**Fixed-bed column adsorption of carbon dioxide by sodium hydroxide modified activated alumina**

**Abstract**

Activated alumina was successfully modified with sodium hydroxide (NaOH) and used for capturing of CO2 in fixed-bed column adsorption system. Calcinations temperature (200–500 C), time (2–4 h) and concentration of NaOH (10–40%) suitable for the modification were studied. urface area and porosity, morphology/elemental composition, crystal structure and functional groups of the plain activated alumina (PAA) and optimally modified adsorbent with 30% NaOH calcined at 500 C for 4 h (3MAA) were characterized using nitrogen adsorption–desorption, scanning electron microscopy/energy dispersive X-ray, X-ray diffraction and Fourier transform infrared spectroscopy techniques (4000–500 cm1). The effect of CO2 % in the feed, adsorption temperature, 3MAA particle sizes, feed flow rate and amount of 3MAA in the column were investigated in the adsorption experiments. Adsorption capacity of 3MAA and PAA were 51.92 and 19.61 mg/g even with their surface areas of 203 and 207 m2/g, respectively. The enhanced adsorption on 3MAA was due to its average pore width and total pore volume which were
larger than those of PAA. Physisorption activities that characterized the nature of the 3MAA adsorption, enhanced easier desorption of CO2 conveniently for three cycles. The results of this study have revealed that sodium hydroxide modified activated alumina can be applied for CO2 pollution control in the environment.