

# Pressure-Swing Distillation Isopropyl Alcohol/Diisopropyl Ether Separation

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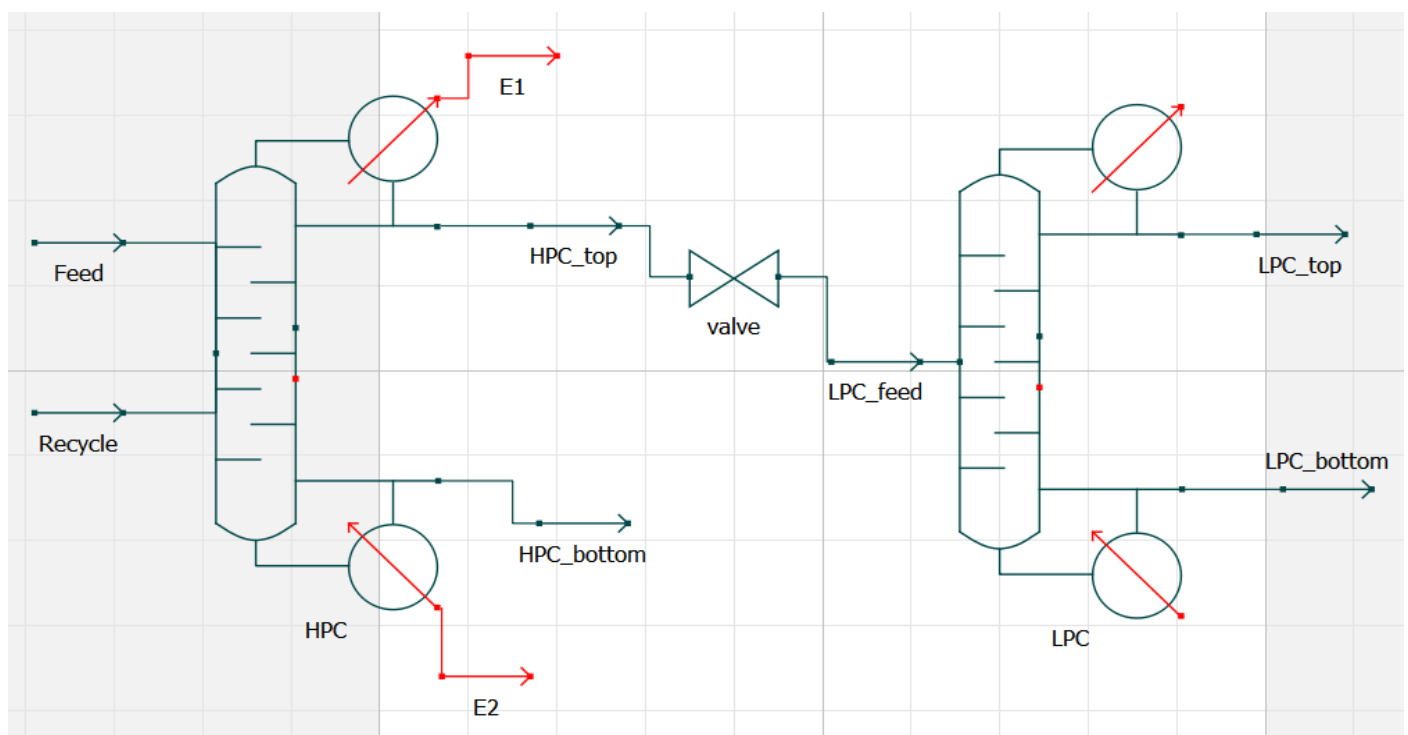
## Introduction:

Diisopropyl ether (DIPE) is a widely used chemical in many different fields, such as fossil oil, tobacco production, and synthetic chemistry. Specifically, it is used as a specialized solvent or remove polar organic compounds from aqueous solutions, for example, phenols, ethanol, acetic acid, whereas isopropyl alcohol (IPA) mainly finds its use in medicine industry as a chemical intermediate and solvent.

## Description:

A Openmodelica Flowsheet is constructed to separate DIPE and IPA azeotrope using pressure swing distillation. Raoult's Law thermodynamic package is used for simulation. A mixture of DIPE and IPA with composition 75% and 25% respectively was fed to a high-pressure distillation column (HPC) operating at 10 atm pressure and having 38 stages. The feed enters at 6<sup>th</sup> stage while recycle enters at 13<sup>th</sup> stage. From top, distillate containing azeotrope of DIPE and IPA is obtained which is passed to valve for reducing pressure to 1 atm. The resultant stream enters at 3<sup>rd</sup> stage of the low-pressure distillation column (LPC) containing 18 stages. LPC operates at 1 atm. The top stream of LPC is a recycle stream. From bottom, pure IPA stream is obtained.

## Flowsheet:



## Results:

	Feed	Recycle	HPC_top	HPC_bottom	LPC_top	LPC_bottom
Pressure (Pa)	1013250	1013250	1013250	1013250	101325	101325
Temperature (K)	298.15	340	433.156	437.17	344.876	355.411
Molar Flow Rate (mol/s)	27.78	21.58	28.37	20.989956	21.58	6.79
Mole Fraction – DIPE	0.75	0.7550	0.576103	0.990178	0.755255	0.00672
Mole Fraction - IPA	0.25	0.2450	0.423897	0.00982	0.244745	0.993277

## References:

Luo, Haotao, et al. "Comparison of pressure-swing distillation and extractive distillation methods for isopropyl alcohol/diisopropyl ether separation." *Industrial & Engineering Chemistry Research* 53.39 (2014): 15167-15182.