**DAV PUBLIC SCHOOL CHANDRASEKHAR PUR BHUBANESWAR-21**

**POST SUMMAR VACATION TEST, 2023-24**

**CLASS –XII**

**SUB: CHEMISTRY**

**Time-1 ½ Hr Full mark-35**

**Read the following instructions carefully.**

1. There are **16** questions in this question paper with internal choice.
2. SECTION A consists of 8 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 2 very short answer questions carrying 2 marks each.
4. SECTION C consists of 3 short answer questions carrying 3 marks each.
5. SECTION D consists of 1 case- based questions carrying 4 marks each.
6. SECTION E consists of 2 long answer questions carrying 5 marks each.
7. **All questions are compulsory.**
8. **Use of log tables and calculators is not allowed.**

**SECTION-A 1x8=8**

1. Sodium-amalgam is used as a reducing agent in many organic synthesis reaction which is prepared by mixing mercury metal with sodium metal . This gives a solution of the type:

(A) Solid in liquid (B) Liquid in solid (C) Liquid in liquid (D) Not a solution at all

2. The quantity of CO2 in 500 ml of soda water when packed under 2.5 atm of CO2 pressure at 298 K is ( Henry’s law constant for CO2 at 298 K is 1.67 x 108 Pa at 298 K ) :

(A) 0.0422 mol (B)1.857 g (C) Both A & B (D) None of these

3. At a certain temperature pure liquid A and liquid B have vapour pressures 10 torr and 37 torr respectively. For a certain ideal solution of A and B, the vapour in equilibrium with the liquid has the components A and B in the partial pressure ratio PA : PB = 1 : 7. What is the mole fraction of A in the solution ?

(A) 0.346 (B) 0.654 (C) 0.5 (D) None of these

4. The van’t Hoff factor for 0.1 M Ba(NO3)2 solution is 2.74. The degree of dissociation is

(A) 91.7 % (B) 87 % (C) 100 % (D) 74 %

5. Salts of A (atomic weight = 7), B(atomic weight = 27) and C(atomic weight = 48) were electrolysed under identical conditions using the same quantity of electricity. It was found that when 2.1 g of A was deposited, the weights of B and C deposited were 2.7 and 7.2 g. The valencies of A,B and C respectively are

(A) 3, 1 and 2 (B) 1, 3 and 2 (C) 3, 1 and 3 (D) 2, 3 and 2

6. Consider the reaction Mn+ (aq) + ne → M(s) . The standard reduction potential values of the elements M1 , M2 and M3 are –0.34 V , –3.05V and –1.66 V respectively. The order of their reducing power will be

(A) M1 > M2 > M3 (B) M3 > M2 > M1 (C) M1> M3 > M2 (D) M2 > M3 > M1

7. During the recharge of lead storage battery , at anode

(A) Pb converts to PbSO4 . (B) PbO2 converts to PbSO4 .

(C) PbSO4 converts to PbO2 . (D) PbSO4 converts to Pb .

8. Equal weights of three iron nails are dropped in three bottles A , B , C containing pure water , dil HCl and dil NaOH respectively. After few days all the nails are thoroughly washed and the weight found to be WA , WB and WC .The correct relation is :

(A) WA < WB < WC (B)WB < WA < WC (C) WC < WA < WB (D) none of these .

**SECTION –B 2x2=4**

9. Out of 1M glucose , 1M NaCl, 1M CaCl2 & 1M AlCl3 , which aqueous solution will show

(a) maximum boiling point at 300 K ?

(b) maximum freezing point at 300 K ?

10. In a particular cell, 0.01 M solution of potassium chloride gave a resistance of 150 ohms at 298 K while 0.01 M solution of hydrochloric acid gave a resistance of 51.40 ohms at the same temperature. At 298 K the specific conductivity of 0.01 M potassium chloride solution is 0.0014088 ohm-1 cm-1. Calculate molar conductivity of the given hydrochloric acid solution.

**SECTION-C 3x3=9**

11. Give reason:

(a) There is an increase in temperature observed on mixing chloroform & acetone?

(b) The vapour pressure of a deliquescent substances is less than that of water vapour in air .

(c)Ethyl alcohol and water cannot be separated into pure components by fractional distillation?

12. What is fuel cell ? Write the cell reactions .What are the advantages of Fuel cell ?

13. (a) How the molar conductance of strong and weak electrolytes vary with increase in concentration? Explain with graph.

(b) Predict the products of electrolysis of the following:

(i) aqueous solution of cupric chloride using platinum electrode.

(ii) Conc. H2SO4 using platinum electrode

**SECTION -D (1+1+2)**

The following question is a case-based question. Read the passage carefully and answer the questions given below.

14. The temperature at which both the solid and liquid co-exist and have the same vapour pressure . Another consequence of the lowering of the vapour pressure of the solvent in a solution is the freezing point of the solution is lower than the pure solvent .If Tf0 is the freezing point of pure solvent and Tf is the freezing point of the solution, the freezing point thus decreased by the amount (Tf0–T f ) = ∆Tf. This is called freezing point depression. We know that the vapour pressure of a solution is less than that of a pure solvent at any temperature. Thus the vapour pressure of the solution will become equal to that of pure solid solvent only at a lower temperature. So that it may start freezing. Hence the freezing point of the solution is less than that of its pure solvent.

Answer the following questions.

(a) Why the freezing point of water lowers by adding a non – volatile solute.

**(b)** Show that depression in freezing point is a colligative property.

(c) **To lower the melting point of 75 g of acetic acid by 1.50C, how much mass of ascorbic acid (C6H8O6) is needed to be dissolved in the solution where Kf = 3.9 K kg**mol-1**?**

**OR**

Calculate the mass of compound (molar mass = 256 gmol-1) to be dissolved in 75 gm of Benzene to lower its freezing point by 0.48 K.

**SECTION-E 1+1+3**

15. (a) What is reverse osmosis ? Give one example.

(b) Why the molecular mass of biomolecules is determined by osmotic pressure measurement rather than other colligative properties?

(c) The freezing point depression of 0.1 molal solution of acetic acid in benzene is 0.256K . Kf for benzene is 5.12 K .kg mol-1. What conclusion can you draw about the molecular state of acetic acid in benzene?

16. (a) State Kohlrausch’s law. **1+1+3**

(b) Predict the products of electrolysis of aq. AgNO3 solution using Ag electrode.

(c) Write the Nernst equation and calculate the e.m.f. of the following cell.

Mg(s) | Mg2+(0.001M) || Cu2+ (0.0001M)/ Cu(s)

Given E0Cu2+/Cu = 0.34V, E0Mg2+/Mg = -2.37V

Determine the value of standard free energy change for the cell. (1F = 96500 C mol–1)