Extractive Distillation of Acetone/Methanol Mixture Using Water Entrainer

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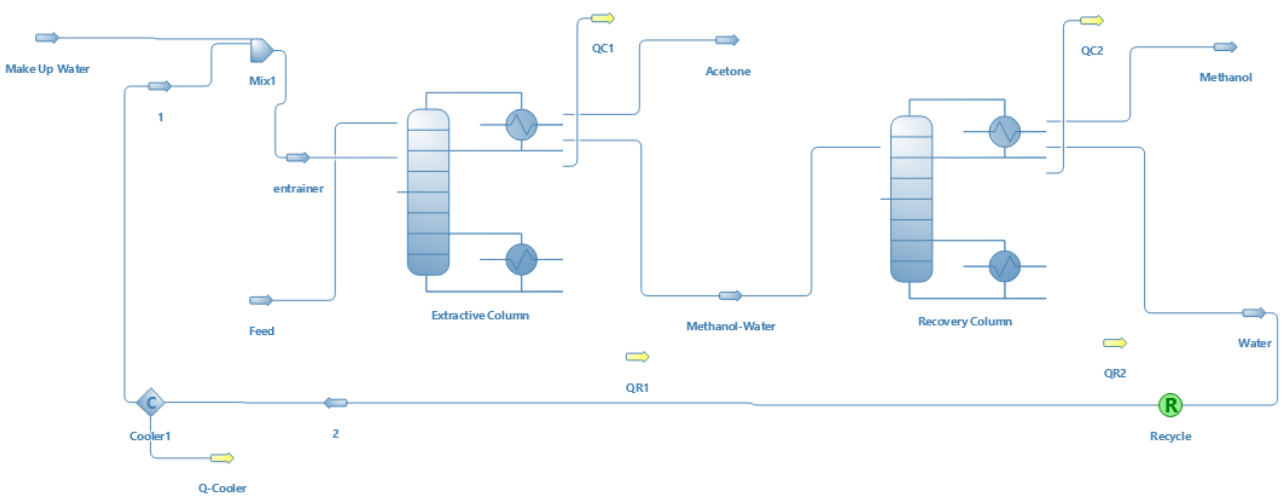
Background & Description:

Methanol and Acetone are extensively used as solvents or reagents in organic chemistry. Acetone is a solvent frequently used in industry to dissolve plastics, like a drying agent, and it is the primary component in nail polish remover. Methanol is also a commonly used solvent, and its mixtures with acetone are usually observed, being necessary to separate these volatile solvents for future applications. Distillation is one of the major importance separation processes in chemical engineering in which the separation is reached because of the volatility difference of the components.

The recovering of volatile solvents with close boiling point or azeotropic systems is difficult by conventional distillation techniques. Advance techniques like pressure distillation, reactive distillation, and extractive distillation may be used to separate such mixtures. In the extractive distillation is required a third component, an entrainer, which modifies the relative volatility of the mixture components. The entrainer selection is an important step because the separation effectiveness depends on the interactions between this component and the azeotropic mixture.
For the acetone-methanol-water system, NRTL thermodynamic package is used.

Flowsheet:



Results:

	Temperature C	Pressure bar	Molar Flow kmol/h	Molar Fraction Acetone	Molar Fraction Methanol	Molar Fraction Water
Feed	67	1.01325	100	0.7775	0.2225	0
Water entrainer	47	1.01325	128.351	4.23919E-20	1E-06	0.999999
Acetone	55.6823	1.01325	83.9629	0.926184	0.0588304	0.0149858
Methanol-Water	86.0744	1.01325	144.424	0.000126464	0.119874	0.88
Methanol	64.57	1.01325	17.338	0.00105346	0.998534	0.000412744
Water	99.9822	1.01325	127.087	4.26538E-20	1E-06	0.999999