**Dougherty Valley HS AP Chemistry**

**WORKSHEET #4**

**Solutions – Raoult’s Law Volatile solutes**

**Name: Date: Period: Seat #:**

Show all work and/or explain using chemistry principles. Box your final numerical answer(s)

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| **#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 (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.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 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**] |
| **#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**: 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**] |
| **#7:** 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**] |