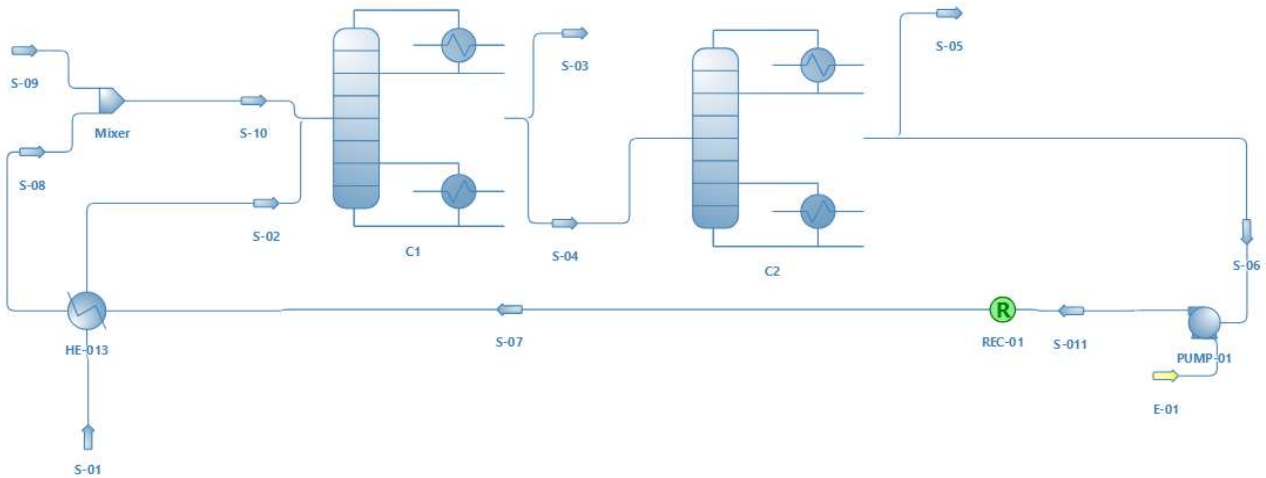
ETHANOL EXTRACTIVE DISTILLATION WITH MIXED GLYCOLS AS SEPARATING AGENT

Himanshu Khadatkar
National Institute of Technology, Warangal

Background: Anhydrous Ethanol is widely used in the chemical industry as a raw material in chemical synthesis of esters and ethers, and as solvent in production of paint, cosmetics, sprays, perfumery, medicine and food, among others. In this flowsheet, we demonstrate the ethanol extractive distillation with mixed glycols {ethylene glycol and glycerol} as separating agent.

Description: Calculations of activity coefficients for the mixture were performed via the NRTL thermodynamic model. In this study, simulations were performed with 20 theoretical stages in the extractive distillation column and 8 theoretical stages in the recovery column. The feed stream comprising of ethanol {mole fraction =0.88} and water {mole fraction 0.12} enters the first distillation column, named C1, at feed stage 12. Ethanol is obtained as the distillate, stream 3. The bottoms, stream 4, goes to the second distillation column {recovery column}, named C2, at feed stage 4, where water is obtained as the distillate, stream 5, and glycol mixture is recovered in the bottom stream, which is further cooled by heat exchanger where it is used to heat preheat the feed mixture to column C1.

Flowsheet:



Ethanol extractive distillation flowsheet

Results:

Streamwise_properties										
Object	S-10	S-09	S-08	S-06	S-05	S-04	S-03	S-02	S-01	
Temperature	59.9992	60	60	213.463	48.69	151.772	78.6555	78.3826	20	C
Molar Fraction (Mixture) / Ethanol	3.22368E-07	0	3.22771E-07	3.27936E-07	0.0906587	0.0129425	0.999992	0.88	0.88	
Molar Fraction (Mixture) / Water	8.60397E-05	0	8.61474E-05	8.77257E-05	0.901816	0.128817	7.6978E-06	0.12	0.12	
Molar Fraction (Mixture) / Ethylene glycol	0.600406	1	0.599906	0.599904	0.00752493	0.515337	3.18036E-09	0	0	
Molar Fraction (Mixture) / Glycerol	0.399508	0	0.400008	0.400008	1.85761E-07	0.342904	1.06966E-14	0	0	

Reference:

https://www.scielo.br/j/bjce/a/CBzxwTCMZnvQmNTt9dGhHwr/?format=pdf&lang=en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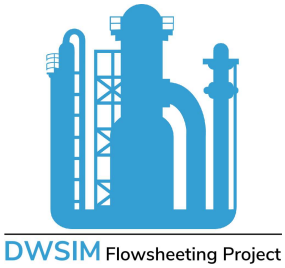
DWSIM Flowsheeting Project