One-Column Analogue to a Four-Zone Simulated Moving Bed for Amino Acids Separation

Chong Ho Lee[a] , Young Sik Kim[a], Phillip C. Wankat[b], Yoon Mo Koo[a*]

[a]Department of Biological Engineering, ERC for Advanced Bioseparation Technology, Inha University, Incheon 402-751, Korea

[b]School of Chemical Engineering, Purdue University, West Lafayette, IN 47907, USA

E-mail: ymkoo@inha.ac.kr

The separation of binary mixture in an one-column chromatograph with recycle that is analogous to a four-zone simulated moving bed (SMB) was studied. The basic principle of the process is identical to a four-zone SMB. The one-column process consists of one adsorption column and four tanks instead of four columns in four-zone SMB (1-1-1-1). The operating parameters of one-column process were obtained from triangle theory developed by Morbidelli group. The computer simulations were done by Aspen Chromatography™. In reference with simulation results a systematic experiment for one-column process was carried out for the separation of two amino acids, phenylalanine and tryptophan. The results of one-column process show good agreements with simulation results. The experimental product purity of the one-column process were 89.9% and 85.1% for phenylalanine and tryptophan, respectively, while 92.1% and 85.7% for the simulation results. The recovery yields of the one-column process were 93.7% and 77.3% for phenylalanine and tryptophan, respectively, while 93% and 84.7% for the simulation results. The one-column process would be useful to reconstruct an existing conventional batch chromatography.