Solutions

Ch.E. 3173 EXAM II November 12, 1985

OPEN BOOKS AND NOTES

I. 30 points

Use the Lewis Fugacity rule and the generalized correlations to calculate the fugacity of each component in a 0.3/0.5/0.2 mole fraction mixture of Ethane/Propane/Butane respectively at 300 atm and 450°K.

II. 30 points

An equation of state has been determined by fitting the compressiblities of pure gases in the range $0 \leq Pr \leq 0.6$ and $1 \leq Tr \leq 2$:

$$PV = RT \left[1 + \frac{PT_c}{17P_cT}\left(1 - \frac{15T_c^2}{2T^2}\right)\right]$$

Using this expression, determine the fugacity of ethane gas at 20 atm at 400°K.

III. 40 points

For the binary system A & B, the activity coefficients are given by:

$$\ln \gamma_A = 0.3\, x_B^2$$
$$\ln \gamma_B = 0.3\, x_A^2$$

The vapor pressures of the pure components at 80°C are:

$$P_A^s = 300$$
$$P_B^s = 338$$

Is there an azeotrope in this system at 80°C?

If so, what is the composition and pressure? Assume ideal vapors.

CONF4/D1