

RESEARCH PAPERS

基于矩法和时间域分析法研究稠密CO₂中甲苯和对氯苯在硅胶固定床系统中的吸附和传递性质

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摘要 Based on chromatographic theory, the moment method and the time-domain fitting analysis were applied to measure and evaluate the adsorption equilibrium constant and mass transfer properties (axial dispersion coefficient and effective intra-particle diffusivity) for toluene and p-dichlorobenzene on silica gel adsorbent in the subcritical and supercritical CO₂. An apparatus based on supercritical fluid chromatography was established and the experiments were performed at temperatures of 298.15–318.15 K and pressures of 7.5–17.8 MPa. The two methods have been compared. The results show that for the systems studied here the moment method can give reasonable values for both adsorption equilibrium constant and mass transfer properties, but the time-domain analysis only can obtain the adsorption equilibrium constant. The dependence of adsorption equilibrium constant and mass transfer properties on temperature and pressure was investigated.

关键词 [supercritical CO₂](#) [adsorption](#) [chromatography](#) [moment method](#) [time-domain analysis](#)

分类号

Adsorption and Transfer Properties for Toluene and p-Dichlorobenzene in Dense CO₂/Silica Gel Packed Bed System by Moment Method and Time-Domain Analysis

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Abstract

Based on chromatographic theory, the moment method and the time-domain fitting analysis were applied to measure and evaluate the adsorption equilibrium constant and mass transfer properties (axial dispersion coefficient and effective intra-particle diffusivity) for toluene and p-dichlorobenzene on silica gel adsorbent in the subcritical and supercritical CO₂. An apparatus based on supercritical fluid chromatography was established and the experiments were performed at temperatures of 298.15–318.15 K and pressures of 7.5–17.8 MPa. The two methods have been compared. The results show that for the systems studied here the moment method can give reasonable values for both adsorption equilibrium constant and mass transfer properties, but the time-domain analysis only can obtain the adsorption equilibrium constant. The dependence of adsorption equilibrium constant and mass transfer properties on temperature and pressure was investigated.

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