**Adsorption of carbon dioxide by diethanolamine activated alumina beads in a fixed bed**

**Abstract**

Application of mesoporous activated alumina functionalized with diethanolamine (DAAB) for selective adsorption of carbon dioxide (CO2) from its mixture with nitrogen gas was investigated. Morphological structure, elemental composition and the functional groups present in the DAAB were analyzed using the scanning electron microscopy; energy dispersive X-ray technique and Fourier transform infrared analysis. Investigation of effect of the gas mixture feed flow rate, column adsorption temperature, DAAB bed height and concentration of CO2 in the feed stream revealed that 90 mL/min, 35 C, 3 g and 10% of CO2, respectively were the optimum operating conditions for the highest adsorption capacity of 55.94 mg/g. The DAAB multi-cycle CO2 adsorption test revealed that it can be reused successfully for about 13 times with high sorption capacity. The DAAB is a promising adsorbent that can be used to capture CO2 pollutant molecules.