

## Homework Set #5

(due March 2, 2001)

1.) Starting with a feed of 30mol% benzene in toluene, you are somehow to generate a distillate product whose composition is at least 90mol% benzene. Two schemes (listed below) are under consideration, both operating at atmospheric pressure. For each scheme, determine i) the number of ideal stages required, and ii) the percent recovery of benzene as distillate product. VLE data for benzene-toluene is given in Table 11.1-1 on page 642.

a. A series of flash units in which partially condensed vapor from the previous flash serves as feed to the next unit. Heat is added or subtracted from the feed of each flash unit such that 50mol% of feed leaves the flash as vapor. The liquid product of each flash unit is discarded.

**Answer:** 7 flash units and a recovery of 2.4% of the benzene in the feed

b. A counter-current cascade of flash units with a reflux ratio equal to 8 (twice the minimum).

**Answer:** 4.4 ideal stages which recover 33% of the benzene in the feed.

2.) Prob. 11.4-7 from Geankoplis

**Comment:** VLE data for benzene/toluene is given in Table 11.1-1 on page 642.

**Answer:** 4.7 theoretical plates required.

3.) Prob. 11.4-9 from Geankoplis.