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Compared novel thermally coupled extractive distillation sequences for separating multi-azeotropic mixture of acetonitrile/benzene/methanol

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Highlights

- EDWC and SSED are extended to separating the system having multi-azeotropes.
- Ten novel thermal coupled extractive distillation sequences are investigated.
- Acetonitrile/benzene/methanol is separated by using chlorobenzene as solvent.
- The optimal scheme is identified in views of energy, environment and economic.

Abstract:

In this paper, extractive distillation applies to separate acetonitrile/benzene/methanol, the medicine is a compounding of multi-azeotropes via introducing chlorobenzene as a solvent. In order to achieve the purpose of energy saving and CO₂ emission reduction, ten novel thermally coupled separation sequences including direct sequences, indirect sequences, hybrid sequences and solvent splitting sequences are established and explored based on extractive dividing wall column (EDWC) and side-stream extractive distillation column (SSED). The corresponding optimal parameters are determined by effective and convenient sequential iterative optimization procedures on the basis of minimized total annual cost (TAC) and meanwhile CO₂ emissions are calculated to evaluate environmental impact. The comparison results illustrate that the solvent splitting SSED sequence

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