GITARATTAN JINDAL PUBLIC SCHOOL

SECTOR-VII ROHINI DELHI-110085

ASSIGNMENT- 2011-12

CLASS : XII **SUBJECT : CHEMISTRY**

CHAPTER 1 – SOLUTIONS
CHAPTER 2 – SOLID STATE

Commit to memory:

1. Solution: A homogeneous mixture of two or more substances in solution.
2. Binary Solution: Those solutions that contain two components are called binary solution.
3. Aqueous Solution: when solute is dissolved in water, it is called aqueous solution.
4. Non aqueous Solution: when solute is dissolved in solvent other than water, is non-aqueous solution. Iodine dissolved in alcohol (Tincture of Iodine).
5. Molarity: It is expressed as no. of moles of solute per litre of solution. $M= \frac{W_B \times 1000}{V \times M_B}$
6. Molarity: It is expressed as number of moles of solute present in 1kg of solvent. $m= \frac{W_B \times 1000}{W_A \times M_B}$
7. Molefraction: It is the ration of moles of a particular component to the total number of moles of all the components. $x_A = \frac{n_A}{n_A + n_B}$, $x_B = \frac{n_B}{n_A + n_B}$, $x_A + x_B = 1$
8. Henry's law: It states that the solubility of a gas in liquid is directly proportional to the pressure of the gas.

   Partial pressure of the gas= k_{11} X molefraction of gas in liquid
9. Raoult's law: When solvent is volatile, vapour pressure of a given solution is directly proportional to mole fraction of solvent.

   $P_s = P_A^\circ x_A$
10. Raoult's law: When both solute and solvent are volatile, V.P of solution is sum of partial pressures of solute and solvent.

    $P_s = P_A^\circ x_A + P_B^\circ x_B$ (A is solvent, B is solute)
11. Lowering of vapour pressure: When a non-volatile solute is added to the solvent is decreased. Lowering of vapour pressure depends only on concentration of solute and is independent of its nature.
12. Ideal solution: Those solutions which obey Raoult's law are called ideal solutions.

    $\Delta H = 0$, $\Delta V = 0$ for ideal solutions, e.g. n-hexane & n-heptane, benzene-tolueye.
13. Non ideal solution: Those solutions which do not obey Roault's law. $\Delta H \neq 0, \Delta V \neq 0$.
    E.g. ethanol and water, chloroform and acetone.
14. Positive deviation from Raoult's law: is those non-ideal solutions, in which partial pressure of each component is higher than that is calculated from Raoult's law. E.g. Water and ethanol, acetone and ethanol.
15. Negative deviation from Raoult's law: is that non-ideal solution in which partial pressure of each component is lower than that is calculated from Raoult's law. E.g. Chloroform and acetone, H_2O and HCl, H_2O and HNO_3.
16. Elevation of the boiling point: The difference in boiling point of solution and pure solvent is called elevation of boiling point which is directly proportional to number of moles of solute in a given

amount of solvent. ΔT_b αm. $\Delta T_b = K_b \text{ X } \frac{W_B}{M_B} \text{ X } \frac{1000}{W_A}$

17. Depression of freezing point: The difference between freezing point of solution and freezing point of pure solvent is called depression in freezing point. $\Delta T_f = K_f \text{ X } \frac{W_B}{M_B} \text{ X } \frac{1000}{W_A}$

18. Reverse osmosis: If pressure greater than osmotic pressure is applied on solution side, then solvent can be forced out of the solvent through the pores of semi permeable is called reverse osmosis.

19. Osmosis: When a solution is separated from the solvent by a semi-permeable membrane, which allows the passage of solvent molecules but does not allow solute particles to pass through it is known as osmosis.

20. Van't hoff's factor (i): The ratio of experimental value of a colligative property to the theoretical value is known as Van't Hoff factor.

$$i = \frac{Theoretical\ molecular\ mass}{Molecular\ mass\ determined}$$

21. Abnormal Molecular Mass: When the molecular mass, calculated with the hlp of Colligative property, is different from theoretical molecular mass, it is called abnormal molecular mass. Abnormality is due to association or dissociation of electrolyte.

ASSIGNMENT

Q.1. Two liquids A and B boil at 145°C and 190°C respectively. Which of them has higher vapour pressure at 80°C?

Q.2. What is the value of Van't hoff factor for $K_3[Fe(CN)_6]$ in solution?

Q.3. What happens when bold cells are placed in pure water?

Q.4. Why is cooking temperature in pressure cooker higher than in open pan?

Q.5. Why is an increase in temperature observed on missing chloroform with acetone?

Q.6. Why is benzene insoluble in water but soluble in toluene?

Short Answer Questions

Q.7. 'The solution of a non-volatile solute boils at higher temperature than the pure solvent'. Show this relationship on a graphic diagram.

Q.8. With help of a neat diagram indicate why the solution of a non-volatile solute should freeze at a temperature lower than the freezing point of pure solvent.

Q.9. For determining molar masses of macromolecular substances in solution, the osmotic pressure measurement method is preferred over any other colligative property of solution. Give two reasons for it.

