**Karan Arora** **R.L. Institute M: 9416974837**

**Max Time : 2 hr** **Class : 12th Chemistry Max Marks : 50**

**Solution + Electrochemistry + Chemica Kinetics +**

**Co-ordination Compounds + D & F- Block**

**Section – A [ 1 X 10 = 10 ]**

1. Multiple choice Questions:
2. Which of the following oxidation state is common for all lanthanoids?

|  |  |  |  |
| --- | --- | --- | --- |
| a) + 2 | b) + 3 | c) + 4 | d) + 5 |

1. A solution is prepared by dissolving 0.6 g of urea and 1.8 g of glucose in 100 mL of water at 27. The osmotic pressure of the solution is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 8.2 atm | b) 4.6 atm | c) 4.92 atm | d) 1.64 atm |

1. For an ideal solution of two components A and B, which of the following is true?
2. Hmixing < 0
3. Hmixing > 0
4. A – B interaction is stronger than A – A and B – B interactions.
5. A – A , B – B and A – B interactions are identical.
6. Saturated solution of KNO3­ is used to make salt bridge because:
7. Velocity of K + ions is greater than the .
8. Velocity of ions is greater than the K+
9. Velocity of both K+ and are nearly the same.
10. KNO3 is highly soluble in water.
11. An octahedral complex of Co3+ is diamagnetic. The Hybridisation involved in the formation of the complex is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) sp3d2 | b) dsp2 | c) d2sp3 | d) sp3d |

1. The rate constant of a zero order reaction is 2 x 10 – 2  mol L – 1 sec – 1 . If the concentration of the reaction after 25 seconds is 0.5 M. What is its initial concentrations.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.5 M | b) 1.25 M | c) 12.5 M | d) 1 M |

1. On addition of small amount of KMnO4 to concentrated H2SO4, a green oily compound is obtained which is highly explosive in nature. Identify the compound from the following :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Mn2O7 | b) MnO2 | c) MnSO4 | d) Mn2O3 |

1. is equal to :

|  |  |
| --- | --- |
| a) + – | b) + – |
| c) + – | d) + – |

1. In comparison to a 0.01 M solution of glucose, the depression point of a 0.01 M MgCl2 solution is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) the same | b) about twice | c) about 3 times | d) about 6 times |

1. Using the data given below find out the strongest reducing agent :

= 1.33 V , = 1.36 V , = 1.51 V , = 0.74 V

|  |  |  |  |
| --- | --- | --- | --- |
| a) Cl – | b) Cr | c) Cr3+ | d) Mn2+ |

**Section – B [ 2 X 5 = 10 ]**

1. Write down the IUPAC name of the complex [Pt (en)2 Cl2] 2+. What type of isomerism is shown by this complex?
2. Give reason : (i) Cooking is faster in pressure cooker than in cooking pan.

(ii) Red Blood Cells (RBCs) shrink when placed in saline water but swell in distilled water.

Or

Determine the amount of CaCl2 (i = 2.47) dissolved in 2.5 liters of water such that its osmotic pressure is 0.75 atm at 27.

1. For the complex [Fe(Co)5]; write the Hybridization , magnetic character and spin of the complex.
2. At which pH of HCl solution will hydrogen gas electrode show electrode potential of – 0.118 V? H2 gas is passed at 298 K and 1 atm pressure.
3. Write the name of the cell which is generally used in hearing aids. Write the reaction taking place at the anode and the cathode of this cell.

**Section – C [ 3 X 5 = 15 ]**

1. One half-cell in a voltaic cell is constructed from a silver wire dipped in silver nitrate solution of unknown concentration. the other half-cells consists of a zinc electrode in a 0.1 M solution of Zn(NO3)2. A voltage of 1.48 V is measured for this cell. Use this information to calculate the concentration of silver ions in the solution. (Given : = 0.763 V , = 0.80 V)

Or

Represent the cell in which the following reaction take place:

2 Al (s) + 3 Ni2+ (0.1 M) 2 Al3+ (0.01 M) + 3 Ni (s). calculate the emf if Eo = 1.41 V.

1. (i) For the complex [Fe(CN)6] 3 –  ; write the Hybridization , magnetic character and spin nature of the complex.

(ii) Draw one of the geometrical isomers of the complex [Pt (en)2 Cl2] 2+, which is optically active.

1. A first order reaction takes 100 min for completion of 60 % of the reaction. Find the time when 90 % of the reaction will be completed.
2. When 19.5 g of F – CH2 – COOH (molar mass = 78 g/mol) is dissolved in 500 g of water, the depression in freezing point is observed to be 1. Calculate the degree of dissociation of F – CH2 – COOH. (Kf for water = 1.86 K kg/mol).
3. Indicates the steps in the preparation of : KMnO4 from Pyrolusite ore.

**Section – D [ 5 X 3 = 15 ]**

1. (a) Complete the following chemical reaction equations :
2. (aq) + (aq) + H + (aq)
3. (aq) + Fe 2+ (aq) + H + (aq)

(b) Cr2+ is reducing in nature while with the same d-orbitals configurations (d4) Mn3+ is an oxidizing agent. Give

reason

1. (a) Draw the geometrical isomers of [Co (en)2 Cl2]2+. Which geometrical isomer of [Co (en)2 Cl2]2+ is optically active

and why?

(b) Write the Hybridisation and magnetic behavior of [Co F6]3 –.

1. (a) Conductivity of 2.5 x 10 – 4 M methanoic acid is 5.25 x 10 – 5 S cm – 1. Calculate its molar conductivity and degree   
    of dissociation? Given : (S cm2 mol – 1 ) : H+ = 349.5 , HCOO –  = 50.5

(b) Define Molar conductivity and Cell constant

Or

Using the standard electrode potentials given below, predict if the reaction between the following is feasible:

|  |  |  |
| --- | --- | --- |
| (i) Fe 3+ (aq) and I – (aq) | (ii) Ag + (aq) and Cu (s) | (iii) Fe 3+ (aq) and Br – (aq) |
| (iv) Ag (s) and Fe 3+ (aq) | (v) Br2 (aq) and Fe 2+ (aq) |  |

Given standard electrode potentials : = 0.34 V ; = 0.80 V ; = 0.77 V ;

= 0.541 V ; s = 1.09 V