

Analysis of R-limonene separation in RP-HPLC (Reversed-phase liquid chromatography) by moment method and van deerter equation

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Parameters of R-limonene separation in HPLC were calculated by moment analysis from experiment data on octadecyl silica (ODS) column. Mobile phase was a mixture of n-hexane and ethanol and had volume ratio of 10/90, 30/70, and 50/50, respectively. Concentrations of R-limonene, were 50, 250, and 500 μM . Experiments were implemented by changing not only mobile phase and solute concentration but also flow velocity from 0.6 to 1.4 mL/min within a linear adsorption range. The first absolute moment and second central moment were determined by GR (general rate) model from elution curve of chromatography. After the molecular diffusivity was obtained by using Wilke-Chang equation, the axial dispersion coefficient was calculated. Wilson-Geankoplis equation was employed to obtain the external mass transfer coefficient. The intra-particle diffusivity was calculated by comparing theoretical plate number and van Deemter equation. The difference in height equivalent to a theoretical plate (HETP, H) was found for each independent variable. Influence on overall H_{total} by each mass transfer phenomenon was also determined by calculating H_{ax} , H_{f} , and H_{p} .