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CO₂ adsorption equilibria on calcium exchanged bentonite modified by mono-, di- and triethanolaminesAli E I Elkhalfah¹ and M Azmi Bustam²¹Al-Neelain University, Sudan²Universiti Teknologi Petronas, Malaysia

This research work investigates the adsorption characteristics of carbon dioxide on calcium form of bentonite modified by amines at ambient conditions. For this purpose, the native exchangeable cations initially presented in the interlayer space of bentonite were replaced by calcium ions, and then the exchanged bentonite was further treated with protonated mono-, di- and tri-ethanolamines via intercalation process. The characteristics of the prepared hybrids were analyzed by XRD, BET and TGA techniques. XRD results revealed that a gradual increase in the basal spacing of bentonite with an increase in the molar mass of amines was observed. Conversely, low surface area values for bentonite were recorded by BET method. However, the thermal analysis (TGA) of the samples showed a shift to lower values in the amount of the physically adsorbed water as well as its desorption temperature. Static adsorption of CO₂ on amine-bentonite adsorbents at ambient conditions showed that the molar mass of amine has an inverse effect on the gas adsorption capacity, where bentonite modified by monoethanolamine adsorbed 0.6 mmol/g compared to 0.4 and 0.3 on that one treated with di- and triethanolamines due to the pore opening effect and a consequential higher surface area.

Biography

Ali E I Elkhalfah has expertise in clay chemistry, adsorption of gases and environmental engineering. He has worked on clay modification and development of low-cost adsorbents improving the CO₂ uptake capacity on the modified clays. He has years of experience in research, teaching and administration both in academia and mission-oriented research.

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