

EXTRACTION OF WATER FROM CHLOROFORM BY USING ACETONE AS A SOLVENT

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PROBLEM STATEMENT:

Extraction of Water from Chloroform by using Acetone as a solvent.

➤ OBJECT USED:

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

➤ DESCRIPTION:

I. Abstract:

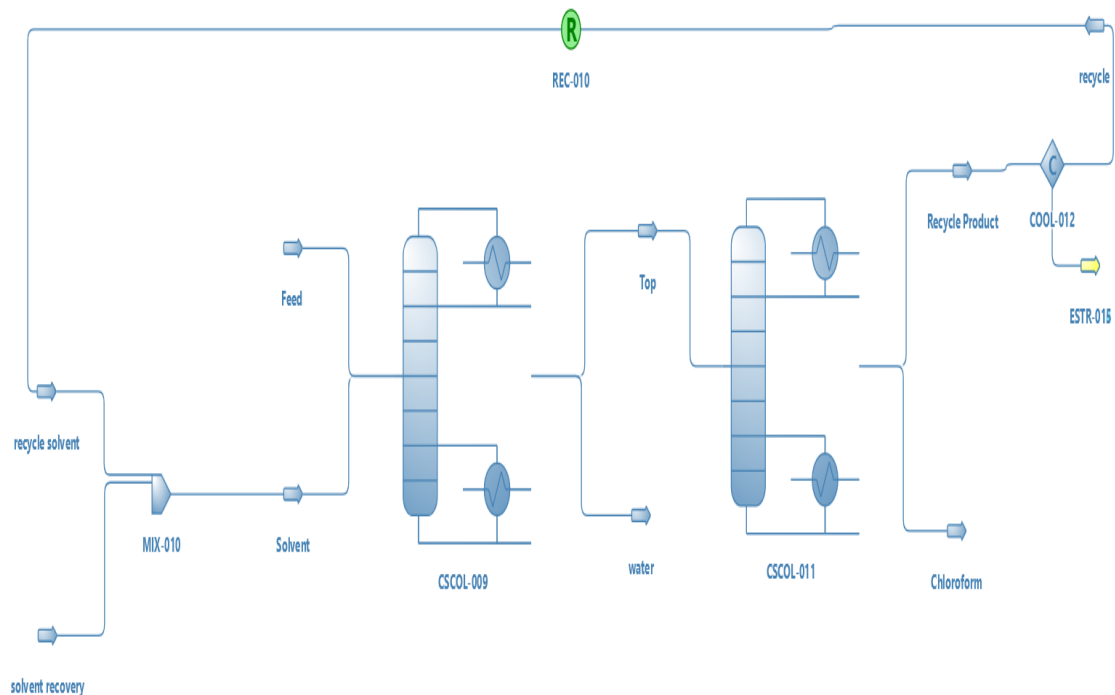
Extractive Distillation technique for the separation of Water and Chloroform by using the solvent of Acetone. Two columns are used, Bottom product from the first column is Water and other column is for further purification of Water where Water is separated from Bottom. The mixture from the Top of second column is recycled back with the feed stream by introducing makeup.

II. Introduction:

Extractive distillation is a commonly used method for the separation of azeotropic mixture. In this method, a third component is added into the system as solvent to alter the relative volatility of the component to be separated. With the presence of the suitable solvent, the relative volatility of the original two components can be enhanced.

III. Flowsheet Description:

This process content a two-column design. The reproduced flowsheet is shown in Figure 1. Among the various Entrainer available like DMSO, DMF here Acetone is used as it is easily and cheaply available. In Figure-I column-I is Extractive column and column-II is of simple Distillation Column of further purification of Water. The mixture of Chloroform-Water along with Entrainer is fed to column-I, the bottom product of column-I is our desired product i.e. 92 wt. % Water. The bottom product is fed again to column-II for further purification so that more mole fraction of water will obtained. The top Product is again recycled to column-I after adding make-up stream of Feed to account for the loss of Component in distillates of column-I and column-II. Fresh feed flow rate is kept at 14.5568 mol/s containing 0.5 wt. % Chloroform and rest water at a temperature of 298 K. The pressure of both the columns are maintained at 101325 Pa.



Flowsheet of Extractive Distillation of Water-Chloroform Solution

The property table for the flowsheet is given below:

Object	Water	Top	Solvent	Recycle Product	Chloroform	Units
Temp	372.423	329.356	298.15	329.332	333.738	K
Pressure	101325	101325	101325	101325	101325	Pa
Molar Flow	7.35189	1725.12	1717.92	1714.66	10.4636	mol/s
Molar Fraction (Mixture)/ Water	0.99	1.71E-08	3.13E-23	1.19E-19	2.82E-06	
Molar Fraction (Mixture)/ Acetone	0.007647	0.9844	0.9885	0.990098	0.0499972	
Molar Fraction (Mixture)/ Chloroform	0.002353	0.015604	0.01144	0.009902	0.95	

Table-1 Streamwise Result for Extractive Distillation of Water-Chloroform Solution

➤ REFERENCES:

Unit Operations of Chemical Engineering by Warren L. McCabe, Julian C. Smith, Peter Harriott, 7 Edition, McGraw Hill Education.