CHAPTERWISE QUESTION

CHEMISTRY CLASS XII

Time: 1 ½ hrs **Solution-SETA** Marks: 35

Section A (1MARK)

1) _____ _ obeys Raoult's law in all stages of concentration.

a) Ideal Solutionb) Non-Ideal solution

c) Real Solution d) None of the mentioned

2) What happens when a solute crystal is added to a supersaturated solution?

a) It becomes a colloidal solution b) The solute dissolves in the solution

c) The solution desaturates d) The solute precipitates out of the solution

3) Which of the following mixture is(are) called solution?

(i) water + ammonia (ii) water + acetone

(iii) acetone + alcohol (iv) hexane + water

a)(i),(ii)and(iii) (b) (i), (iii) and (iv)

c) (i) and (iv) (d) (ii) and (iii)

4) Sprinkling of salt helps in clearing the snow covered roads in hills. The phenomenon involved in the process is

(a) lowering in vapour pressure of snow

(b) depression in freezing point of snow

(c) melting of ice due to increase in temperature by putting salt

(d) increase in freezing point of snow

5) The van't Hoff factor [i] for a dilute aqueous solution of the strong electrolyte barium hydroxide is?

(a) 0 (b) 1 (c) 2 (d) 3

6) . The osmotic pressure of a solution is directly proportional to

(a) the molecular concentration of the solute

(b) the absolute temperature at a given concentration

(c) the lowering of vapour pressure (d) all the above

ASSERTION- REASON TYPE QUESTIONS

A. If both Assertion and Reason are correct and reason is the correct explanation of Assertion

B If both Assertion and Reason are correct and reason is not correct explanation of Assertion

C. If Assertion is correct but Reason is incorrect.

D. If Assertion is incorrect and Reason is correct.

7) **Assertion:** Molarity of the solution changes with temperature.

Reason: Molarity is a colligative property.

8)Assertion : If one component of a solution obeys Raoult's law over a certain range of composition, the other component will not obey Henry's law in that range.
Reason : Raoult's law is a special case of Henry's law.

SECTION B (2 MARK)

9) . Osmotic pressure of 1M solution of NaCl is approximately double than that of 1M sugar solution. Why?

10) A solution of 12.5 g of an organic solute in 170g of H_2O a boiling point elevation of0.63K. Calculate the molecular mass of the solute (K_2=0.52 K/m).

OR

Find the freezing point of the solution containing 3.6 g of glucose dissolved in 50 g of H_2O(K_f forH_2O = 1.86 K/m).

11) Explain why aquatic species are more comfortable in cold water rather than in warmwater.

SECTION C (3MARK)

12) The vapour pressure of water is 12.3 Kpa at 300K. Calculate vapour pressure of 1 molalsolution of a non-volatile solute in it.

13) The partial pressure of ethane over a saturated solution containing 6.56×10^{-2} g of ethane is 1 bar. If the solution were to contain 5.0×10^{-2} g of ethane, then what will be the partial pressure of the gas?

14**)** If a solution is prepared by dissolving 1.0 g of polymer of molar mass 185,000 in 450mL of water at 37^0C, Calculate the osmotic pressure in Pascal exerted by it

OR

Determine the osmotic pressure of a solution prepared by dissolving 25 mg of K_2SO_4 in 2 litre of water at 25°C, assuming that it is completely dissociated.

15) Answer the following:

i) Wilted flowers revive when placed in fresh water. Identify and define the phenomenon.

ii) Mixing of acetone and $CHCl_3$ results in a reduction in volume. What type of deviation from Raoult's law is observed here? Give reason.

iii) Benzoic acid dissolved in benzene shows double of its molecular mass. Explain.

SECTION D (4MARK)

16)**Read the following paragraph and answer any four questions:**

Colligative properties of a solution depend upon the number of moles of the solute dissolved and do not depend upon the nature of the solute. However, they are applicable only to dilute solutions in which the solutes do not undergo any association or dissociation. For solutes undergoing such changes, Van't Hoff introduced a factor, called Van't Hoff factor (i). This has helped not only to explain the abnormal molecular masses of such solutes in the solution but has also helped to calculate the degree of association or dissociation.

(i) What is Van't Hoff factor (i) for a compound undergoing tertramerization in an organic solvent?

(ii) Arrange the following in the increasing order of freezing point
0.1M $Al_2(SO_4)_3$, 0.1M KCl, 0.1M Glucose, 0.1M K_2SO_4

(iii) The molar mass of Sodium Chloride determined by elevation of boiling point method is found to be abnormal. Why?

(iv) What is the elevation of boiling point of a solution of 13.44g of $CuCl^2$ in 1kg of water? (Kb for water = 0.52Kkg/mol^{-1}, molar mass of $CuCl_2$ = 134.4g/mol)

(v) Equimolal solutions of NaCl and $BaCl_2$ are prepared in water. Freezing pint of NaCl is found to be -20C. What freezing point do you expect for $BaCl_2$ solution?

SECTION E (5 MARK)

17) (a) Outer shells of two eggs are removed. One of the egg is placed in pure water and the other is placed in saturated solution of NaCl. What will be observed and why?

(b) A solution prepared by dissolving 8.95 mg of a gene fragment in 35.0 ml of water has an osmotic pressure of 0.335 ton at 25ºC. Assuming the gene fragment is a non-electrolyse, determine the molar mass.

