**ChE 221A Chemical Engineering Thermodynamics**Quiz 2 (30 Points) Time: 45 min

1. The volume change of mixing (cm³mol) for the system ethanol (1)/methyl butyl ether (2) at 25°C is given by the expression:

Given that = 58.63 cm³/mol and = 118.46 cm³/mol, what volume of mixture is formed when 750 cm³ of pure ethanol is mixed with 1500 cm³ of pure methyl butyl ether at 25°C? What would be the volume if an ideal solution were formed? (10 Points)

2. Assuming the validity of Raoult’s law, do the following calculations for the benzene(1)toluene (2) system:

Antoine’s equation:

|  |  |  |  |
| --- | --- | --- | --- |
|  | A | B | C |
| Benzene | 4.0814 | 1203.835 | -53.226 |
| Toluene | 4.14157 | 1377.578 | -50.507 |

If and , find and . (10 Points)

3. There are several proposed expressions for excess Gibbs free energy. The three suffix Margules equation is given by:

where and are nonzero constants. Find expressions for the activity coefficients for this excess Gibbs energy model in which is given solely in terms of and the parameters and , while is given only in terms of , and the parameters and . (10 Points)