Pressure Swing Distillation for The Separation of Ethyl Acetate and Cyclohexane

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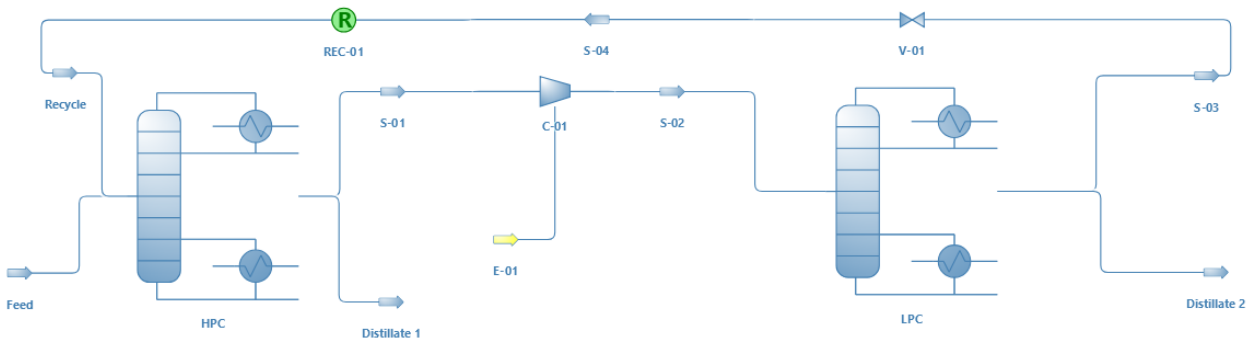
BACKGROUND AND DESCRIPTION

Ethyl acetate and cyclohexane mixture is commonly used as an organic solvent in the pesticide industries and chemical engineering industries. Separation of them is essential for economic and environmental reasons. Ethyl acetate and cyclohexane form minimum boiling type azeotrope at atmospheric pressure. Special distillation processes like pressure swing distillation have been developed to separate such azeotropes in the past decades.

PSD process uses the changes of azeotropic compositions under different operating pressures to realize the separation

The feed stream is 100 kmol/h with the compositions of 50 mol% ethyl acetate and 50 mol% cyclohexane is sent at the 40^{th} stage (Total stages in HPC=69). The separation is feasible if the stream should be sent to HPC at first (from Txy curve). In HPC (10atm), high-purity cyclohexane is obtained at the bottom and the minimum azeotrope is sent to the LPC(0.5atm) at the 16^{th} stage (Total stages in LPC=36). The high-purity ethyl acetate is collected at the bottom of LPC and the minimum azeotrope would be sent back to the HPC as Recycle (34^{th} stage).

FLOWSHEET



RESULTS

Master Property Table						
Object	**S-03**	**S-01**	**Feed**	**Distillate 2**	**Distillate 1**	
Temperature	331.034	443.368	303.15	184.385	456.042	**K**
Pressure	50662.5	1.0132E+06	1.01325E+06	0.5	1.0132E+06	**Pa**
Molar Flow	20.052	33.658	27.7778	13.6061	14.0197	**mol/s**
Molar Fraction (Mixture) / Ethyl acetate	0.794315	0.87705	0.5	0.999	0.01	
Molar Fraction (Mixture) / Cyclohexane	0.205685	0.12295	0.5	0.001	0.99	