

Dehydration of THF by Pressure Swing Distillation.

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Unit System:

1. Temperature: Celsius ($^{\circ}\text{C}$)
2. Pressure: bar
3. Molar Flow: Kmol/h
4. Mass Flow: Kg/h
5. Volumetric Flow: m^3/h
6. Other units are in SI units

❖ Background

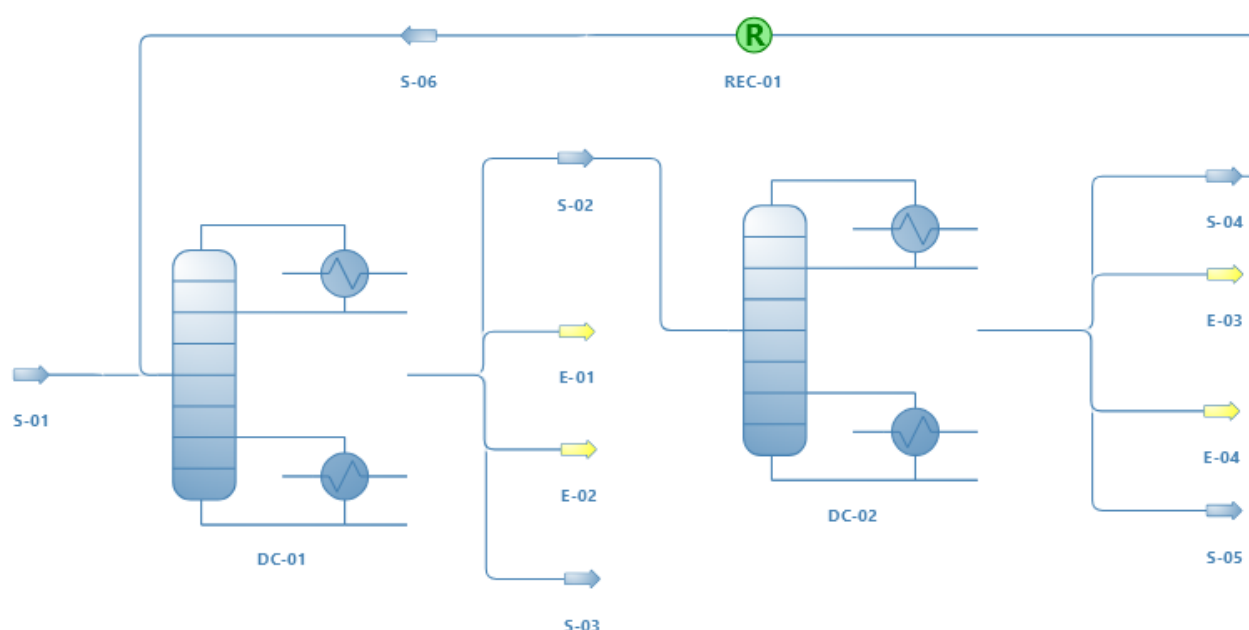
THF (Tetrahydrofuran) is a stable and versatile compound with relatively low boiling point and excellent solvency. It is widely-used for dissolution and reaction of various substances. Also, it is used as a starting material for the synthesis of poly (tetramethylene ether). Polymerisation means to form a repeating network of molecules, and tetrahydrofuran is commonly used in polymer science. In the presence of strong acids, THF converts to the polymer poly (tetramethylene ether) glycol which is used to make elastomeric polyethene fibres like Spandex, Lycra, elastane, etc.

❖ Description of Flowsheet

The flowsheet contains two distillation columns named as “DC-01” and “DC-02”. “DC-01” has 25 trays and 16th tray is the feed location for feed “S-01” and 16th stage is the feed for recycle feed (“S-06”) coming from “DC-02”. “DC-02” has 25 trays and 12th tray is the feed location for the feed “S-02”.

Pure Tetrahydrofuran (THF) of **99.76%** purity is obtained from the bottom product (“S-05”) in column “DC-02”. The top product (“S-04”) of column “DC-02” is recycled back to column “DC-01”.

❖ Flowsheet



❖ Result

Master Property Table							
Object	S-06	S-05	S-04	S-03	S-02	S-01	
Temperature	142.538	142.338	142.538	106.469	71.2702	25	C
Pressure	7.2	7.2	7.2	1.2	1.2	2.5	bar
Mass Flow	3101.37	3095.96	3101.37	1435.54	6197.34	4506.05	kg/h
Molar Flow	43.0115	43.0115	43.0115	57.3416	86.023	100	kmol/h
Volumetric Flow	4.20602	4.19502	4.20602	1508.16	7.46803	4.81688	m3/h
Molar Fraction (Mixture) / Tetrahydrofuran	1	0.997674	1	0.129777	0.998837	0.5	
Molar Fraction (Mixture) / Water	1.49693E-10	0.00232589	1.49693E-10	0.870223	0.00116295	0.5	

❖ Reference

<https://link.springer.com/article/10.1007/s11814-010-0467-1>