

Answer Sheet for CHE654 Homework Set #3 (100 Points)

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

21. (20 points) *Using ASPEN PLUS to Perform Simple Calculations*

Answer the following questions:

(a) (i) At $P = 1.01325$ bar (1 atm):

Bubble point temperature of the mixture = _____ °C

Dew point temperature of the mixture = _____ °C

(ii) At $T = 100$ °C:

Bubble point pressure of the mixture = _____ bar

Dew point pressure of the mixture = _____ bar

(iii) Temperature at which the flash will produce a vapor stream containing

exactly 50 mol% acetone = _____ °C

(b) Composition (mass fractions) of the benzene-toluene feed = _____

23. (20 points) *Simulating an Acetic-Anhydride Production Process*

Answer the following questions:

(a) (i) Calculated reactor length = _____ m

(ii) Cooling water needed = _____ gmole/min

(b) Mole fraction of acetic-anhydride in the HP-Column bottom stream = _____

(c) Fractional conversion based on ketene = _____

(d) Mole fraction of acetic-anhydride in the HP-Column bottom stream = _____

24. (20 points) *Simulating an Acetone Production Process*

Answer the following questions:

1. ΔP across the reactor = _____ psia
2. % conversion of the reaction based on IPA = _____ %
3. Temperature of the condenser in Column-1 = _____ °F
4. Product purity (mole%) of acetone in liquid distillate of Column-1 = _____ %

26. (30 points) *Solving a Highly Constrained Toluene Production Problem with A+*

Answer the following questions:

1. Total flow rate of Stream FEED = _____ lbmol/hr
2. Flow rate of cooling water = _____ lbmol/hr
3. Reactor length = _____ feet
4. Vapor fraction in Stream LITE-GAS = _____
5. Purity of toluene in the product stream TOLUENE = _____ mole%