CENG 102 Project Submission Sheet

Plant for Hydrodealkylation of Toluene to Benzene

Team Name: _____

Names (Last, First)	Student ID #	Project Contribution (General or Specific)

If groups have members from both CENG 100 sections, please clarify in the table above which section (professor) you have!

Problem #		Solution
1	Hydrogen Compression: Work & Final Temperature	Work (kW): Temperature (K):
2	Hydrogen Non-idealities	Residual 1 (J/mol): Residual 2 (J/mol): New Work (kW): Ideal gas? Why or why not?
3	Toluene Heating (kW)	Q =
4	Toluene Compression	Work (kW): Temperature (K)
5	Toluene Vapor Non-Ideality	Residual 1 (J/mol): Residual 2 (J/mol): New Work (kW): Ideal gas? Why or why not?
6	Mixing Temperature (K)	T =
7	Pre-Reactor Compression	Work (kW): Temperature (K)
8	Pre-Reactor Heating (kW)	Q =

9	Reactor Heat (kW)	Q =
10	Adiabatic Temperature	T =
11	Influence on Equilibrium	a.) K_1 = _____ K_2 = _____ b.) $K_{1,eff}$ = _____ $K_{2,eff}$ = _____ Effect on Rxn 1: Effect on Rxn 2:
12	Pre-Separation Pressure Reduction	a.) T (K) = _____ b.) W (kW) = _____ T (K) = _____
13	Flash I (1) = Toluene; (2) = Hydrogen (3) = Benzene; (4) = Methane; (5) = Biphenyl	V (mol/s) = _____ L (mol/s) = _____ x_1 = _____ y_1 = _____

	R = recovery fraction	x_2 = _____ y_2 = _____ x_3 = _____ y_3 = _____ x_4 = _____ y_4 = _____ x_5 = _____ y_5 = _____ $R_{2,V}$ = _____ $R_{4,V}$ = _____ $R_{1,L}$ = _____ $R_{3,L}$ = _____ $R_{5,L}$ = _____
14	Flash II (1) = Toluene; (2) = Hydrogen (3) = Benzene; (4) = Methane; (5) = Biphenyl	V (mol/s) = _____ L (mol/s) = _____ x_1 = _____ y_1 = _____ x_2 = _____ y_2 = _____ x_3 = _____ y_3 = _____ x_4 = _____ y_4 = _____ x_5 = _____ y_5 = _____ Benzene Purge (mol/s) = _____ Value of Flash II:

15	Flash III (Ideal) (1) = Toluene; (2) = Biphenyl	a.) x_1 = _____ y_1 = _____ x_2 = _____ y_2 = _____ b.) V (mol/s) = _____ L (mol/s) = _____ c.) P (bar) = _____ y_1 = _____ V (mol/s) = _____ L (mol/s) = _____
16	Flash III (Non-Ideal) (1) = Toluene; (2) = Biphenyl	a.) x_1 = _____ y_1 = _____ x_2 = _____ y_2 = _____ b.) V (mol/s) = _____ L (mol/s) = _____
17	Final Question: Value of Flash III	

XC I	Extra Credit I: Compression with Inter-Stage Cooling	a.) All in kW W_1 = _____ W_2 = _____ W_3 = _____ W_4 = _____ b.) All in K T_{F1} = _____ T_{F2} = _____ T_{F3} = _____ T_{F4} = _____ c.) All in kW Q_1 = _____ Q_2 = _____ Q_3 = _____
XC II	Extra Credit II: Mixing Temperature with Residuals	T (K) =
XC III	Extra Credit III: Non-Ideal Flash Pressure	P (bar) = _____ y_1 = _____ V (mol/s) = _____ L (mol/s) = _____