

Fully Thermally Coupled Distillation Column Design for Liquid Petroleum Gas fractionation using Kremser group method and Fenske expression

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An efficient method is proposed for determining the optimal design structure of a fully thermally coupled distillation column (FTCDC). The method proposes three-column arrangement, wherein internal sections are matched to those of the FTCDC. From the prefractionator, the proposed method uses Kremser group method which is used for the fractional absorption. The number of stages in the main column is equal to the sum of stages of the last two binary distillation columns which are estimated using the Fenske expressions applicable to separation between any two components with constant volatility. The simulation study that a fully thermally coupled distillation column designed by the proposed method gives a near-optimal structure. Based on the extensive simulation study, a two-step approach is suggested for the optimal design of the FTCDC: (1) the structure of the FTCDC is designed using the structure of the corresponding three-column configuration; (2) the optimal FTCDC structure is then directly determined from the FTCDC configuration by adjusting the interlinking trays.