

**King Fahd University of Petroleum & Minerals**  
**Chemical Engineering Department**  
**CHE 303 – Chemical Engineering Thermodynamics II**  
**2008 - 2009 (082)**

**HW#11**

Due: Sat. 6-June-2009

**Problem 1.**

Consider the experimental data shown in problem 12.1 of your textbook representing the VLE of the methanol(1)/water(2) system at 60 oC. Assuming that the vapor phase can be treated as an ideal gas mixture, do the following:

- (a) Compute the liquid phase activity coefficients ( $\gamma_1$  and  $\gamma_2$ ) and the (dimensionless) excess Gibbs energy ( $G^E/(RT)$ ) at each data point and summarize your results in a table.
- (b) Reduce the excess Gibbs energy data to Margules equation:

$$\frac{G^E}{RT x_1 x_2} = A_{21}x_1 + A_{12}x_2$$

where  $A_{21}$  and  $A_{12}$  are a constants (independent of composition). Show your fit.

- (c) Based on the model derived in part (b), compute the activity coefficients, P and  $y_1$  for each data point and compare your result with part (a). Summarize your results in a table.

**Problem 2.**      12.43 from textbook

**Problem 3.**      12.45 from textbook