CHEN 425 ASPEN Simulation Report

Title: Simulation of a Flash Process

Workshop: #2

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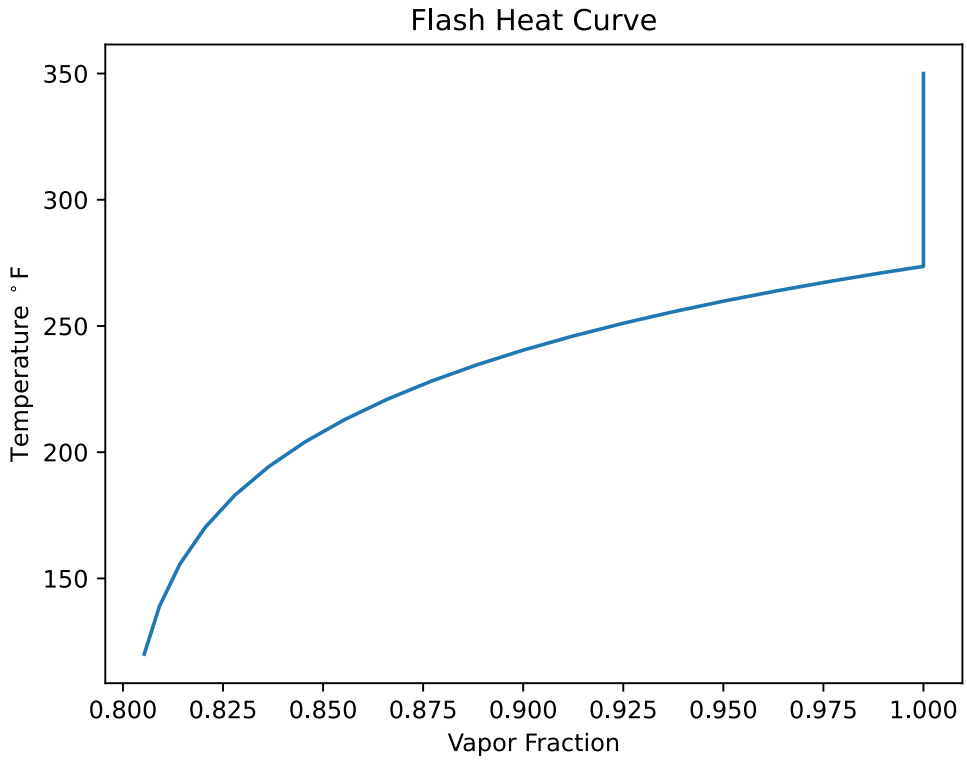
1 Summary of Results

1. Vapor flow: 32290.72 kmol/hr

   Vapor stream composition:

Species	Mole fraction
HYDROGEN	0.272523897
CO	0.148649452
N2	0.421173402
WATER	0.009009942
CO2	0.061931519
METHANE	0.049549613
ETHYLENE	0.02477473
CYCLOHEXANE	0.012387445

2. Heat curve:



The dew point is 273.61 °F.

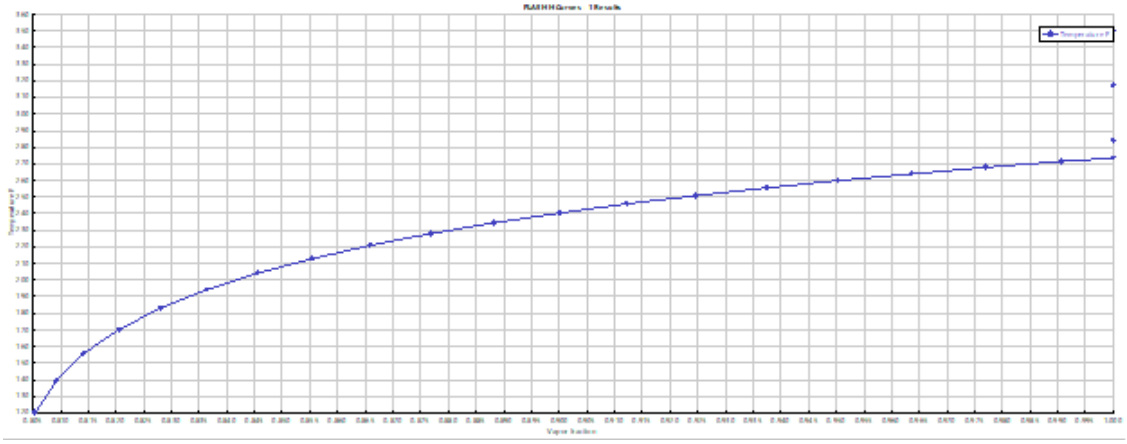
3. A temperature of 240 °F is required for the overall vapor fraction to be 90%.

