

# Selecting the Optimum Sequence of Distillation Column Train for Multicomponent Separation System †

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**Abstract:** Chemical processes often involve separating multicomponent mixtures into multiple products by a sequence of separators; each reproduces typically two or more products of intermediate streams. There are only two alternative sequences for the three-component mixture, and the complexity of separation increases significantly as the number of products increases. There are many ways for the separation of a multicomponent mixture to produce the same products. However, the problem is that there may be significant differences in the capital and operating costs and energy requirements between different distillation sequences that can produce the same products. The present work selects the ideal miscible system of a multicomponent mixture containing four hydrocarbon components to find the optimal sequence. Different trial and error calculations have been employed for the methodology presented in this work to arrive at an optimal sequence based on the total cost of separation. All calculations are performed on a generalized code specifically developed for the multicomponent distillation with sharp separation. The results obtained for the total cost comprising fixed cost and operating cost of each sequence are summarized and then compared to find out the optimal sequence of the system under consideration.

**Keywords:** separation; multicomponent distillation; sequencing of columns; sharp separation; optimization.

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