorption capacity of CaO decreases during repeated adsorption/desorption cycles. The stability of Ca-based sorbents during cyclic runs can be achieved via the incorporation of inert support materials. Among the available inert materials, MgO is most promising for CO_2 due to high stability and a high Tammann temperature. Most of Ca- based MgO hybrid adsorbent synthesis methods sorbent come with its own limitations which are longer synthesis duration and complex or multistep methods. In this research, Ca-based MgO hybrid adsorbent was prepared via two-step method. Calcium acetate and magnesium nitrate as precursor had dissolved in water, follow by addition of ethanol. The mixture then became gelated and proceeded for calcination at 5500C and 650°C. The prepared sorbent was characterized by Scanning Electron Microscope (SEM), X-Ray Diffraction (XRD) and fourier transfer infrared spectroscopy (FTIR). The XRD analysis of the Ca-based MgO hybrid adsorbent showed the existence of MgO,CaO and $CaCO_3$. FTIR analysis showed existant of CaO bond and MgO bond. The morphology of the hybrid adsorbent was found to be spherical to granular shape and agglomerated. The Ca- based MgO hybrid adsorbent structural and morphological shows great potential for CO_2 capturing capacity over multiple carbonation cycles for CO_2 capturing application. © 2020 Trans Tech Publications Ltd, Switzerland.

SciVal Topic Prominence

Topic: Steam Reforming | Carbonation | Sorbents

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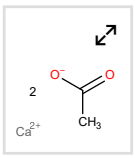
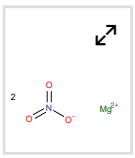
Chemistry database information

Substances





Author keywords

Adsorbent | Ca-based | Carbon dioxide | Hybrid | MgO | Two-step

Indexed keywords

Engineering controlled terms: Calcite | Calcium carbonate | Calcium oxide | Carbon capture | Fourier transform infrared spectroscopy | Lime | Magnesia | Scanning electron microscopy | Sorbents | X ray diffraction

Engineering uncontrolled terms: Adsorption capacities | Adsorption/desorption | Carbon capture and storages (CCS) | Carbon dioxide emissions | Fourier transfers | Multi step methods | Synthesis durations | Two-step synthesis

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