2 Discussion of Simulation Results

1. Stream results for part i:

	Units	INLET	LIQUID	VAPOR	
Mass Enthalpy	cal/gm	-897.956	-3804.15	-504.622	
Molar Entropy	cal/mol-K	-0.692468	-39.3136	-1.63265	
Mass Entropy	cal/gm-K	-0.0326986	-2.18216	-0.0744412	
Molar Density	mol/cc	0.000406883	0.0538752	0.000568167	
Mass Density	gm/cc	0.00861667	0.970612	0.012461	
Enthalpy Flow	cal/sec	-2.11292e+08	-1.46766e+08	-9.92705e+07	
Average MW		21.1773	18.0159	21.932	
+ Mole Flows	**kmol/hr**	**40000**	**7709.28**	**32290.7**	
− Mole Fractions					
HYDROGEN		0.22	9.11486e-07	0.272524	
CO		0.12	2.74324e-07	0.148649	
N2		0.34	9.61615e-07	0.421173	
WATER		0.2	0.999972	0.00900994	
CO2		0.05	2.42072e-05	0.0619315	
METHANE		0.04	9.45667e-07	0.0495496	
ETHYLENE		0.02	7.93929e-07	0.0247747	
CYCLOHEX		0.01	6.05875e-08	0.0123874	
+ Mass Flows	**kg/hr**	**847091**	**138890**	**708201**	
+ Mass Fractions					
Volume Flow	l/min	1.63847e+06	2384.92	947220	
+ Vapor Phase					
+ Liquid Phase					
<add properties>					

2. ASPEN Heat Curve:



The dew point is the temperature at which the vapor fraction changes to 1. ASPEN reports this point in the results.

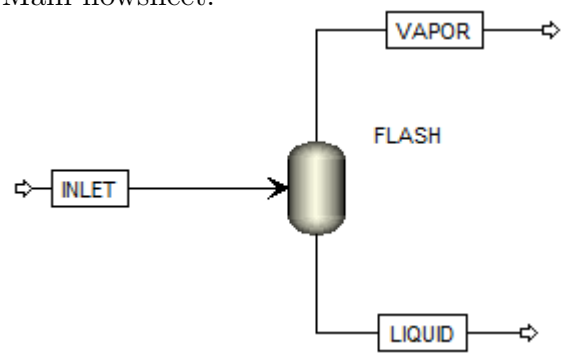
3. Stream results showing that the vapor stream is 90% of the overall flow rate.

	Units	INLET	LIQUID	VAPOR
Pressure	atm	15	15	15
Molar Vapor Fraction		1	0	0.998879
Molar Liquid Fraction		0	1	0.00112087
Molar Solid Fraction		0	0	0
Mass Vapor Fraction		1	0	0.999062
Mass Liquid Fraction		0	1	0.00093804
Mass Solid Fraction		0	0	0
Molar Enthalpy	cal/mol	-19016.3	-67141.2	-15343.7
Mass Enthalpy	cal/gm	-897.956	-3726.62	-712.733
Molar Entropy	cal/mol-K	-0.692468	-35.3813	-0.958509
Mass Entropy	cal/gm-K	-0.0326986	-1.96382	-0.0445238
Molar Density	mol/cc	0.000406883	0.0500427	0.000470965
Mass Density	gm/cc	0.00861667	0.901601	0.0101389
Enthalpy Flow	cal/sec	-2.11292e+08	-7.45136e+07	-1.53457e+08
Average MW		21.1773	18.0166	21.528
+ Mole Flows	**kmol/hr**	**40000**	**3995.29**	**36004.7**
+ Mole Fractions				
+ Mass Flows	**kg/hr**	**847091**	**71981.7**	**775109**
+ Mass Fractions				
Volume Flow	l/min	1.63847e+06	1330.63	1.27415e+06
+ Vapor Phase				
+ Liquid Phase				
<add properties>				

Find on the heat curve where the vapor fraction is 0.9, and find the corresponding temperature.

3 Simulation Screenshots

Main flowsheet:



Stream results are included in the discussion section.

4 Conclusions

1. It looks like the vapor is more concentrated in the more volatile components than the feed. The vapor flow is the majority of the outlet flow.

2. Looking at the heat curve, it is clear where the vapor becomes saturated. Above the dew point, the vapor fraction is constant.

3. The vapor fraction increases as the temperature increases. This increase can be seen in the heat curve and by comparing the results bewteen part i and part iii.