Chemistry-4311
October 17, 2014

Quiz #6 **Name** Key

$R = 1.987$ cal K^{-1} mol^{-1} $= 8.314$ J K^{-1} mol^{-1} $= 0.08206$ L atm K^{-1} mol^{-1} $K = {}^{o}C + 273.15$

1. Matching (Use a letter only once)
For an ideal solution $\Delta G = -T\Delta S$. f (yes or no)

Raoult's Law is h.

For an ideal liquid solution, $\mu_1(l)$ equals j.

Henry's Law is e.

Molarity equals a.

a. moles/liter
b. $P_1 = \mu_1 P_1^*$
c. $P_2 = x_2/K_2$
d. no
e. $P_2 = x_2 K_2$
f. yes
g. $RT\ln x_1$
h. $P_1 = x_1 P_1^*$
i. moles/kilogram
j. $\mu_1^*(l) + RT\ln x_1$

+32. Start with the relationship $dG = VdP$ at constant temperature and integrate it between states 1 and 2 to show the $G_2 = G_1 + nRT\ln(P_2/P_1)$.

$\int_1^2 dG = \int_1^2 V\,dP$

Gas: $V = nRT/P$

$G_2 - G_1 = \int_1^2 dG = nRT\int_1^2 dP/P$

$G_2 - G_1 = nRT \ln P_2/P_1$

$G_2 = G_1 + nRT \ln P_2/P_1$

Solid/Liquid: Assume V is a constant

$G_2 - G_1 = \int_1^2 dG = V\int_1^2 dP$

$G_2 = G_1 + V[P_2 - P_1]$

+23. A solution is prepared by adding 15 grams of CH_3OH to 500 grams of H_2O. What is the molality of this solution? $M_H = 1.008$ g/mole, $M_C = 12.01$ g/mole, and $M_O = 16.00$ g/mole.

CH_3OH: $4 \times 1.008 + 12.01 + 16.00 = 32.04$ g/mole

$15/32.04 = 0.468$ moles per 500 grams H_2O

molality $= 0.936$

molality $= m = \dfrac{\text{moles solute}}{1\text{ kg solvent}}$

Give 0.9±0 +1½