

Adsorption of CO₂ onto EDA-MCM41

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MCM-41 (CP-MS41) via the immobilization of ethylene diamine (EDA-MS41) was synthesized as an adsorbent for chemical adsorption of CO₂. CO₂ was adsorbed in a laboratory-scale packed-bed using EDA-MS41 at constant pressure (101.3 kPa). The packed-bed was operated batchwise with the charge of EDA-MS41 to obtain the breakthrough curves of CO₂. Experiments were carried out at different temperatures and flow rates of nitrogen to investigate the effects of these experimental variables on the breakthrough curves. The deactivation model was tested for these curves by using the analogy between the adsorption of CO₂ and the deactivation of adsorbent particles. The observed values of the adsorption rate constant and the deactivation rate constant were evaluated through analysis of the experimental breakthrough data using a nonlinear least squares technique. A good agreement of the deactivation model was obtained with the experimental breakthrough data more accurately compared to the adsorption isotherms in the literature.