

Heterogeneous Entrainer Selection for the Separation of Azeotropic and Close Boiling Temperature Mixtures by Heterogeneous Batch Distillation

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Abstract

The presence of azeotropes in multicomponent mixtures complicates the design of batch distillation separation processes widely used in pharmaceutical and speciality chemical industries. Most of those processes include the use of homogeneous entrainer to ease the separation. We describe novel methods to break azeotropes using an entrainer that is partially miscible with one of the initial binary mixture components. The core of the paper presents the rules for the selection of a heterogeneous entrainer leading to a feasible process for the separation of a minimum or maximum temperature azeotropic binary mixture or a close boiling binary mixture. Through several illustrating examples, we depict some of the advantages of heterogeneous batch distillation processes: more design alternatives for the separation of an azeotropic binary mixture than with homogeneous batch distillation, simplified distillation sequences as a consequence of fewer distillation tasks, crossing of batch distillation boundaries due to the reflux of either one or both of the decanter phases.

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