**Name: Period: Seat#:**

**Worksheet #4**

**Directions:** Show all work. Box final answers.

|  |
| --- |
| 1. At 333 K, substance A has a vapor pressure of 1.0 atm and substance B has a vapor pressure of 0.20 atm. A solution of A and B is prepared and allowed to equilibrate with its vapor. The vapor is found to have equal moles of A and B. What was the mole fraction of A in the original solution? *x = 0.17*
 |
| 1. 30.0 mL of pentane (C5H12, d = 0.626 g/mL, v.p. = 511 torr) and 45.0 mL of hexane (C6H14, d = 0.655 g/mL, v.p. = 150. torr) are mixed at 25.0 ° C to form an ideal solution.
	1. Calculate the vapor pressure of this solution. *307 torr*
	2. Calculate the composition (in mole fractions) of the vapor in contact with this solution. *Pentane: 0.724, hexane: 0.276*
 |
| 1. What is the vapor pressure (in mmHg) of a solution of 4.40 g of Br2 in 101.0 g of CCl4 at 300 K? The vapor pressure of pure bromine at 300 K is 30.5 kPa and the vapor pressure of CCl4 is 16.5 kPa. *128 mmHg*
 |
| 1. A solution has a 1:3 ratio of cyclopentane to cyclohexane. The vapor pressures of the pure compounds at 25 °C are 331 mmHg for cyclopentane and 113 mmHg for cyclohexane. What is the mole fraction of cyclopentane in the vapor above the solution? *0.494*
 |
| 1. Acetone and ethyl acetate are organic liquids often used as solvents. At 30.0 °C, the vapor pressure of acetone is 285 mmHg and the vapor pressure of ethyl acetate is 118 mmHg. What is the vapor pressure at 30.0 °C of a solution prepared by dissolving 25.0 g of acetone in 22.5 g of ethyl acetate? *223 mmHg*

>> **Special bonus question for fun!** Determine the composition (expressed in mole fraction) of the vapor above  this solution *acetone: 0.8028, ethyl acetate: 0.1972* |
| 1. A solution containing hexane and pentane has a pressure of 252.0 torr. Hexane has a pressure at 151.0 torr and pentane has a pressure of 425.0 torr. What is the mole fraction of pentane? *0.3686*
 |
| 1. The vapor pressure above a solution of two volatile components is 745 torr and the mole fraction of component B (χB) in the vapor is 0.59. Calculate the mole fraction of B in the liquid if the vapor pressure of pure B is 637 torr. *0.69*
 |
| 1. Label each diagram with whether it is showing a strong solute-solvent interaction, or a weak solute-solvent interaction. The dashed line is the ideal solution.

Topic Three: Thermodynamics of Non-Ideal Mixtures - Chemistry Revision Site *Strong or Weak**Solute-solvent interaction ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  |
| 1. Draw a particulate diagram showing the difference between a pure solvent and a solution made by adding a nonvolatile solute to the pure solvent, and then a new solution made by adding a volatile solute to the pure solvent. Make sure to include a color coded key indicating which particles are which.

Beaker pictures clipart free clipart images jpeg - ClipartixBeaker pictures clipart free clipart images jpeg - ClipartixBeaker pictures clipart free clipart images jpeg - Clipartix *Key:* *Solvent* *Nonvolatile solute*  *Volatile solute* *Pure Solvent + Nonvolatile Solute + Volatile Solute*  |
| 1. Draw a particulate diagram showing the difference between a pure solvent and a solution made by adding an electrolyte and a non-electrolyte. Make your own key to indicate which particles are which.

Beaker pictures clipart free clipart images jpeg - ClipartixBeaker pictures clipart free clipart images jpeg - ClipartixBeaker pictures clipart free clipart images jpeg - Clipartix *Key:* *Pure Solvent + Electrolyte + Non-electrolyte* |