

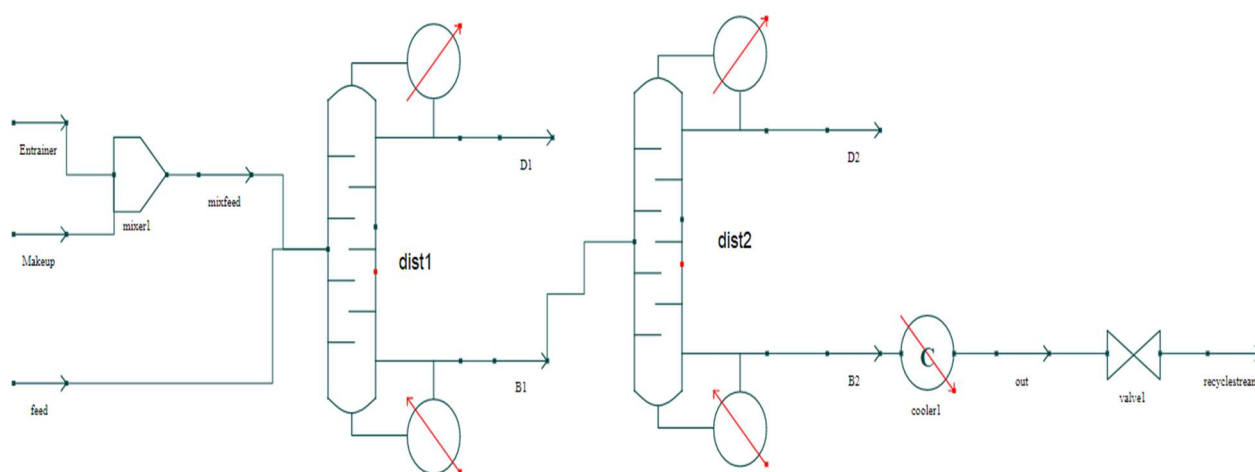
ETHANOL EXTRACTIVE DISTILLATION WITH MIXED GLYCOLS AS SEPARATING AGENT

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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: The simulations were performed via the Raoult's Law 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 dist1, at feed stage 12. Ethanol is obtained as the distillate, stream D1. The bottoms, stream B1, goes to the second distillation column {recovery column}, named dist2, at feed stage 4, where water (mole fraction 0.88) is obtained as the distillate, stream D2, and glycol mixture is recovered in the bottom stream, which is further cooled by cooler and recycled to use as solvent in dist1.

Flowsheet:



Ethanol extractive distillation flowsheet



OpenModelica Results:

Mole Fraction	D1	B1	D2	B2
Ethanol	0.9915	0.032	0.22	0
Water	0.0085	0.11	0.78	0.0018
Glycerol	0	0.343	0	0.3982
Ethylene glycol	0	0.515	0	0.6

DWSIM Results:

Mole Fraction	D1	B1	D2	B2
Ethanol	1	0.013	0.092	0
Water	0	0.129	0.9	0.0
Glycerol	0	0.343	0	0.4
Ethylene glycol	0	0.515	0.008	0.6

Reference:

<https://www.scielo.br/j/bjce/a/CBzxwTCMZnvQmNTt9dGhHwr/?format=pdf&lang=en>