

Model-based optimization of nonlinear simulated moving bed chromatography

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This study aims to optimize the SMB process described by a nonlinear and nonequilibrium model in terms of i) maximization of productivity in the production section and ii) minimization of wash-water consumption, thereby resulting in increased profit and reduced operating cost of the downstream processing. The two objectives are sequentially treated in the framework of a multi-level optimization procedure (MLOP) which includes two pre-optimization levels, a productivity maximization level and a desorbent (or wash-water) consumption minimization level.

Illustrating a chiral SMB chromatographic system, the MLOP is presented in detail and its characteristics are clarified. In the optimization study of the six-zone ion-exchange SMB process, it is shown that wash-water consumption can be reduced achieving a higher productivity.