Chemistry   **WEEKLY TEST 2**   **Vapour pressure of liquid solutions and Raoult's law**   date:_____

1. The amount of solute (molar mass 60 g mol^{-1}) that must be added to 180 g of water so that the vapour pressure of water is lowered by 10% is

(a) 30 g   (b) 60 g   (c) 120 g (d) 12 g   (e) 24 g

2. At 80°C, the vapour pressure of pure liquid 'A' is 520 mm Hg and that of pure liquid 'B' is 1000 mm Hg. If a mixture solution of 'A' and 'B' boils at 80°C and 1 atm pressure, then amount of 'A' in the mixture is (1 atm 760 mm Hg)

(a) 48 mol percent   (c) 52 mol percent

(b) 50 mol percent   (d) 34 mol percent

3. Two liquids X and Y form an ideal solution. The mixture has a vapour pressure of 400 mm at 300K when mixed in the molar ratio of 1:1 and a vapour pressure of 350 mm when mixed in the molar ratio of 1:2 at the same temperature. The vapour pressures of the two pure liquids X and Y   respectively are

(a) 250 mm, 550 mm   (b) 350 mm, 450 mm   (c) 350 mm, 700 mm   (d)500mm ,500mm   (e) 550 mm, 250 mm

4. The relative lowering of vapour pressure of an aqueous solution containing non-volatile soluteis 0-0125. The molality of the solution is

(a) 0-70   (b) 0-50   (c) 0-60   (d) 0-80   (e) 0-40

5. If x_1 and x_2 represent the mole fraction of a component A in the vapour phase and liquid mixture respectively and $P_{A°}$ and $P_{B°}$ represent vapours pressures of pure A and pure B, then total vapour pressure of the liquid mixture is

(a) $\dfrac{p_{A°}x_1}{x_2}$ (b) $\dfrac{p_{A°}x_2}{x_1}$ (c) $\dfrac{p_{B°}x_1}{x_2}$ (d) $\dfrac{p_{B°}x_2}{x_1}$

6. An ideal solution is formed by mixing two volatile liquids A and B. X_A and X_B are the mole fractions of A and B respectively in the solution and Y_A and Y_B are the mole fractions of A and B respectively in the vapour phase. A plot of I/Y_A along y-axis against I/X_A along x-axis gives a straight line. What is the slope of the straight line?

(a) $P_{B°}/ P_{A°}$ (b) $P_{A°}/ P_{B°}$ (c) $P_{B°}- P_{A°}$ (d) $P_{A°}- P_{B°}$

(where $P_{A°}$ and $P_{B°}$ are the vapour pressures of the pure components A and B respectively)

7. The vapour pressure of a solvent decreases by 10 mm of mercury when a non-volatile solute was added to the solvent. The mole fraction of the solute in the solution is 0-2. What should be the mole fraction of the solvent if the decrease in vapour pressure is to be 20 mm of mercury?

(a) 0-8   (b) 0-6   (c)0-4   (d) 0-4

8. Which of the following statements about the composition of the vapour over an ideal 1:1 molar mixture of benzene and toluene is correct? Assume that the temperature is constant at 25°C (Given vapour pressure data at 25°C, benzene 12-8 kPa, toluene = 3-85 kPa)

(a). The vapour will contain equal amounts of benzene and toluene   (b) Not enough information is given to make a prediction

(c)The vapour will contain a higher percentage of benzene   (d) The vapour will contain a higher percentage of toluene

9. Two open beakers one containing a solvent and the other containing a mixture of that solvent with a non-volatile solute are together sealed in a container. Over time:

(a) the volume of the solution and the solvent does not change   (b) the volume of the solution increases and the volume of the solvent decreases

(c) the volume of the solution decreases and the volume of the solvent increases

(d) the volume of the solution does not change and the volume of the solvent decreases.

10. For an ideal solution, the correct option is

(a) Δ_{mix} G= 0 at constant T and P   (b) Δ_{mix} S=0 at constant T and P

(c)Δ_{mix} V≠0 at constant T and P   (d)Δmix H=0 at constant T and P

11. Dry air is passed through a solution containing 10 g of the solute in 90 g of water and then through pure water. The loss in weight of solution is 2-5 g and that of pure solvent is 0-05 g. calculate the molecular weight of the solute.

(a) 50   (b) 180   (c) 100   (d) 25   (e) 51 31.

12. The mass of glucose that should be dissolved in 50 g of water in order to produce the same lowering of vapour pressure as produced by dissolving 1 g of urea in the same quantity of water is

(a) 1 g   (b) 3 g   (c) 6g   (d) 8 g

13. The vapour pressure of a solution of a non-volatile electrolyte (A) in solvent (B) is 95% of the vapour pressure of the solvent at the same temperature. If molar mass of B is 30% of molar mass of A, the mass ratio of the solvent and solute are

(a) 0-15   (b) 0-20   (c)4-0   (d) 5-7

14. If 8 g of a non-electrolyte solute is dissolved in 114 g of *n-octane* to reduce its vapour pressure to 80%, the molar mass (in g mol^{-1}) of the solute is [Given that molar mass of *n-octane* is 114 g mol^{-1}]

(a) 40   (b) 60   (c) 80   (d) 20

15. The empirical formula of a non-electrolyte is CH_2O. A solution containing 3 g L^{-1} of the compound exerts the same osmotic pressure as that of 0-05 M glucose solution. The molecular formula of the compound is

(a) CH_2O (b) $C_2H_4O_2$ (c)$C_4H_8O_4$ (d) $C_3H_6O_3$

ANS

1.(b)   2.(b)   3. (e)   4. (a)   5.(b)   6.(a)   7. (b)   8. (c)   9. (b)   10. (d)   11. (c)   12. (b)   13. (d)   14. (a)   15.(b)