Use of BatchColumn® software for design, analysis and optimization of batch distillation processes

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Abstract

Batch distillation is an important unit operation in the batch processing industry and is used in a wide range of applications: fine chemical industries, pharmaceuticals, specialty chemicals, biochemical, essential oils, alcohols… The great flexibility of batch distillation allows for the separation of complex mixtures with a single column. This flexibility, combined with the inherent unsteady state nature of the process, poses challenging design and operation problems [1]. There is no 'rule of thumb' to achieve the optimal solution (reduced operating time, good product separation, minimum energy consumption…) and dedicated tools are required.

BatchColumn® software [2] allows for the detailed representation almost any kind of distillation column, e.g. azeotropic and close boiling separation using heterogeneous or homogeneous entrainers [3, 4, 5, 6], batch distillation with a middle vessel column [7], etc. The software takes into account the associated equipment technology (middle vessels, boiler, condenser…) and column hydrodynamics. It provides the evolution through time of all parameters of interest such as compositions, temperature, pressure, reflux ratio… Through the creation and analysis of operating scenarios, it enables the identification of the best resources management policies, recipes for product quality optimization and cost reduction. BatchColumn® allows modeling of complex systems by taking advantage of the power of Simulis® Thermodynamics (thermodynamic properties server) which offers an extensive set of thermodynamic models with a pure components database of more than 2,000 pure components (AIChE's DIPPR® database [8]). The main features and strengths of BatchColumn® are highlighted on various application examples.

Keywords

Batch distillation; Modeling; Simulation; Thermodynamic server; Complex mixtures.

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