CO₂ Capture by Clay and Its Adsorption Mechanism

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Abstract : Natural and modified clay were used as an adsorbent for CO2 capture. Sample of clay was subjected to acid treatments to improve their textural properties, namely, its surface area and pore volume. The modifications were carried out by heating the clays at 120 °C and then by acid treatment with 3M sulphuric acid solution at boiling temperature for 10 h. The CO2 adsorption capacities of the acid-treated clay were performed out in a batch reactor. It was found that the clay sample treated with 3M H2SO4 exhibited the highest Brunauer-Emmett-Teller (BET) surface area (16.29-24.68 m2/g) and pore volume (0.056-0.064 cm3/g). After the acid treatment, the CO2 adsorption capacity of clay increased. The CO2 adsorption capacity of clay increased after the acid treatment. The CO2 adsorption by clay, were characterized by SEM, FTIR, ATD-ATG and BET method. For describing the phenomenon of CO2 adsorption for these materials, the adsorption isotherms were modeled using the Freundlich and Langmuir models. CO2 adsorption isotherm was found attributable to physical adsorption. **Keywords :** clay, acid treatment, CO2 capture, adsorption mechanism

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1