# RAVI MATHS TUITION CENTER , CHENNAI- 82. WHATSAPP - 8056206308

**Solution**

12th Standard

Chemistry

10 x 2 = 20

1) 1.00 g of a non-electrolyte solute dissolved in 50.0 g of benzene by 0.40 K. The freezing point depression constant of benzene is 5.12 K kg $mol^{-1}$. Find the molecular mass of the solute.

2) State Henry's law and mention some important applications.

3) The partial pressure of ethane over a saturated solution containing $6.56 \times 10^{-3}$ g of ethane is 1 bar. If the solution contains $5.00 \times 10^{-2}$ g of ethane then what shall be the partial pressure of the gas?

4) Calculate molality of 2.5 g of ethanoic acid ($CH_3COOH$) in 75 g of benzene.

5) Define the following terms:
(i) Mole fraction
(ii) Isotonic solutions
(iii) van't Hoff factor
(iv) Ideal solution

6) State Raoult's law for a solution conatining volatile components. How does Roult's law become a special case of Henry's law?

7) What concentration of nitrogen should be present in a glass of water at room temperature?Assume temperature of $25^0$C,a total pressure of 1 atmosphere and mole fraction of nitrogen in air as 0.78[$K_H$ for nitrogen=$8.42 \times 10^{-7}$ M/mm Hg].

8) (a) Explain the following phenomena with the help of Henry's law.
(i) Painful condition known as bends.
(ii) Feeling of weakness and discomfort in breathing at high altitude.
(iii) Why soda water bottle kept at room temperature fizzes on opening ?

9) State Raoult's law for solutions of volatile liquids. Taking suitable examples explain the meaning of positive and negative deviations from Raoult's law.

10) State the following:
(i) Raoult's law in its general from in reference to solutions.
(ii) Henry's law about partial pressure of a gas in a mixture.

5 x 3 = 15

11) If $N_2$ gas is bubbled through water at 293 K, how many millimoles of $N_2$ gas would dissolve in 1 liter of water? Assume that $N_2$ exerts a partial pressure of 0.987 bar. Given Henry's law constant for $N_2$ at 293 K is 76.48 kbar.

12) 45 g of ethylene glycol ($C_2H_4O_2$) is mixed with 600 g of water. Calculate
(i) the freezing point depression and
(ii) the freezing point of the solution.

13) What mass of ethylene glycol (molar mass = 62.0 g $mol^{-1}$) must be added to 5.50 kg of water to lower the freezing point of water from 0°C to -10°C? ($K_f$ for water = 1.86 K kg $mol^{-1}$)

14) Calculate the freezing point depression expected for 0.0711 m aqueous solution of $Na_2SO_4$. If this solution actually freezes at -0.320 °C, what would be the value of van't Hoff factor? ($K_f$ for water is 1.86 °C $mol^{-1}$).

15) Calculate the boiling point of solution when 4 g of $MgSO_4$ (M = 120 g $mol^{-1}$) was dissolved in 100 g of water, assuming $MgSO_4$ undergoes complete ionization. ($K_b$ for water = 0.52 K kg $mol^{-1}$)

5 x 5 = 25

16) How many mL of 0.1 M HCl are required to react completely with 1 g mixture of $Na_2CO_3$ and $NaHCO_3$ containing equimolar amounts of both?

17) Calculate the mass of ascorbic acid (vitamin C, $C_6H_8O_6$) to be dissolved in 75 g of acetic acid to lower its melting point by $1.5^0$ C.($K_f$ for acetic acid = 3.9K kg $mol^{-1}$)

18) (a) Explain the following:

(i) Henry's law about dissolution of a gas in a liquid.

(ii) Boiling point elevation constant for a solvent.

(b) A solution of glycerol ($C_3H_8O_3$) in water was prepared by dissolving some glycerol in 500 g of water. This solution as a boiling point of 100.42 $^oC$. What mass of glycerol was dissolved to make this solution? ($K_b$ for water = 0.512 K kg $mol^{-1}$)

19) (a) Differentiate between molarity and molality for a solution. How does a change in temperature influence their values?

(b) Calculate the freezing point of an aqueous solution containing 10.50 g of $MgBr_2$ = 184 g) ($K_f$ for water 1.86 K kg $mol^{-1}$)

20) (a) Define the following terms:

(i) Mole fraction,

(ii) Ideal solution.

(b) 15.0 g of an unknown molecular material is dissolved in 450 g of water. The resulting solution freezes at - 0.34 $^\circ C$. What is the molar mass of the material? [$K_f$ for water=1.86 K Kg $mol^{-1}$]