Effect of Distillation column sequence on the separation of Methanol, Ethanol and 1-propanol

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Background & Description:

Distillation is one of the most common and energy-intensive separation processes. These are used extensively in various chemical processes to separate components from mixtures. In these processes the feed usually contains more than two components. The distillation columns are placed in series where at each column a component is desired to be separated from the mixture based on their relative volatility. For streams containing more than 2 components, there could be more than a one way to sequence and separate the components. Therefore, the sequencing of distillation columns plays a major role in designing the separation process. In this work, two different sequences of distillation columns are simulated to separate a mixture containing aliphatic alcohols namely Methanol, Ethanol and 1-propanol and the results are compared to draw meaningful conclusion.

Flowsheet:
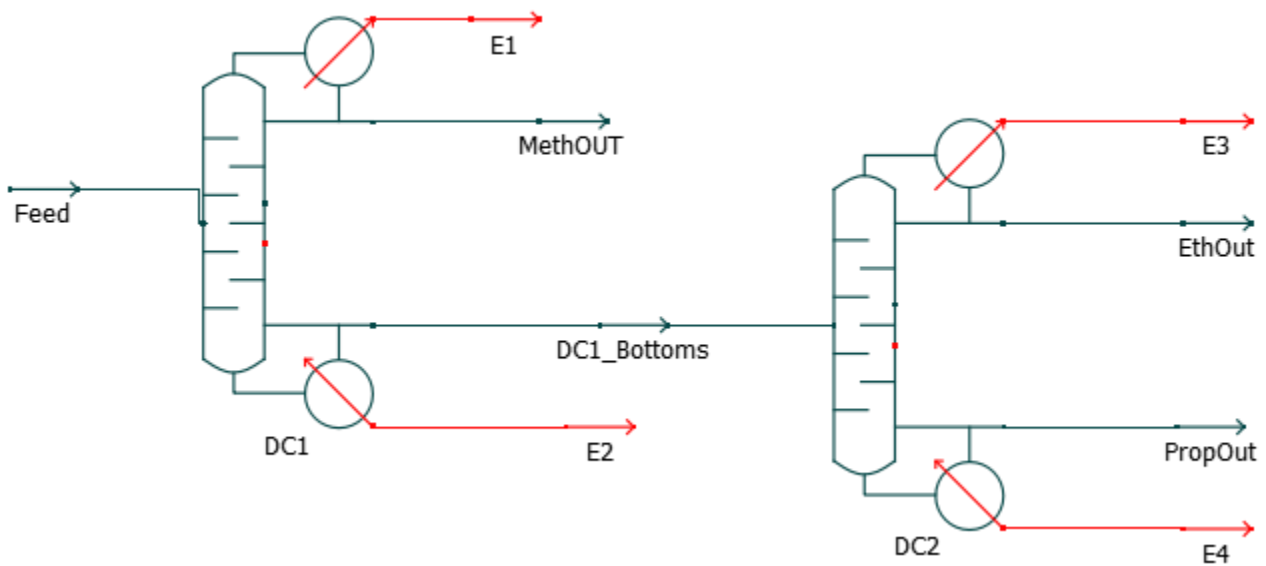
Results:

DWSIM-Molar Flow Rate(mol/s)

	MethOut	DC1_Bottoms	EthOut	PropOut
Ethanol	880.71976	12144.098	11781.689	365.82229
Methanol	7676.4781	2089.71	2089.1024	1.2485949
Propanol	2.6574748	9766.1827	129.20855	9632.9291

OpenModallica-Molar Flow Rate(mol/s)

	MethOut	DC1_Bottoms	EthOut	PropOut
Ethanol	942.084	12081.9	11718.6	363.29
Methanol	7611.67	2156.28	2155.56	0.721522
Propanol	6.09873	9761.83	125.87	9635.99