

CO₂ capture on natural zeolite clinoptilolite: Effect of temperature and role of the adsorption sites

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Description

In this study, the adsorption capacity of the low-cost zeolite clinoptilolite was investigated for capturing carbon dioxide (CO₂) emitted from industrial processes at moderate temperature. The CO₂ adsorption capacity of clinoptilolite (a commercial natural zeolite) and ion-exchanged (with Na⁺ and Ca²⁺) clinoptilolite were tested under both dynamic (using a fixed-bed reactor operating with 10% vol. CO₂ in N₂) and equilibrium conditions (measuring single component adsorption isotherms). The dynamic CO₂ adsorption capacity of bare clinoptilolite and ion-exchanged clinoptilolite were evaluated in the temperature range from 293 K to 338 K and the obtained breakthrough curves were compared with those of the commercial zeolite 13X (Z13X). Although the adsorption capacity of Z13X exceeded those of bare clinoptilolite and ion-exchanged clinoptilolite at