Characterization of Flat Micro-scale Chromatography Columns by Elution Analysis

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Chromatography is known as a powerful tool for separation and purification due to its diversity and high efficiency. Meanwhile, miniaturized micro-scale chromatography system is gaining attention because of easy maintenance, high efficiency, low operation cost, and small sample and reagent consumption. In this study, we have fabricated micro-chromatography columns using low-cost polymer-based materials, such as polycarbonate and polyethylene, using conventional milling machine. The separation characteristics of miniaturized flat micro-column packed with micro-beads were compared with traditionally used cylindrical packed column. The elution peak symmetry and theoretical plate number were compared in six different micro-chromatography systems that have different geometries and volumes. Blue dextran and 0.1 M HCl were used as model solutes for the visualization and symmetry analysis, respectively. A mixture of glucose and fructose was used to compare the separation efficiencies. Micro-chromatography column showed similar symmetry in the elution curves and higher theoretical plate number compared to the conventionally used cylindrical column.