

Answer Sheets for CHE654 Homework Set #5 (100 Points)

Note: For all problems, submit a copy of your process flow diagram and a copy of your input summary of the process.

34. *Double-Effect Evaporator* (20 points)

(a) Don't forget to submit the process flowsheet and input summary!

The required physical property parameters for sugar in IDEAL are: _____

The redundant data are: _____

(b) The mass fraction of sugar from the concentrated liquor of the second evaporator is _____

35. *Separation of Compound X, I* (20 points)

(a) Redundant parameters: _____

Required but missing parameters: _____

(b) Thermal diffusivity of column bottom stream = _____ cs

Column bottom flow rate = _____ lbmol/hr

38. *Property Requirements and PCES, I* (20 points)

(a) Required parameters in UNIQU-RKS are:

(b) Values of estimated parameters:

$$MW = \underline{\hspace{2cm}}; T_C = \underline{\hspace{2cm}} \text{ K}; P_C = \underline{\hspace{2cm}} \text{ N/m}^2$$

$$V_C = \underline{\hspace{2cm}} \text{ m}^3/\text{kmol}; Z_C = \underline{\hspace{2cm}}; \text{CPIG at 300 K} = \underline{\hspace{2cm}} \text{ J/kmol-K}$$

$$\text{DHFORM} = \underline{\hspace{2cm}} \text{ J/kmol}; \text{DGFORM} = \underline{\hspace{2cm}} \text{ J/kmol}$$

$$\text{Vapor pressure at } T_B = \underline{\hspace{2cm}} \text{ N/m}^2; \text{OMEGA} = \underline{\hspace{2cm}}$$

$$\text{DHVLB} = \underline{\hspace{2cm}} \text{ J/kmol}; V_B = \underline{\hspace{2cm}} \text{ m}^3/\text{kmol}$$

$$\text{(c) At } T = 500 \text{ }^\circ\text{F}, C_p^{IG} = \underline{\hspace{2cm}} \text{ Btu/lbmol-R}$$

$$\text{At } T = 32 \text{ }^\circ\text{F}, C_p^{IG} = \underline{\hspace{2cm}} \text{ Btu/lbmol-R}$$

(d) H_V^{IG} (ideal gas enthalpy) of 2-BHA at 500 °F = $\underline{\hspace{2cm}}$ Btu/lbmol

H_L (liquid enthalpy) of 2-BHA at 500 °F = $\underline{\hspace{2cm}}$ Btu/lbmol

(e) The UNIQU – RKS is a good choice for representing the properties of this system

because $\underline{\hspace{10cm}}$

$\underline{\hspace{10cm}}$

$\underline{\hspace{10cm}}$

Two more property methods that are appropriate are: $\underline{\hspace{10cm}}$

40. Extractive Distillation, I (20 points)

(a) Mole purity of MCH in the overhead stream of the first column = $\underline{\hspace{2cm}}$ mole%

Mole purity of toluene in the overhead stream of the second column = $\underline{\hspace{2cm}}$ mole%

(b) The final value of D/F ratio in the second column = $\underline{\hspace{2cm}}$

(c) Submit plots of the densities (vapor and liquid) as a function of tray number

43. Purifying a Wastewater Stream (20 points)

Condenser temperature in Column 1 = $\underline{\hspace{2cm}}$ °C

Molar distillate to feed ratio in Column 2 = $\underline{\hspace{2cm}}$