

Prediction and Experiment of Multi-component Adsorption Equilibrium for H₂, CO, CO₂ and Their Binary Mixture on Zeolite 5A

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Equilibrium isotherms of the gases H₂, CO, and CO₂ and their binary mixtures on zeolite 5A have been measured using volumetric method in the pressure range of 0 to 25 atm at temperatures of 293.15, 303.15, and 313.15 K. Experimental data of single component were correlated by the model equations. The Langmuir, Langmuir-Freundlich (L-F), and Dual-Site Langmuir (DSL) model were used to correlate the experimental data. The DSL isotherm has expected a better fit than the other isotherms. The parameters obtained from single component adsorption isotherm. Multicomponent adsorption equilibria could be predicted and compared with experimental data. Langmuir isotherm, Langmuir-Freundlich isotherm and Dual-Site Langmuir isotherm be used to predict the experimental results for binary adsorption equilibria of CO₂/CO, CO₂/H₂ and CO/H₂ on zeolite 5A. The DSL isotherm was checked the most useful for simulation of PSA process because of its mathematical simplicity and reduction of computation time.