

CO₂ Adsorption on the Activated Klaten-Indonesian Natural Zeolite in a Packed Bed Adsorber

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Abstract : Carbon dioxide (CO₂) adsorption on the activated Klaten-Indonesian natural zeolite (AKINZ) in a packed bed adsorber has been studied. Experiment works consisted of acid activation and adsorption experiments. The natural zeolite sample was activated using 0.3 M HCl at the temperature of 353 K. In the adsorption experiments the feed gas concentrations were 40 and 80 % CO₂ in helium within various temperatures of 303; 323 and 373 K. The experiments were conducted by using transient step change adsorption and 20 % Ar/He tracer experiment was conducted to measure dispersion and time lag effect of the packed bed system. A mathematical model of CO₂ adsorption had been set up by assuming plug flow; isothermal; isobaric and no gas film mass transport resistance. Single site Langmuir physisorption and Maxwell Stefan mass transport in micropore were applied. All the data were then optimized to get the best value of modified fitted parameter. The model was in a good agreement with the experiment data. Diffusivity tended to increase by increasing temperatures.

Keywords : adsorption, Langmuir, Maxwell-Stefan, natural zeolite, surface diffusion

Conference Title : ICCET 2016 : International Conference on Chemical Engineering and Technology

Conference Location : Tokyo, Japan

Conference Dates : September 05-06, 2016