

Separation of D-Psicose and D-Fructose from Binary Mixture using Simulated Moving Bed Chromatography

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The simulated moving bed (SMB) chromatography has been widely used in sugar industries with ion-exchange resin as the stationary phase. D-psicose, a rare monosaccharide used as a valuable pharmaceutical, has been synthesized by the enzyme conversion from D-fructose. In this study, the post-reaction mixture was treated to remove the contaminants such as buffers, proteins, and organic materials by adsorption and ion exchange resins before it was used as feed solution in SMB process. Four columns packed with Dowex 50WX4-Ca²⁺ (200-400 mesh) ion exchange resin were used for the separation of D-psicose and D-fructose in the four-zone SMB with one column per zone. Several single-step frontal analyses of binary mixture were carried out to estimate the isotherm parameters for each monosaccharide. The operating condition of SMB process was determined based on the Triangle Theory. According to the simulation results, SMB process showed that purity and yield of extract product (D-psicose) were 99.01% and 96.94%, respectively and those of raffinate product (D-fructose) were 99.00% and 99.69%, respectively.