

Flash Calculations

A feed stream enters a flash unit at 60 °C. The composition of the stream as well as the Antoine coefficients are given below:

Compound	Flow rate (kmol/hr)	B.Pt.(°C)	A	B	C
Hexane	20	68.7	6.87776	1171.530	224.366
1,2 Dichloroethane	30	83.4	7.04636	1305.400	230.000
Methylcyclohexane	50	100	6.82689	1272.864	221.630

Antoine Equation:

$$\log_{10}(P) = A - \frac{B}{T + C}$$

where P is the vapor pressure in $mm\ Hg$ and T is the temperature in °C.

1. The flash operates at 80 °C and 1 bar. What is the composition of the liquid and vapor streams exiting the flash unit?
2. The flash operates at 80 °C and it is desired to have a vapor fraction of 20 % ($\frac{V}{F} = 0.20$). What is the pressure at which the flash unit operates and what is the composition of the liquid and vapor streams exiting the flash unit?
3. The flash operates at 1 bar and it is desired to have a vapor fraction of 25 % ($\frac{V}{F} = 0.25$). What is the temperature at which the flash unit operates and what is the composition of the liquid and vapor streams exiting the flash unit?
4. The flash operates at 80 °C and it is desired that the split fraction of 1,2 Dichloroethane in the vapor phase be 0.25 ($\xi_2 = 0.25$). Compute the pressure at which the flash unit operates and the composition of the liquid and vapor streams exiting the flash unit.

Instructions

- Do the above problems in CHEMCAD.
- How do the results change if you use different “K-value” methods? Tabulate your results to show this comparison.
- Do these problems by “hand calculations”.