

Pressure Swing Distillation for the Separation of Methyl Acetate-Methanol Azeotrope

Dhaval Vijaybhai Patel
Indian Institute of Technology, Madras

Background & Description:

Methyl acetate and methanol is forming azeotrope at atmospheric pressure, so one cannot go with the mostly preferred option that is ordinary atmospheric distillation. For separating the components which form the azeotrope special distillation techniques are used i.e. extractive distillation, azeotropic distillation, pressure swing distillation (PSD), etc. As azeotropic composition of methyl acetate- methanol mixture is pressure sensitive, PSD can be used to separate these components.

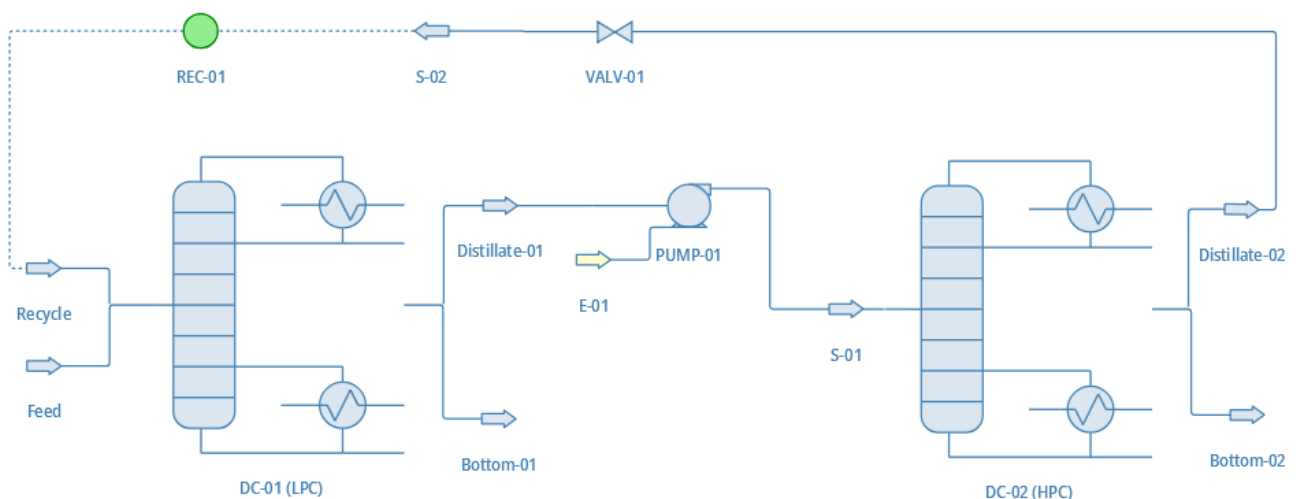
In this separation process low pressure column (LPC) is followed by high pressure column (HPC). Distillate of LPC is at nearly azeotropic composition which is then pumped to HPC. Bottom product from each column is at desired purity level.

Thermodynamic property model : NRTL

Column specification:

Parameters	Low Pressure Column	High Pressure Column
Pressure	1 atm	9 atm
Stages in column	33	26
Feed stage	Feed stream :- 23 Recycle stream :- 18	Distillate of LPC :- 16

Flowsheet:



PSD for separation of methyl acetate - methanol azeotrope

Results:

Master Property Table						
Object	Feed	Distillate-02	Distillate-01	Bottom-02	Bottom-01	
Temperature	25	126.467	53.6335	138.189	64.5404	C
Pressure	1.01325	9.11925	1.01325	9.11925	1.01325	bar
Mass Flow	1000	555.018	953.369	398.352	600.853	kg/h
Mass Fraction (Mixture) / Methanol	0.6	0.323083	0.188268	0.000432785	0.997691	
Mass Fraction (Mixture) / Methyl acetate	0.4	0.676917	0.811732	0.999567	0.0023089	