The Adsorption-Desorption Rate of Non-polar VOCs onto Activated Carbon Exemplified by C6H6 and CCl4

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摘要.

Abstract

This investigation was to evaluate the performance of a thermodynamic model using nonlinear driving force in conjunction with the Langmuir model exemplified by the adsorption of benzene and carbon tetrachloride onto activated carbon in mono- and binary-adsorbate systems. Results show that model-fitted adsorption and desorption rate constants could well predict the adsorption isotherms and breakthrough curves under various conditions. This numerical model can provide adsorption and desorption rate constants. The kinetic parameters are of the same order of magnitude as reported in several studies. Under high reaction temperatures, both the adsorption and desorption rate constants increased while equilibrium constants decreased. A dimensionless valuable C0 /K can be used to describe the relationship between adsorbate and adsorbent, and predict the service cycle during the adsorption process. For adsorption in binary mixtures, a high inlet concentration or a low temperature, the weak adsorbate, C6H6 , will have a high breakthrough concentration when the strong adsorbate, CCl4 , began to break through.