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Study on the Separation of Binary Azeotropic Mixtures by Continuous Extractive Distillation

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Abstract:

For azeotropic mixtures or close-boiling mixtures which is often observed in the pharmaceutical and specialty chemicals industries, conventional distillation has been shown to be unable to reach the separation desired. In this paper, continuous extractive distillation (CED) was used to separate acetone–tetrahydrofuran, n-hexane-tetrahydrofuran, n-hexane-ethyl acetate and ethyl acetate-ethanol that form azeotropic mixtures. The characters of the CED were simulated with Aspen Plus and experiments also showed the feasibility of the technology in separating the azeotropic mixtures. The mass fraction of the light component in the separation of acetone–tetrahydrofuran, n-hexane-tetrahydrofuran, n-hexane-ethyl acetate and ethyl acetate-ethanol reached 99.02%, 99.00%, 99.15% and 98.80% respectively. These azeotropic mixtures were separated successfully through solvent selection based on polarity principle and pseudo-binary vapor-liquid equilibrium, simulation via Aspen Plus and experimental verification. This algorithm may become a generally applicable method for solvent selection in developing new extractive distillation processes.

Keywords: extractive distillation; azeotropic mixtures; simulation; separation

1. Introduction

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