

Adsorption Equilibrium and Column Dynamics of Capillary Condensation of VOCs on Mesoporous Materials

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Since the mesoporous materials named as the M41S family were synthesized by Mobil researchers, mesoporous materials with 2.0 to 10 nm diameters have been attracting much attention as adsorbents and catalysts. In the design and optimization of adsorption separation processes basic experimental equilibrium data in wide range of temperature and concentration is required. Unfortunately, the information of VOCs adsorption isotherm is very limited in the previous studies. Hence, we measured the adsorption equilibrium of VOCs both on uncompressed and compressed mesoporous adsorbent by using a quartz spring balance. Adsorption breakthrough curves according to the input concentration as well as the compressing pressure were measured. In order to do quantitative analysis of this behavior, a lot of experiments under key operating conditions were carried out. In this study, an interesting dynamic behavior was observed in the MCM-48-VOC system. The shape of isotherm on these materials shows complicated equilibrium relationships, which are distinguishable as linear and favorable types.