

Name: _____

Period: _____

Seat#: _____

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? $x = 0.17$

2) 30.0 mL of pentane (C_5H_{12} , $d = 0.626$ g/mL, v.p. = 511 torr) and 45.0 mL of hexane (C_6H_{14} , $d = 0.655$ g/mL, v.p. = 150. torr) are mixed at 25.0 ° C to form an ideal solution.

a) Calculate the vapor pressure of this solution. 307 torr

b) Calculate the composition (in mole fractions) of the vapor in contact with this solution.

Pentane: 0.724, hexane: 0.276

3) What is the vapor pressure (in mmHg) of a solution of 4.40 g of Br_2 in 101.0 g of CCl_4 at 300 K? The vapor pressure of pure bromine at 300 K is 30.5 kPa and the vapor pressure of CCl_4 is 16.5 kPa. 128 mmHg

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4) 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

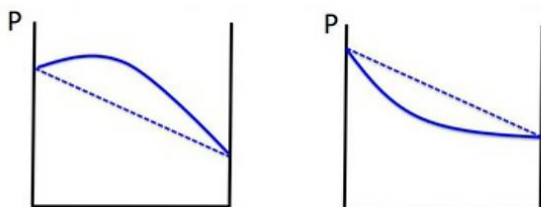
5) Acetone and ethyl acetate are organic liquids often used as solvents. At 30.0 °C, the vapor pressure of acetone is 285 mmHg and the vapor pressure of ethyl acetate is 118 mmHg. What is the vapor pressure at 30.0 °C of a solution prepared by dissolving 25.0 g of acetone in 22.5 g of ethyl acetate? 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

6) 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

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- 7) The vapor pressure above a solution of two volatile components is 745 torr and the mole fraction of component B (x_B) 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

- 8) 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.

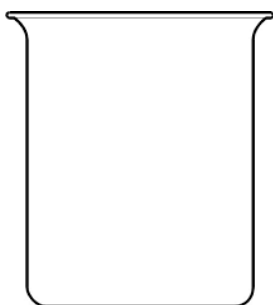


Strong or Weak
 Solute-solvent interaction ?

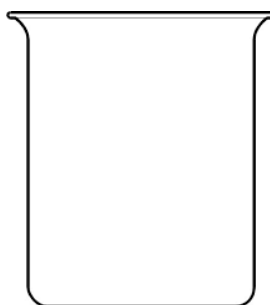
- 9) Draw a particulate diagram showing the difference between a pure solvent and a solution made by adding a nonvolatile solute to the pure solvent, and then a new solution made by adding a volatile solute to the pure solvent. Make sure to include a color coded key indicating which particles are which.

Key:

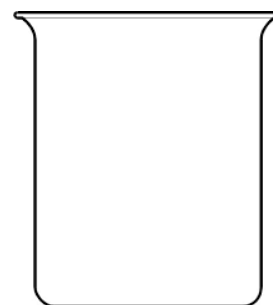
Solvent ○
 Nonvolatile solute ○
 Volatile solute ○



Pure Solvent



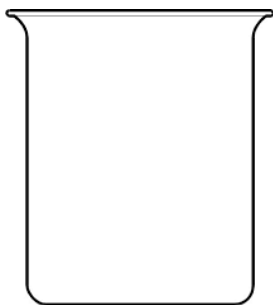
+ Nonvolatile Solute



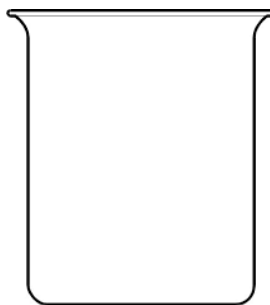
+ Volatile Solute

- 10) 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.

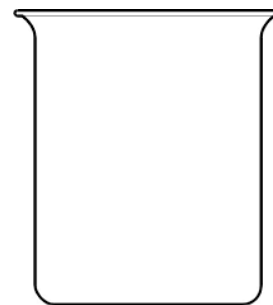
Key:



Pure Solvent



+ Electrolyte



+ Non-electrolyte