Pressure swing distillation of Acetonitrile Water System

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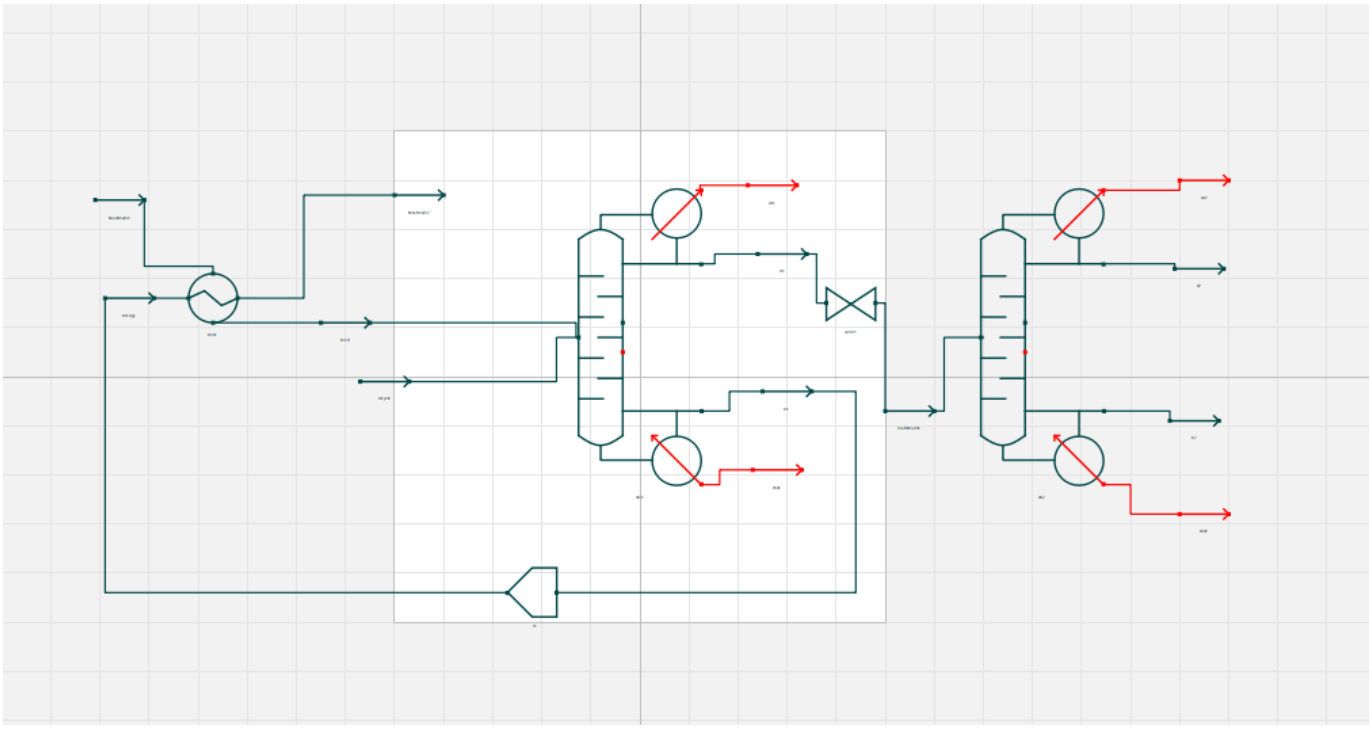
Background & Description:

Acetonitrile is the chemical compound with the formula CH_3CN. It is a colorless liquid and the simplest of organic nitrile. It is mainly produced as a byproduct of acrylonitrile production. It is used as a polar aprotic solvent in organic synthesis and purification of butadiene.

In the flowsheet proposed here, the feed mixture contains ACN and water in equal mass fraction. The feed goes into a heat exchanger. The heated feed goes into the first Distillation Column which operates at a pressure of 1 atm, separating a fraction of water in the feed with molar concentration of 0.9999 as bottom product.
The distillate from the first column goes to second distillate operating at 3 atm. The bottom product form the second Distillation Column is Acetonitrile with molar concentration of 0.9999. The distillate from the second column is recycled back to the first column.

Flowsheet:



Results:

	Temperature (K)	Pressure (Pa)	Mole flow (mol/s)	Mole fraction (ACN)
Hexstream1	308	101325	27.7778	0.304
feed	326.84	101325	27.7778	0.304
recycle	361.56	101325	46.9899	0.6
b1	373.13	101325	19.2227	0.0001
b2	394.24	303975	8.5567	0.99
d2	382.84	303975	46.988	0.6