Q.10. Give one example each of miscible liquid pairs showing positive and negative deviation from Raoult's law. Give one reason each for such deviation.

Q.11. What is meant by abnormal molecular mass of solute? Discuss the factors which bring abnormality in the experimentally determined molecular masses of solutes using colligative properties.

Q.12. Draw a suitable diagram to express the relationship for ideal solutions of A and B between vapour pressures and mole fractions of components at constant temperatute.

Q.13. The freezing point of a solution composed of 5.85g of NaCl in 100g of water is -3.348°C. Calculate the Van't Hoff factor 'i' for this solution. K_f = 1.86kg/mol. (Ans. 1.8)

Q.14. The boiling point of a solution of urea in water is 100.13°C. Calculate the freezing point of solution. (K_f and K_b for water are 1.86k/m and 0.52k/m respectively) (Ans. 273.5k)

Q.15. A sugar syrup of weight 214.2g contains 34.2g of sugar ($C_{12}H_{22}O_{11}$). Calculate:

i. Mole fraction

ii. Molarity of sugar syrup (Ans. i-0.0099, ii-0.55m)

SOLID STATE

1. Amorphous Solids: The solid substance with no regular arrangement of atoms is known as amorphous solids.
2. Crystalline Solids: The solid substances with three dimensional regular arrangements are known as crystalline solids.
3. Anisotropy: The property of crystals that show different electrical and optical properties in different planes of the same crystal is known as Anisotropy.
4. Isotropy: It is the property due to which amorphous substances show identical, electrical and optical properties in all directions is known as isotropy.
5. Crystal lattice: A well ordered and regular arrangement of atom molecules or ions in the three dimensional space is called crystal lattice.
6. Unit cell: It s the smallest repeated unit in a crystal lattice.
7. Rank of the crystal: It is number of atoms per unit cell of a crystal. For example, for simple unit cell z=1, for BCC=2, for FCC, Z= 4.
8. Octahedral Void: Void present in between six spheres is octahedral void.
9. Tetrahedral void: Void present in between four spheres is tetrahedral void.
10. Stoichiometric defect: These are point defects that do not disturb the stoichiometry of the solid.
11. Frenkel defect: is due to shifting of an ion from its normal position to an interstitial in the crystal lattice is Frenkel defect. Density is not affected by this defect. This defect is found in AgCl, AgBr, AgI. Anion is much larger than cation.
12. Schottky defect: This is due to missing of cations and anions from their positions. So electrical neutrality maintained. The overall density of the substance decreases. Schottky defect is found in AgBr, KCl, NaCl, CsCl.
13. F-centres: Anion vacancy occupied by electrons is F-centres. They impart characteristic colours to the crystals and increase electrical conductivity.
14. Semi conductors: When silicon is doped with a group-15 element which has '5' valence electrons such as P, As, Sb or Bi, the structure of crystal lattice is left unchanged but the fifth electron becomes delocalized and contribute to electrical conduction.
15. P-type semi conductor: It is produced by doping 'Si' with group 13 elements like B, Al, Ga which has three valence electrons. The place where fourth electron is missing is called a hole. Such holes can move through the crystal giving rise to electrical conductivity.
16. Curie temperature: The temperature at which a ferromagnetic substance loses its property and becomes paramagnetic is called curie temperature. For Fe_3O_4 the curie temperature is 850k.
17. n-type and p-type are extrinsic semi conductors as they are produced by doping.
18. Conductance of semi conductors increase with increase in temperature.

I. Very short answer questions: (1 mark each)

Q.1. Why are amorphous solids considered as super cooled liquids?

Q.2. Why urea has a sharp melting point but glass does not?

Q.3. A NaCl crystal is formed to has CsCl structure. Guess how it might have happened.

Q.4. Why common salt is sometimes yellow instead of being pure white?

Q.5. Why is Frenkel defect not found in pure alkalimetal halides?

Q.6. Zno crystal turns yellow on heating. Explain?

Q.7. What is the difference in the semi-conductors obtained by doping silicon with 'Al' or with 'P'.

Q.8. Why stoichiometric defects are also called intrinsic defects?

Q.9. What happens when ferromagnetic substance is heated to high temperature?

Q.10. Out of NaCl and CsCl, Which one is more stable and why?

II. Short Answer Questions: (2 marks each)

Q.1. Explain the nature of crystal produced when sodium chloride is doped with magnesium chloride.

Q.2. What are tetrahedral and octahedral voids? How are their radii related to the radii of the spheres in the close packed arrangement?

Q.3. What are interstitials? Explain with suitable examples.

Q.4. Account for the following:

i. Silicon is an insulator but silicon doped with phosphorous acts as a semi conductor.
ii. Some of the glass objects recovered from ancient monuments look milky instead of being transparent.

Q.5. If the atom of an element has the radius r, then in a primitive cubic unit cell, Calculate.

a. The length of the face diagonal
b. Length of body diagonal

Solve the following numerical: (3 marks)

Q.1. Metallic magnesium has a hexagonal close-packed structure and a density of $1.74 g/cm^3$. Calculate the radius of magnesium atom.