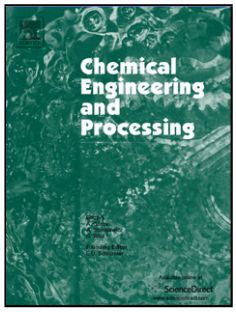

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Adopting Feed Splitting in Design of Reactive Distillation Columns with Two Reactive Sections

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Highlights

- A performance index is derived for process evaluations.
- Feed splitting is suggested for reactive distillation column with two reactive sections.
- The performance index and feed splitting are examined by simulation studies.
- Feed splitting enhances internal mass and energy integration.

Abstract

For the separations of reacting mixtures featuring the heaviest and lightest reactants and intermediate products, although feeding the heaviest/lightest reactant to condenser/reboiler of reactive distillation columns with two reactive sections (RDCs-TRS) at top/bottom favors the reaction operation involved, it poses a detrimental effect to the separation operation involved because the reactants tend to move through the stage for withdrawing the intermediate product and increase consequently separation difficulties. A performance index is derived for the RDC-TRS and feed splitting is adopted to suppress the drawback. The separations of an ideal quaternary reaction, the esterification of lactic acid with methanol, and the esterification of palmitic acid with isopropanol, are employed to evaluate the proposed design

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