

Benzene Toluene Distillation

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BACKGROUND

Benzene Toluene fractionation is widely used in industries. Benzene is an important component as it is used as a primary element of raw material for manufacturing of some important explosives. Also benzene has good gasoline characteristics, so its recovery is very much important. Toluene is also used as raw material for benzene manufacturing hydrodealkylation.

DESCRIPTION OF FLOESHEET

Feed contains 50% benzene (by mole) and rest is toluene at room temperature. Due to high difference in boiling point of benzene and toluene, its separation is not much complex.

To make separation more economical we have used preheating of feed stream with help of bottom product of distillation column.

Preheated Feed connected to 11th stage of distillation column which is having 24 stages. Condenser and reboiler pressure is fixed at 101325 Pa. Reflux ratio is fixed as 10. Bottom product molar flow is set to be 12.5 mol/s.

Rigorous Heat Exchanger is set by defining Global heat transfer coefficient 1000 and Q_{actual} 64017.165375 based on same flowsheet simulated in DWSIM.

RESULT

Material Streams					
	Input	Preheded_Feed	Distillate	Bottoms	Outlet
Temperature(K)	298.15	313.469	355.2	383.541	356.473
Pressure(Pa)	101325	101325	101325	101325	101325
Molar Flow(mol/s)	27.78	27.78	15.28	12.5	12.5
Mole Fraction of Benzene 1	0.5	0.5	0.909029	3.16846e-06	3.16846e-06
Mole Fraction of Toluene 2	0.5	0.5	0.0909712	0.999997	0.999997

Distillation Column	
Distillate mole fraction of benzene	0.91
Bottom mole fraction of toluene	0.99
Condenser Duty (kW)	5259.66
Reboiler Duty (kW)	-5514.35

Heat Exchanger	
Heat Exchanger Area (m ²)	0.9999
Heat Exchanger Q _{actual} (W)	64017.2

REFERENCE

Unit Operations of Chemical Engineering, by Warren L. McCabe, Julian C. Smith, Peter Harriott, Chapter 18, Problem no.4