

## EXTRACTIVE DISTILLATION OF BENZENE AND ETHANOL USING P-XYLENE AS A SOLVENT

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### **BACKGROUND WORK:**

The separation of azeotrope and close boiling mixture is a challenge in most chemical process. For the separation, the use of a single convective distillation column is impossible. **Extractive distillation** is a method where the relative volatilities of components to be separated are altered by using an additional component called (solvent or entrainer).

### **PROCESS:**

The mixture "benzene and ethanol" is feed to the 50<sup>th</sup> stage of 71 staged extractive distillation column with the solvent 1 p-xylene fed to the 24<sup>th</sup> stage. The presence of entrainer alters the relative volatility between the two, causing pure benzene to move toward the top of the column. The mixture is feed into the 10<sup>th</sup> stage of a 21 stage extractive distillation to produce almost pure ethanol at top of the column. P-xylene is recycled back to the extractive distillation column and merged with one additional pure make up stream to account for the solvent losses.

### **Results:**

Object	ethanol	SOLVENT	P-XYLENE RECYCLE	MAKEUP	FEED	Benzene	
Temperature	350.688	323.116	323.15	298.15	298.15	353.384	K
Pressure	101325	101325	101325	101325	101325	101325	Pa
Molar Flow	50.1011	215.001	264.9	0.301	100	9.84738E-05	kmol/h
Molar Flow (Mixture) / Ethanol	49.55	0	0.449992	0	50	6.78077E-08	kmol/h
Molar Flow (Mixture) / Benzene	0.048269	0	49.9517	0	50	9.81188E-05	Kmol/h
Molar Flow (Mixture) / P-xylene	0.502843	215.001	214.498	0.301	0	3.26244E-07	kmol/h

**References:**

[https://drive.google.com/file/d/1hZKCgUakhbANaqw1\\_0pSg5Z861ZU6h6w/view?usp=drivesdk](https://drive.google.com/file/d/1hZKCgUakhbANaqw1_0pSg5Z861ZU6h6w/view?usp=drivesdk)



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