CM3230
Quiz 5b

Name _____

1. The enthalpy of solution for 20 mole% HCl in H_2O is given as $\Delta_s\tilde{h} = -61.2\frac{kJ}{mole\ HCl}$.
   The heat of mixing is closest to
   a) $\Delta_{mix}h = 61.2\frac{kJ}{mol}$
   b) $\Delta_{mix}h = -12.24\frac{kJ}{mol}$
   c) $\Delta_{mix}h = -48.96\frac{kJ}{mol}$
   d) $\Delta_{mix}h = 15.30\frac{kJ}{mol}$
   e) None of the above

2. The molar internal energy of pure A and B are given by $u_A = 2.0\frac{kJ}{mole\ A}$ and $u_B = 1.5\frac{kJ}{mole\ B}$. After mixing 5 moles of A with 3 moles of B, it was found that $\Delta_{mix}u = 0.5\frac{kJ}{mole}$. Then the molar internal energy of the mixture closest to
   a) $u = \frac{21}{16}\frac{kJ}{mole}$
   b) $u = \frac{37}{16}\frac{kJ}{mole}$
   c) $u = \frac{37}{2}\frac{kJ}{mole}$
   d) $u = \frac{21}{8}\frac{kJ}{mole}$
   e) None of the above

3. The enthalpy of a binary mixture was found to be

$$H = \left(20\ n_A + 40\ n_B - \ 10\ \frac{n_A n_B}{n_A + n_B}\right)\ kJ$$

   Then the partial molar enthalpy of A for a mixture composed of 2 moles of A and 2 moles of B is closest to

   a) $\bar{H}_A = \frac{35}{2}\frac{kJ}{mole\ A}$
   b) $\bar{H}_A = \frac{70}{2}\frac{kJ}{mole\ A}$
   c) $\bar{H}_A = 20\frac{kJ}{mole\ A}$
   d) $\bar{H}_A = 40\frac{kJ}{mole\ A}$
   e) None of the above

4. The partial molar Gibbs energy of the three species A, B and C are $\bar{G}_A = 1.2\frac{kJ}{mol\ A}$, $\bar{G}_B = 2.4\frac{kJ}{mol\ B}$ and $\bar{G}_C = 0.3\frac{kJ}{mol\ C}$. Then the molar Gibbs energy of the ternary mixture composed of 1 mole A, 2 mole B and 1 mole C is closest to
   a) $g = 6.3\frac{kJ}{mol}$
   b) $g = 1.575\frac{kJ}{mol}$
   c) $g = 3.9\frac{kJ}{mol}$
   d) $g = 0\ \frac{kJ}{mol}$
   e) None of the above

5. The assumptions used to obtain the Claussius-Clapeyron equation for vapor-liquid equilibrium includes:
   a) Molar volume of liquid is about half the molar volume of vapor
   b) Heat of vaporization is temperature dependent and vapor phase has ideal gas behavior
   c) Molar volume of liquid is much smaller than molar volume of vapor and Δh_{vap} is constant.
   d) Temperature is constant and substance is at supercritical condition.
   e) None of the above

6. Which of the following equations can be considered a Gibbs-Duhem equation of a ternary mixture:
   a) $n_A\, d\bar{G}_A + n_B d\bar{G}_B = n_C d\bar{G}_C$
   b) $x_A\, d\bar{G}_A + x_B d\bar{G}_C = -x_C d\bar{G}_B$
   c) $\bar{G}_A dn_A + \bar{G}_B dn_B + \bar{G}_C dn_C = 0$
   d) $-d\bar{G}_A = x_B d(\bar{G}_B - \bar{G}_A) + x_C d(\bar{G}_C - \bar{G}_A)$
   e) None of the above