Binary azeotropic separation containing tetrahydrofuran and ethanol with the help of Ethylene glycol

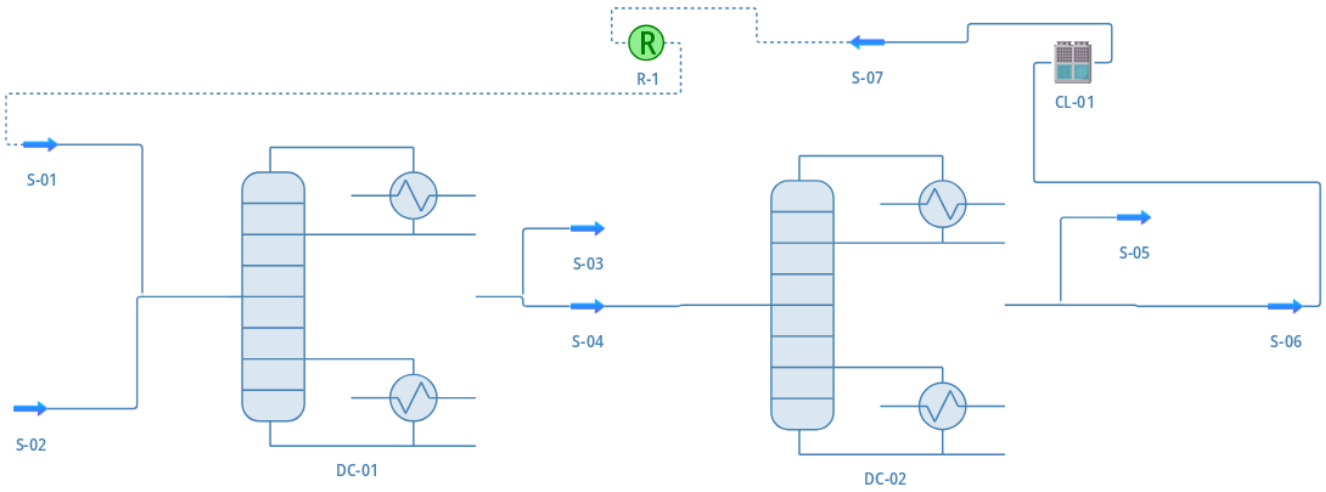
OM PANDEY
Sardar Vallabhbhai National Institute of Technology, Surat

Background & Description:

In the industrial domain of chemicals, tetrahydrofuran (THF) is quite frequently used as an organic solvent for the production of adhesives, Adipic acids and PVC. So, we can say THF is a crucial raw material. In Parallel, the pharmaceutical industry frequently uses ethanol for the production and synthesis of drugs and medicines. So, both the components are quite useful and need to be taken care of. As a result, recovering these two valuable components contributes to environmental protection and makes the process of recovering sustainable resources easier.

Here, UNIFAC was selected as thermodynamic property package. 2 extractive distillation columns have been used with Ethylene glycol as a solvent. The fresh feed stream and the solvent EG enter the extractive distillation column (DC-01) to facilitate the binary azeotropic separation of THF and ethanol. The high purity THF (S-03) comes from the EDC distillate, and the remaining mixture of ethanol and EG solvent comes from the EDC's bottom (S-04) and is sent to the solvent recovery column (DC-02) for solvent regeneration. The regenerated (i.e. recovered) EG solvent is obtained at the bottom (S-06) and cooled (CL-01) before being recycled back to the EDC, where high purity ethanol is obtained from the distillate.

Flowsheet:



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Results:

Master Property Table								
Object	S-07	S-06	S-05	S-04	S-03	S-02	S-01	
Temperature	314	468.584	358.537	394.851	339.137	320	314	K
Pressure	101325	101325	101325	101325	101325	101325	101325	Pa
Molar Fraction (Mixture) / Ethanol	0.00110178	0.00110178	0.996562	0.193548	0.000436545	0.5	0.00110178	
Molar Fraction (Mixture) / Tetrahydrofuran	5.23291E-09	5.23291E-09	0.00123747	0.000239237	0.999561	0.5	5.23291E-09	
Molar Fraction (Mixture) / Ethylene glycol	0.998898	0.998898	0.00220026	0.806213	2.28221E-06	0	0.998898	

Conclusion:

We can separate Binary azeotropic separation containing tetrahydrofuran and ethanol with the help of Ethylene glycol with purity of 99.956% THF at DC-01 and purity of 99.652% Ethanol at DC-02 distillate.

Reference:

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