

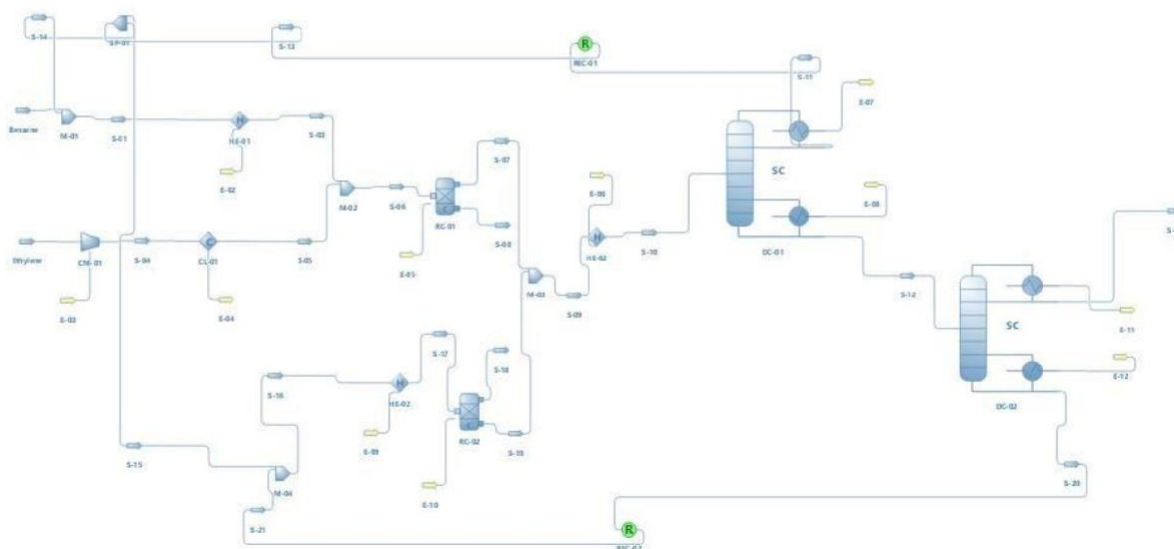
Ethyl Benzene Production with Liqphase Zeolite based Reactions and Conventional Column Separation.

Tarun Pratap Singh
R.B.S Engineering Technical Campus Agra

Background and Description :

Ethylbenzene is being produced from benzene and ethylene by liquid phase alkylation in a reactor zeolite used as catalyst. Gaseous ethylene is sparged into the liquid phase of benzene mixture in the first reactor. Both reactors operate at high pressure (20 atm) to maintain the liquid phase in the reactor at high temperatures required for reasonable reaction rates. The reaction is exothermic under isothermal condition. Bottom stream mixture of ethylbenzene and diethylbenzene, is fed to a second distillation column. It produces ethylbenzene as a distillate and a diethylbenzene bottom is recycled back to reactor. In the reactor diethylbenzene reacts with benzene to produce ethylbenzene which is mixed with the effluent from the reactor and sent for purification in benzene and ethylbenzene columns.

Flowsheet :



Results:

Feed Table (Benzene) :			
BENZENE	Mole Fraction of Ethylene	0.3333	
	Mole Fraction of Benzene	0.3333	
	Mole Fraction of Ethylbenzene	0.3333	
	Temperature	25	C
	Pressure	1013255	bar
	Mass Flow	36000	kg/h
	Molar Flow	50.8642	Kmol/h

Feed Table (Ethylene) :			
ETHYLENE	Temperature	25	C
	Pressure	101325	bar
	Mass Flow	3600	kg/h
	Molar Flow	128.328	Kmol/h
	Mole fraction of Ethylene	1	
	Mole Fraction of Benzene	0	
	Mole Fraction of Ethylbenzene	0	

Unit - C5

References : Production of Ethylbenzene by liquid alkylation of benzene using zeolite catalyst – Alaa Elgabry, Amr Mansi, Amr Nabil, Basma Ali, Karim Ashour and spoken tutorials FOSSEE.