Stationary phase gradients in preparative chromatographic separation

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Abstract

The technique of solvent gradient has been widely applied in analytical and preparative chromatography to enhance selectivity and improve productivity. Recently, a new alternative concept using stationary phase gradient was introduced in analytical chromatography [1]. This concept is based on connecting columns filled with different stationary phases and using only one mobile phase composition (isocratic conditions). With the availability of column connecting devices [2], it is possible to extend this new concept to the preparative separations. The application of such serially connected columns introduces new degrees of freedoms like relative length of individual segments.

In this study, an attempt is made to see if the potential of such stationary phase gradients could be exploited favorably in the preparative regime for separating multi-component mixtures.

At first a theoretical study was carried out based on numerical solution of the equilibrium dispersive model incorporating specific adsorption isotherm parameters for each segment [3]. The influences of various parameters that are crucial for the separation are analyzed. Additionally, the influence of the relative length of the stationary phase segments and their arrangement orders are illustrated.

Subsequently, experimental results which demonstrate the potential of solid phase gradients will be given.

References