Homework 5 – Simple Mixtures

Name: _____

Exercise 5A.8(a) (5 points)

At $300\ K$, the partial vapor pressure of HCl (that is, the partial pressure of the HCl vapor) in liquid $GeCl_4$ is as follows:

χ_{HCl}	0.005	0.012	0.019
$p_{HCl}(kPa)$	32.0	76.9	121.8

Show that the solution obeys Henry's law in this range of mole fractions, and calculate the Henry's law constant at $300\ K$

Exercise 5B.2(a) (5 points)

The vapor pressure of benzene is $53.3\ kPa$ at $60.6°C$, but it fell to $51.5\ kPa$ when $19.0\ g$ of a non-volatile organic copound was dissolved in $500\ g$ of benzene. Calculate the molar mass of the compound

Exercise 5B.8(a) (5 points)

The enthalpy of fusion of anthracene is $28.8 \frac{kJ}{mol}$ and its melting point is $217°C$. Calculate its ideal solubility in benzene at $25°C$.

Exercise 5C.3(a) (5 points)

Phenol and water form non-ideal liquid mixtures. When $7.32\ g$ of phenol and $7.95\ g$ of water are mixed together at $60°C$ they form two immiscible liquid phases with mole fractions of phenol of 0.042 and 0.161. (i) Calculate the overall mole fraction of the phenol in the mixture. (ii) Use the lever rule to determine the relative amounts of the two phases.

Exercise 5F.2(a) (5 points)

Substances A and B are both volativel liquids with $p_A^\star = 300\,Torr$, $p_B^\star = 250\,Torr$, and $K_B = 200\,Torr$ (For concentration expressed in mole fraction). When $\chi_A = 0.900$, $p_A = 250\,Torr$, and $p_B = 25\,Torr$. Calculate the activities of A and B. Use the mole fraction, Raoult's law basis system for A and the Henry's law basis system for B. Go on to calculate the activity coefficients of A and B

Exercise 5F.7(a) (5 points)

Estimate the mean ionic activity coefficient ($\gamma_\pm$) and activity of $CaCl_2$ in a solution that is $0.010\,{}^{mol}/_{kg}$ $CaCl_2$(aq) and $0.030\,{}^{mol}/_{kg}$ NaF(aq) at $25^\circ C$.

Slaveships

By Lucille Clifton

loaded like spoons
into the belly of Jesus
where we lay for weeks for months
in the sweat and stink
of our own breathing
Jesus
why do you not protect us
chained to the heart of the Angel
where the prayers we never tell
and hot and red
as our bloody ankles
Jesus
Angel
can these be men
who vomit us out from ships
called Jesus Angel Grace of God
onto a heathen country
Jesus
Angel
ever again
can this tongue speak
can these bones walk
Grace Of God
can this sin live