OR

(a) Define Raoult's law of binary solution containing non-volatile solute in it.

(b) On dissolving 3.24 g of sulphur in 40 g of benzene, boiling point of solution was higher than that of benzene by 0.81K (Kb = 2.53 K kg mol^{-1}). What is molecular formula of sulphur? (Atomic mass s = 32 g mol^{-1})

CHAPTERWISE QUESTION

CHEMISTRY CLASS XII

Time: 1 ½ hrs **Solution-SET B** Marks: 35

SECTION A (1MARK)

1) A solution made up of numerous components in which each component's property is the weighted sum of its separate properties. The answer is
   a) Ideal Solution b) Non-Ideal solution
   c) Real Solution d) None of the mentioned
2) Which of the following units is useful in relating concentration of solution with its vapour pressure?
   (a) Mole fraction(b) Parts per million(c) Mass percentage (d) Molality
3) The relative lowering in vapour pressure is proportional to the ratio of number of
   (a) solute molecules to solvent molecules
   (b) solvent molecules to solute molecules
   (c) solute molecules to the total number of molecules in solution
   (d) solvent molecules to the total number of molecules in solution
4) Partial pressure of a solution component is directly proportional to its mole fraction. This is known as
   (a) Henry's law (b) Raoult's law
   (c) Distribution law (d) Ostwald's dilution law
5) What will be the degree of dissociation of 0.1 M $Mg(NO_3)_2$ solution if van't Hoff factor is 2.74?
   (a) 75% (b) 87% (c) 100% (d) 92%
6) Low concentration of oxygen in the blood and tissues of people living at high altitude is due to-
   (a) Low temperature (b) low atmosphericpressure (c) high atmospheric pressure
   (d) both low temperature and high atmospheric pressure

ASSERTION- REASON TYPE QUESTIONS

A. If both Assertion and Reason are correct and reason is the correct explanation of Assertion
B. If both Assertion and Reason are correct and reason is not correct explanation of Assertion
C. If Assertion is correct but Reason is incorrect.
D. If Assertion is incorrect and Reason is correct.

7) **Assertion**: Isotonic solutions do not show any osmosis when placed side by side.
Reason: Isotonic solutions have same solute concentration.

8) Assertion : If a liquid solute more volatile than the solvent is added to the solvent, the vapour pressure of the solution may increase i.e., $p_s > p_o$.
Reason : In the presence of a more volatile liquid solute, only the solute will form the vapours and solvent will not.

SECTION B (2MARK)

9) 200 cm^3 of an aqueous of a protein contains 1.26 g of the protein. The osmotic pressure of such a solution at 300 K is found to be 2.57×10^{-3} bar. Calculate the molar mass of the protein.

OR

A solution is obtained by mixing 300 g of 25 % solution and 400 g of 40 % solution by mass. Calculate the mass percentage of the resulting solution.

10) What type of deviation from Raoult's law is exhibited by a mixture of phenol and aniline? Explain with the help of graph.

11) Why does a gas always tend to be less soluble in liquids as the temperature is raised?

SECTION C (3MARK)

12) Answer the following questions:

a. State Henry's law and explain why are the tanks used by scuba divers filled with air diluted with helium (11.7% helium, 56.2% nitrogen and 32.1% oxygen)?

b. Assume that argon exerts a partial pressure of 6 bar. Calculate the solubility of argon gas in water. (Given Henry's law constant for argon dissolved in water, K_H = 40kbar)

13) 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 $1.5^{o}C, K_f = 3.9K\,kgmol^{-1}$.

OR

Calculate the mass of urea (NH_2CONH_2) required in making 2.5 kg of 0.25 molal aqueous solution.

14) Obtain a relationship between relative lowering of vapour pressure and mole fraction of solute?

15) If the solubility product of CuS is 6×10^{-16}, calculate the maximum molarity of CuS in aqueous solution.

SECTION D (4MARK)

16) **Read the following paragraph and answer the questions:**

Henna is investigating the melting point of different salt solutions. She makes a salt solution using 10 mL of water with a known mass of NaCl salt. She puts the salt solution into a freezer and leaves it to freeze. She takes the frozen salt solution out of the freezer and measures the temperature when the frozen salt solution melts. She repeats each experiment.

Sl.no.	Mass of the salt used(g)	Melting point in ^{0}C Reading set 1	Melting point in ^{0}C Reading set 2
1	0.3	-1.9	-1.9
2	0.4	-2.5	-2.6
3	0.5	-3.0	-5.5
4	0.6	-3.8	-3.8
5	0.8	-5.1	-5.0
6	1.0	-6.4	-6.3

a. One temperature in the second set of results does not fit the pattern. Which temperature is that? Justify your answer.

b. Why did Henna collect two sets of results?

c. In place of NaCl, if Henna had used glucose, what would have been the melting point of the solution with 0.6 g glucose in it? .

SECTION E (5MARK)

17) What is meant by positive and negative deviations from Raoult's law and how is the sign of $\Delta_{sol}H$ related to positive and negative deviations from Raoult's law?

OR

a) Give reason for the following:

(i) Osmotic pressure is considered to be the best colligative property for determining the molar masses of biomolecules and polymers.

(ii) A person suffering from high blood pressure should take less common salt.

b) Define isotonic solution.

c) Calculate the mass percentage of carbon tetrachloride (CCl_4) if 122 g of carbon tetrachloride is mixed with 22g of benzene.