

Non-isothermal adsorption kinetics of CO₂, CO, N₂, and CH₄ on Activated carbon and Zeolite LiX

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Non-isothermal adsorption kinetics of carbon dioxide, carbon monoxide, nitrogen and methane on zeolite LiX and activated carbon. The experiments were performed by a high pressure volumetric system at (293, 308, and 323) K and pressure up to 0.1 MPa. The kinetic behavior of gases was studied to determine the diffusivity at different conditions. The iso-steric heat of adsorption occurred during adsorption process. Therefore, the thermal effects were considered to predict the kinetic behavior accurately. And the experimental uptake curves were correlated with non-isothermal model. The adsorption uptake curves showed the dependence on temperature and pressure. But, the kinetic behavior of gases was unpredictable when the uptake curves were measured at low pressure, below 15 kPa. Thus, the uptake curves were analyzed by non-linear regression method separately at low pressure condition, which consisted of the former and the latter period. To optimize the simulation of separation process such as PSA, PVSA and etc., the kinetic results of the gases can contribute to predicting the dynamic behavior accurately.