Retention Behaviors of Small Molecular Compounds Based on the Adsorption Equilibrium in Reversed-Phase Liquid Chromatography

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The retention behavior of solute is one of the most important factors to design a batch and a continuous liquid chromatographic separation process. In liquid chromatography, the retention behaviors are based on the adsorption equilibrium between a liquid mobile-phase and a solid stationary-phase. However, almost of the retention models were developed under linear adsorption isotherm only few researchers have investigated the relationship between the adsorption parameters and the mobile phase composition, and some empirical models were introduced. To design a robust operating condition of gradient chromatographic separation process, such as gradient SMB, the precise retention model based on the adsorption equilibrium is required. In this work, the adsorption isotherms were obtained by the frontal analysis for four small molecular compounds (benzene, toluene, 1, 2-dichlorobenzene, and m-xylene) on a commercial C18 bonded column. The retention behaviors according to the changes of the mobile phase composition were investigated based on the adsorption isotherm models.