**DAV PUBLIC SCHOOL CHANDRASEKHARPUR, BBSR-21**

**POST SUMMER VACATION TEST-2022**

**CLASS -XII**

**SUB: CHEMISTRY**

**Time Allowed: 2Hours Maxim3um Marks: 35**

***General Instructions :***

Read the following instructions carefully.

1. There are 12 questions in this question paper .

2. **SECTION A** - Q. No. 1 to 3 are very short answer questions carrying 2 marks each.

3. **SECTION B** - Q. No. 4 to 11 are short answer questions carrying 3 marks each.

4. **SECTION C**- Q. No. 12 is case based question carrying 5 marks.

5. All questions are compulsory.

**SECTION – A**

1. A solution of urea (molar mass 56 g/mol) boils at 100.18oC at the atmospheric pressure. If Kf and Kb for water are 1.86 and 0.512 K kgmol-1 respectively, at what temperature will the above solution freeze?
2. What is the trend in boiling point and freezing point temperatures of equimolar solutions of urea, NaCl, K2SO4 and K3[Fe(CN)6] ?
3. (a) In a cell reaction, the equilibrium constant Kc is less than one. Is Eo for the cell positive or negative?

(b) What will be the value of Kc if Eocell = 0?

**SECTION – B**

4. 19.5g of CH3FCOOH is dissolved in 500g of water. The depression in the freezing point of water observed is 1.0oC. Calculate Van’t Hoff factor and dissociation constant of the acid : K*f* = 1.86 K kg mol-1.

5. Henry’s law constant for CO2 in water is 1.67 x 108 Pascal at 298K. Calculate the quantity of CO2 in 500mL of soda water when packed under 2.5 atm pressure of CO2 at 298K.

6. The vapour pressure of pure liquids A and B are 450 mm and 700 mm of Hg respectively at 350K. Calculate the composition of the liquid mixture if total vapour pressure is 600 mm of Hg. Also find the composition in the vapour phase.

7. Calculate the boiling point of 1M aqueous solution( density = 1.04 g/ml) of

KCl( Kb = 0.52 Kkg mol-1) assuming that it is completely dissociated.

8. How many grams of silver could be plated on a serving tray by the electrolysis of a solution containing silver in +1 oxidation state for a period of 8 hours by a current of 8.46 amperes ? What is the area of the tray if the thickness of the silver plating is 0.00254cm? (Density of silver is 10.5g cm-3, atomic mass of Ag is 108).

9. Calculate the standard cell potential of the galvanic cell in which the following reaction take place.

2Cr + 3Cd2+ → 2Cr3+ + 3Cd. Also calculate standard free energy change and log Kc for the reaction.

(EoCr3+/Cr = - 0.74V, EoCd2+/Cd= - 0.40V)

10. A zinc rod is dipped in 0.1 M ZnSO4 solution. The salt is 95% dissociated at this dilution at 298K. Calculate the electrode potential.

( EoZn2+/Zn = - 0.76 V, log 0.095=1.0223)

11. A copper-silver cell is set up. The copper ion concentration in it is 0.10M. The cell potential measured is 0.422 V. Determine the concentration of silver ions in the cell.

(EoCu2+/Cu = + 0.34V, EoAg+/Ag = + 0.80V, antilog 1.2881 = 19.41)

**SECTION – C**

12**. Read the passage carefully and answer the following questions. (1+1+1+2)**

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 associations or dissociation. For solutes undergoing such changes, Van’t Hoff factor(i) is taken into consideration. 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. Relative lowering of vapour pressure, elevation in boiling point, depression in freezing point and osmotic pressure are considered as colligative properties.

(a) At a certain temperature, the value of the slope of the plot of osmotic pressure verses concentration of a certain polymer solution is 291R. Calculate the temperature at which the osmotic pressure is measured. ( R is gas constant)

(b) A 0.004M solution of sodium sulphate is isotonic with a 0.01M solution of glucose at a given temperature. Calculate the apparent degree of dissociation of sodium sulphate.

(c) Osmotic pressure method is most suitable to to determine the molecular mass of macromolecules. Why?

(d) A solution contains 0.896g of K2SO4 in 500ml. Its osmotic pressure is found to be 0.69 atm at 27oC. Calculate the value of Van’t Hoff factor.