BTX DIVIDED WALL COLUMN

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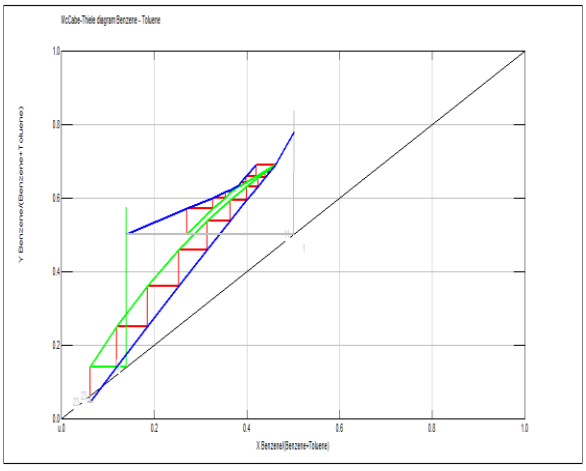
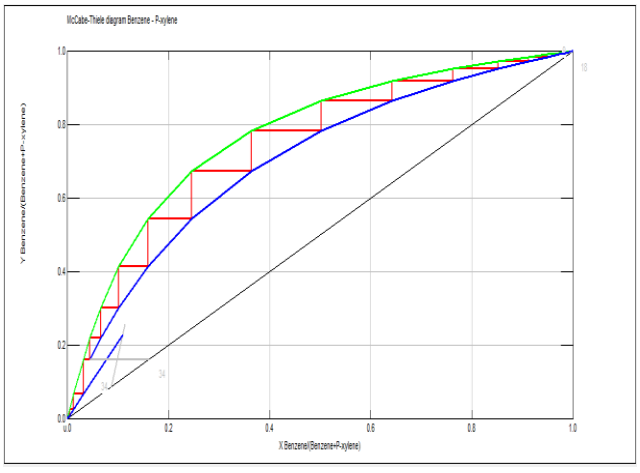
About flowsheet:

The divided-wall column is a practical way to implement the topology of the Petlyuk column that features two columns with interconnected vapor and liquid streams arising from a single reboiler and a single condenser. The dynamic control of the divided-wall column has been explored in a relatively small number of papers. Control is more difficult than with a conventional two-column separation sequence because there is more interaction among controlled and manipulated variables since the four sections of the column are coupled.

The BTX involves separation of benzene, toluene and p-xylene mixture and to form desire products. In the process three side stream produce. Here raw material fed up in to the prefrac column with 1 kmol/s, 358 K and 1atm pressure. The top product of column fed in to mainfrac column with 0.64140174 kmol/s, 141.08182 K temperature and 0.37000049 atm and the bottom product fed in to mainfrac column with 1.3116154 kmol/s, 357.6269 K temperature and 0.37000049 atm pressure. There are three side streams outlet from the mainfrac column in which one of the side stream gave final product of toluene with 0.296 kmol/s, 351.2307 K temperature and 0.37000049 atm and two streams are further connected in to prefrac column. The top product (benzene) of the mainfrac column with the 0.29779501 kmol/s, 323.25563 K temperature and 0.37000049 atm pressure. The bottom product (p-xylene) of the mainfrac column with 0.40416887 kmol/s, 377.64258 K temperature and pressure was 0.37000049 atm.





Results:

DC1 Distillate	
Object	Prefrac column
Molar Flow	0.64140174 kmol/s
Molar Fraction benzene	0.49819461
Molar Fraction toluene	0.50177321
Molar Fraction p-xylene	3.2180079e-05

DC1 Bottom	
Object	prefrac column
Molar Flow	1.2860963 kmol/s
Molar Fraction benzene	0.025807482
Molar Fraction toluene	0.57110965
Molar Fraction p-xylene	0.40308287

DC2 Distillate	
Object	Mainfrac column
Molar Flow	0.2999357 kmol/s
Molar Fraction benzene	0.99
Molar Fraction toluene	0.0099999998
Molar Fraction p-xylene	2.4337443e-10

DC2 Bottom	
Object	Mainfrac column
Molar Fraction benzene	0.40402023 kmol/s
Molar Fraction benzene	7.9634753e-09
Molar Fraction toluene	0.009999992
Molar Fraction p-xylene	0.99

DC2 side stream	
Object	Mainfrac column
Molar Flow	0.296 kmol/s
Molar Fraction benzene	0.01037556
Molar Fraction toluene	0.98955989
Molar Fraction p-xylene	6.4553529e-05

Conclusion and Recommendation:

This work illustrates that open source simulator serves as a good platform for carrying out process development flowsheeting with ease. However, during the simulation it's examined that process has sensitivity towards temperature and pressure and one should have proper knowledge regarding selection of property package.

Unit of System used:

BTX	
Temperature	k
Pressure	Atm
Molar Flow	Kmol/h
Volumetric Flow	m3/s

References:

Flowsheet Source: http://www.chemsep.com/downloads