The Scale-Up Study of Simulated Moving Bed Chromatography for the Separation of L-Ribose and L-Arabinose

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In the previous study, the separation of L-ribose from L-arabinose by using Lab-scale simulated moving bed (SMB) chromatography had been performed. The frontal analyses to measure the isothermal adsorption equilibrium of L-sugars on the ion-exchange resin of Ca^{2+} and then the operating condition for the SMB experiment was optimized by using the estimated parameters. From the results of the SMB experiment, the purities of L-sugars were over 99% and the SMB results agreed well with the simulation. In this study, a scale-up study of the Lab-scale column (2.5 cm x 20 cm) to a pilot-scale column (5 cm x 50 cm) was carried out. Based on the parameters calculated using the Lab-scale column, it was considered that the retention behaviors of L-sugars in the pilot-scale column can be described. Simulation results with varying the values of mass transfer coefficient and total bed void fraction were performed and the simulation results were compared with the results of a frontal analysis using the pilot-scale column. It was confirmed that the parameters calculated using the Lab-scale column can well describe the retention behaviors of L-sugars in the pilot-scale column.