

PSD OF ISOBUTYL ALCOHOL AND ISOBUTYL ACETATE

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PROBLEM STATEMENT:

Pressure-swing Distillation of Isobutyl Alcohol and Isobutyl Acetate

➤ OBJECT USED:

1. Distillation column
2. Material Stream
3. Recycle block
4. Valve

➤ DESCRIPTION:

I. Abstract:

Pressure Swing Distillation technique for the separation of Isobutyl Acetate (IBAC) and Isobutyl Alcohol (IBA). Two columns are used, Bottom product from the first column is Isobutyl Acetate and other column is for further recovery of feed where Isobutyl Acetate is separated from Bottom. The mixture from the Top of second column is recycled back with the feed stream.

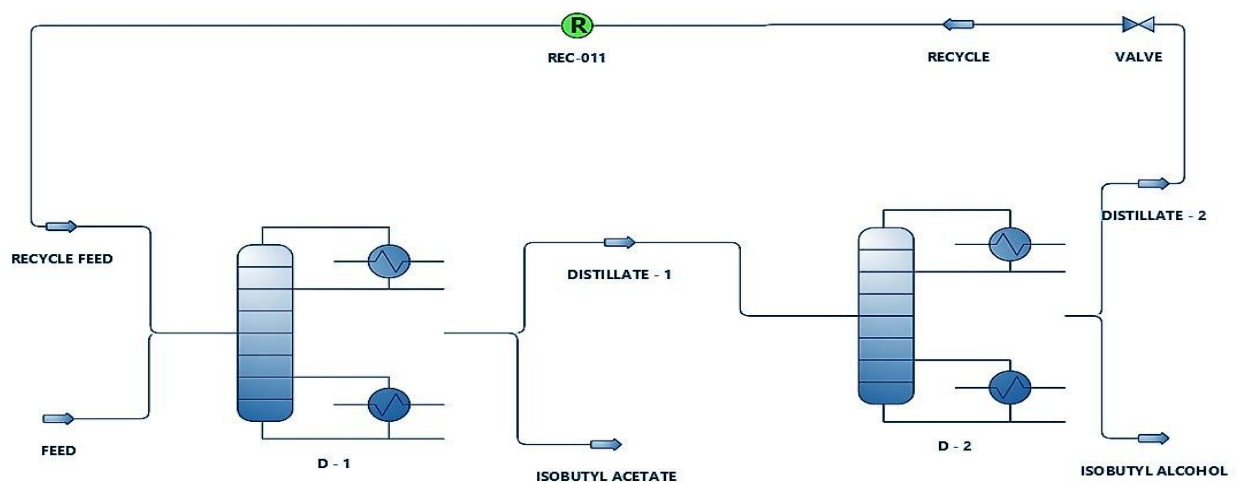
II. Introduction:

Plenty of separation methods can be employed to separate the azeotrope, including extractive distillation (ED), pressure swing distillation (PSD) and so on. The mixture of IBAC (Iso Butyl Acetate) and IBA (Iso Butyl Alcohol) because of the limited conversion ratio, it is a pity that the

complete separation of the mixture of IBAC and IBA cannot be achieved by simple distillation process due to the formation of minimum boiling azeotrope between them, so isobutyl acetate and isobutyl alcohol are separated by pressure swing distillation.

III. Flowsheet Description:

In the flowsheet, the fresh feed stream is mixed with the recycle stream as final feed to the high-pressure column (HPC) despite of the different composition of the feed stream and recycle stream. The recycle with 338.577 K of temperature and 101325 Pa of pressure while that of feed with 380.69 K of temperature and 101325 Pa of pressure is fed to the column-1 where from bottom portion Isobutyl Acetate is obtained while from top there is a mixer of IBAC and IBA. So the mixer is fed again to column-2 where the temperature of mixer is 381.665 K and 101325 Pa of pressure is content. In the column-2 i.e. (LPC) low pressure should be maintained so the pressure of column is 19000 Pa. From the LPC column Isobutyl Alcohol is obtained from bottom while from top again mixer is obtained which is recycled back to column-1 by using recycle block.



Flowsheet of Pressure-Swing Distillation of IBA and IBA

The property table for the flowsheet is given below:

Object	ISOBUTYL ALCOHOL	ISOBUTYL ACETATE	FEED	DISTILLATE - 2	DISTILLATE - 1	UNITS
Temperature	337.756	389.528	380.69	338.408	381.665	K
Pressure	19000	101325	101325	19000	101325	Pa
Mass Flow	624.749	875.279	1500.02	1121.56	1746.31	kg/h
Molar Flow	0.00232156	0.00209691	0.00441861	0.00333448	0.00565604	kmol/s
Volumetric Flow	0.820613	1.10179	1.95964	3.17187	2.40189	m ³ /h
Molar Fraction (Mixture) / Isobutyl acetate	0.015	0.995	0.48	0.459349	0.276963	
Molar Fraction (Mixture) / 2-methyl-1-propanol	0.985	0.005	0.52	0.540651	0.723037	

Table-1 Streamwise Result for Pressure Swing Distillation of IBA-IBAC Solution

➤ REFERENCES:

Control of fully heat-integrated pressure swing distillation for separating isobutyl alcohol and isobutyl acetate

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