BHARATIYA VIDYA BHAVAN'S V M PUBLIC SCHOOL, VADODARA

QUESTION BANK   CHAPTER 2   SOLUTIONS

Vary short answer type questions   [01 marks]

1) Give one example each of solid in gas and liquid in gas solutions.

2) Define mole fraction.

3) What is the sum of the mole fractions of all the components in a three component system?

4) What is meant by molality of the solution?

5) Define Molarity and ppm.

6) Which of the two molality and molarity is better to express concentration of solution? Why?

7) Under what conditions are the molarity and molality of a solution nearly the same?

8) Will the molarity of a solution at 60°C be same, less or more than molarity at 35°C?

9) Why is 1 molar aqueous solution more concentrated than 1 molal aqueous solution?

10) How is it that alcohol and water miscible in all proportions?

Short answer type questions   [02 marks]

1) Differentiate between molality and molarity for a solution. How does a change in temperature on influence their values? **OR**

Differentiate between molality and molarity of a solution. What is the effect of rise in temperature on molarity and molality of the solution?

2) (i) Write the relationship between molality and molarity of any solution.

(ii) What is the relationship between molality and mole fraction of the solute?

3) If the density of water of a lake is 1.25g mL^{-1} and one kg of lake water contains 92g of Na$^+$ ions, calculate the molarity of Na$^+$ ions in this lake water.(Gram atomic mass of Na = 23g mol^{-1}).

4) A6.90 M solution of KOH in water contains 30% by mass of KOH. Calculate the density of the KOH solution. [Molar mass of KOH = 56 g mol^{-1}]

5) Calculate the molarity and molality of a 15% solution (by weight) of sulphuric acid of density 1.020 g cm^{-3} . (Atomic masses of H = 1, O = 16, S = 32).

6) An anti-freeze solution is prepared from 222.6 g of ethylene glycol $C_2H_4(OH)_2$ and 200 g of water. Calculate the molality of the solution. If the density of this solution be 1.072 g mL^{-1}, What will be the molarity of the solution?

7) A solution of glucose (molar mass = 180 g mol^{-1}) in water is labelled as 10% (by mass). What would be the molality and molarity of the solution? (density of solution = 1.2g m L^{-1}).

8) If 20.2 cm^3 of 1.0 M CaCl$_2$ and 60.0cm^2 of 0.20 M CaCl$_2$ are mixed, what will be the molarity of the final solution?

9) The density of 3 M solution of NaCl is 1.25 g mL^{-1}. Calculate the molality of solution.

10) State Henry's law and mention its two important applications.

Short answer type questions   [03 marks]

1) Define the term osmosis and osmotic pressure. Is the osmotic pressure of solution a colligative property? Explain.

2) Show graphically how the vapour pressures of a solvent and a solution of a nonvolatile solute in it change with temperature. Show on the graph the boiling points of the solvent and the solution. Which is higher and why?

3) The vapour pressure of pure benzene at a certain temperature is 0.850 bar. A nonvolatile, non-electrolyte solid weighing 0.5 g when added to 39.0 g of benzene (molar mass 78 g mol^{-1}), vapour pressure of the solution, then is 0.845 bar. What is the molar mass of the solid substance?

4) A 0.2 per cent aqueous solution of a non-volatile solute exerts a vapour pressure of 1.004 bar at 100°C. What is the molar mass of the solute? (Given vapour pressure of pure water at 100°C is 1.013 bar and molar mass of water is 18 g mol^{-1}).

5) The boiling point of pure benzene is 353.23 K. When 1.80 g of a non-volatile solute was dissolved in 90 g of benzene; the boiling point becomes 354.11 K. Calculate the molar mass of the solute.
(K_b of benzene = 2.583 K kg mol^{-1})

6) A 0.1539 molal aqueous solution of cane sugar (molar mass = 342 g mol^{-1}) has a freezing point of 271 K while the freezing point of pure water is 273.15 K. What will be the freezing point of an aqueous solution containing 5 g of glucose (mol. Mass = 180 g mol^{-1}) per 100 g of solution?

1) (i) Define the term osmotic pressure. Describe how the molecular mass of a

substance can be   determined by a method based on measurement of osmotic pressure?

   (ii) The boiling point of pure benzene is 353.23 K. When 1.80 g of a non-volatile solute was dissolved in 90 g of benzene; the boiling point becomes 354.11 K. Calculate the molar mass of the solute.
   (K_b of benzene = 2.583 K kg mol^{-1})

2) (i) Define the following terms: (a) Ideal solution
          (b) Azeotrope.

   (ii) The elements A and B form purely covalent compounds having molecular formulae AB_2 and AB_4.When dissolved in 20g of benzene, 1g of AB_2 lowers the freezing ppoint by 2.3K, whereas 1g of AB_4 lowers it by 1.3 K. The molal depression constant for benzene is 5.1 K kg mol^{-1}, calculate the atomic mass of A and atomic mass of B.