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论文

10° 锥角台锥型液相色谱柱尺寸等比例放大和柱内谱带流型的可视化研究

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摘要:

摘要利用改进的可视化装置, 研究了10°锥角的台锥型液相色谱柱内的谱带流型与柱参数变化的关系. 将有机玻璃柱管加工成内圆台外方型的一体结构, 选择折射率一致的色谱固定相硅胶和流动相环己烷, 使整个色谱柱成为高度清晰的透明体, 能直接观察柱中彩色样品谱带的动态三维流型. 研究表明, 在实验条件范围内, 流动相流速对谱带流型无影响, 填料的形状和性质对塞子状流型有一定程度的影响. 比较了柱长为5cm和等比例放大后柱长为10cm锥型柱内的流型, 发现放大后的锥型柱内仍然保持塞子状流型, 总柱效等比例增加. 表明继续按比例放大成为工业规模色谱柱后仍能保持塞子状流型.

关键词: 锥型色谱柱; 可视化; 柱尺寸放大; 谱带流型; 制备液相色谱

Studies on Column Size Scale-up and Flow Profile in Conical Shape Liquid Chromatographic Column of 10° by Visualization Method

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Abstract:

Abstract An improved visualization device made of polymethyl methacrylate (PMMA), packed with C18, was utilized to study the 3D flow profile of conical columns with an angle of 10°. The outside wall of the conical columns was a rectangular shape in order to improve the transparency property of the column wall and reduce the deformation of image for better observation of the flow profiles of colored solutes inside the column. The influence of mobile phase flow rate, particle size and shape on the flow profile of a colored band was studied both for a 5 cm long column and a scaled-up column of 4 fold in volume. The experimental results show that the flow rate of mobile phase has a little influence on the flat flow profiles of the iodine band while the properties of stationary phase have a certain influence on them. The flow profiles of the scaled-up column are flat during the whole chromatographic process, and the efficiency and resolution of the column are also increased in accordance with theoretical prediction. The results indicate that the 10° conical columns can be proportionally scaled up while still keeping the flat flow profile and superior column efficiency than conventional column.

Keywords: Conical chromatographic column; Visualization; Column scale-up; Flow profile; Preparative liquid chromatography

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