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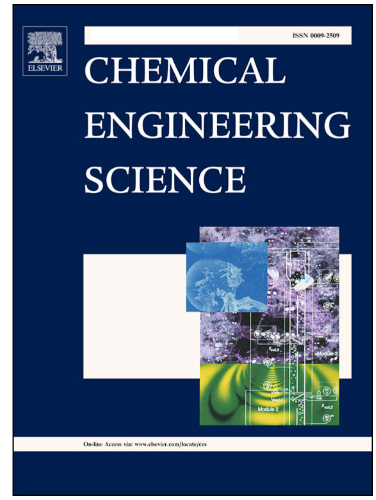

Novel Solvent Exchange Distillation Column

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Novel Solvent Exchange Distillation Column

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Abstract- Solvent exchange or solvent swap is commonly used in production of complex organic molecules when the next processing step requires that the solute be dissolved in a different solvent. The current methods for solvent exchange, batch distillation and diafiltration, also produce a waste stream containing a mixture of the feed and chasing solvents that must be separated, usually by distillation. The results obtained from an Aspen Plus model of the new exchange column are compared with constant volume batch distillation simulations for both still pot and still pot plus column systems. The new solvent exchange column reduces the amount of the waste stream, and when the feed solvent is the more volatile solvent the exchange column can often be designed to produce feed solvent at the desired purity; thus, eliminating the need for an additional distillation column to separate the two solvents. When the initial solvent is the less volatile component, the new exchange column will often be competitive with constant volume diafiltration which is currently used.

Keyword: Solvent exchange, Batch distillation, Simulation, Energy, Diafiltration

1. Introduction:

Distillation is widely used as a separation process in the chemical industries accounting for up to 3% of total world energy consumption [1]. Since separation processes play a significant role in the process industries, increasing their efficiency to decrease energy consumption and/or capital costs has led to continued re-examination of current separation process.

Although distillation is one of the most intensively studied and better understood processes in the process industries, the batch version still represents an interesting field for academic and industrial research for a number of reasons. Batch distillation refers to the use of distillation in steps, or in batches, and is used extensively in laboratory separations and in the production of fine and specialty chemicals, pharmaceuticals, polymers, and biochemical products either for purification or for the recovery of valuable solvents. The greatest advantage of batch distillation is its ability to cope with different separation duties, for example, varying feed mixtures, feed compositions, and product specifications, by simply changing the operating conditions of the column. However, this flexibility, and the inherent unsteady-state nature of batch distillation, poses additional design and operational challenges when compared with continuous distillation.

Batch distillation is widely used in fine and specialty chemical and pharmaceutical industries for purification or recovery of high-value liquid components because of its advantages such as flexibility and several products with a single column. With an increasing demand for high quality products and flexible plants, the optimal operation of columns is of great economic importance.