

PRESSURE-SWING DISTILLATION OF ETHYL ACETATE AND N-HEXANE

Created By: Prajapati Jaykumar Pareshbhai; Government Engineering College, Valsad

INTRODUCTION:

Pressure swing distillation is a method used to separate azeotropic mixture in more than one distillation column which is operated under different pressure. Binary azeotropic mixture loses their azeotropic behavior by varying pressure of the column.

Ethyl acetate and N-hexane both are important organic solvents widely used in textile and chemical industries due to having high solubility. Here ethyl acetate and N-hexane are separated using pressure swing distillation by NRTL thermodynamic model.

PROCESS:

A mixture of ethyl acetate and N-hexane having mass fraction 0.39 and 0.61 respectively fed to the low pressure distillation column (LPC) which is operate at 0.1 MPa Pressure. Feed is fed to the 8th stage of 26 staged low pressure distillation column. At the bottom of LPC 0.97 mol% ethyl acetate were obtained. Top product feed to the 7th stage of 25 staged high pressure column (HPC), which is operate at 0.6 MPa Pressure. Here bottom product N-hexane having 0.999 mol% is obtained. Top product is get recycle back and feed to the LPC at 16th stage.

RESULT:

	RECYCLE STREAM	N-HEXANE	FEED	ETHYL ACETATE	DISTILLATE 1	Units
Temperature	72.175192	138.40697	25	76.578923	71.823226	C
Pressure	0.1	0.6	0.101325	0.1	0.1	MPa
Mass Flow	17367.52	251.80514	1000	109.20924	18258.311	kg/h
Molar Flow	199.57862	2.9218875	11.504941	1.2403358	209.84322	kmol/h
Molar Fraction (Mixture) / N-hexane	0.56249543	0.999	0.61525346	0.03	0.56853542	
Mass Fraction (Mixture) / N-hexane	0.55704023	0.99897764	0.61	0.029362463	0.56309704	
Molar Fraction (Mixture) / Ethyl acetate	0.43750457	0.001	0.38474654	0.97	0.43146458	
Mass Fraction (Mixture) / Ethyl acetate	0.44295977	0.0010223613	0.39	0.97063754	0.43690296	

REFERENCE:

- Comparison of continuous homogenous azeotropic and pressure-swing distillation for a minimum azeotropic system ethyl acetate/N-hexane separation by Liping Lv, Lin Zhu, Huimin Liu, Hang Li, Shirui Sun