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**Max Time : 3 hr** **Class : 12th Chemistry Max Marks : 70**

**Mid Term Exam**

**Section – A [ 1 X 15 = 15 ]**

1. Zinc is coated over iron to prevent rusting of iron because :

|  |  |  |  |
| --- | --- | --- | --- |
| a) = | b) < | c) > | d) None of these |

1. In comparison to a 0.01 M solution of glucose, the depression in freezing point of a 0.01 M MgCl2­ solution is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

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

1. The rate constant of a reaction is 2 x 10 – 6 mol – 2 L2 s – 1. The order of the reaction is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0 | b) 2 | c) 1 | d) 3 |

1. Out of the following transition elements, the maximum number of oxidation states are shown by:

|  |  |  |  |
| --- | --- | --- | --- |
| a) Sc | b) Cr | c) Mn | d) Fe |

1. KMnO4 acts an oxidizing agent in acidic medium. The number of moles of KMnO4 that will be needed to react with one mole of sulphide ions in acidic solution is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2/5 | b) 3/5 | c) 4/5 | d) 1/5 |

1. Which of the following is – acid ligand?

|  |  |  |  |
| --- | --- | --- | --- |
| a) NH3 | b) CO | c) F – | d) ethylenediammine |

1. The total number of unpaired electrons present in Co3+ (Z = 27) is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2 | b) 7 | c) 3 | d) 4 |

1. In the graph plotted between ln [R] and t for first order reaction, the intercept on y axis is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) - k | b) [R]0 | c) ln [R]0 | d) k/2.303 |

1. The values of Vant’s Hoff factors for KCl , NaCl & K2SO4 are :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2,2 & 2 | b) 2,2 & 3 | c) 1,1 & 2 | d) 1,1 & 1 |

1. In a leclanche dry cell, the cathode is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Zn container | b) MnO2 | c) Graphite rod | d) NH4Cl |

1. Which of the following is correct for spontaneity of a cell ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) G = - ve & E0 = + ve | b) G = + ve & E0 = 0 | c) G = -ve & E0 = 0 | d) G = + ve & E0 = - ve |

1. The role of catalyst is to change \_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a) Gibbs energy of reaction | b) enthalpy of reaction |
| c) activation energy of reaction | d) equilibrium constant |

1. Which set of ions exhibit specific colours?

(At. no. : Sc = 21 , Ti = 22 , V = 23 , Mn = 25 , Fe = 26 , Ni = 28 , Cu = 29 , Zn = 30 )

|  |  |  |  |
| --- | --- | --- | --- |
| a) Sc3+, Ti4+ , Mn3+ | b) Sc3+, Zn2+ , Ni2+ | c) V3+, V2+ , Fe3+ | d) Ti3+, Ti4+ , Ni2+ |

1. The magnetic moment is associated with its spin angular momentum and orbital angular momentum. Spin only magnetic moment value of Cr3+ ion is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2.87 B.M. | b) 3.87 B.M. | c) 3.47 B.M. | d) 3.57 B.M. |

1. Predict the number of ions produced per formula unit in an aqueous solution of [Co (en)3 ]Cl3

|  |  |  |  |
| --- | --- | --- | --- |
| a) 4 | b) 3 | c) 6 | d) 2 |

**Section – B [ 1 X 5 = 5 ]**

1. What is the effect of temperature on ionic conductance?
2. Time required to decompose SO2Cl2 to half of its initial amount is 60 minutes. If the decomposition is a first order reaction, calculate the rate constant of the reaction.
3. Using IUPAC norms, write formula for the following complexes :

|  |  |
| --- | --- |
| a) hexaaquachromium (III) chloride | b) Sodium trioxalatoferrate (III) |

1. Depict the galvanic cell in which the cell reaction is Cu + 2 Ag+ 2 Ag + Cu2+.

Or

What is the reference electrode in determining the standard electrode potential?

1. What are isotonic solutions?

**Section – C [ 2 X 7 = 14 ]**

1. Define Molarity and Normality?
2. Differentiate between rate of reaction and reaction rate constant.
3. Complete and balanced following equations : (a) + + H+ (b) Na2Cr2O7 + KCl
4. Write the correct formula for the following coordination compounds :

a) CrCl3.6H2O (violet with 3 chloride ions precipitated as AgCl)

b) CrCl3.6H2O (light green colour, with 2 chloride ions precipitated as AgCl)

Or

Define Monodentate ligand with examples:

1. Calculate the degree of dissociation () of acetic acid if it’s molar conductivity () is 39.05 S cm2 mol – 1. [Given : = 349.6 S cm2 mol – 1 , = 40.9 S cm2 mol – 1 ]
2. Define half-life of a reaction. Write expression of half-life for Zero order reaction & First order reaction
3. Calculate molarity of 20 % (w/w) aq solution of NaOH. Density of solution is 1.2 g/mL.

**Section – D [ 3 X 7 = 21 ]**

1. (i) What type of isomerism is shown by the complex [Cr (H2O)6 ] Cl3 ?

(ii) On the basis of crystal field theory, write electronic configuration for d4 ion if > P.

(iii) Write the hybridisation and shape of [CoF6] 3 – .

1. Indicates the steps in preparation of : (i) K2Cr2O7 from chromite ore (ii) KMnO4 from pyrolusite ore.

Or

Calculate half life of a first order reaction from their rate constant given below:

(i) 200 s – 1  (ii) 2 min – 1  (iii) 4 years – 1

1. Calculate Go and Log Kc for the following reaction : Cd2+ (aq) + Zn (s) Zn2+ (aq) + Cd (s)

[Given : = 0.403 volt , = 0.763 volt ]

1. For a 5 % solution of urea (Molar mass = 60 g/mol), calculate the osmotic pressure at 300 K. (R = 0.0821 L atm J – 1  mol – 1).
2. Explain: (i) Osmotic pressure (ii) Order of reaction
3. A + 2 B → 3 C + 2 D . The rate of disappearance of B is 1 x 10 – 2 mol L – 1 s – 1. What will be (i) Rate of the reaction (ii) Rate of change in concentration of A and C ?
4. Write configuration of the following : (i) Cd (ii) Gd (iii) Zn

**Section – E [ 5 X 3 = 15 ]**

1. Specify oxidation numbers of the following metal : (i) [Co(H2O)(CN)(en)2] 2+ (ii) [CoBr2(en)2] +

(iii) [PtCl4]2 –  (iv) K3[Fe(CN)6] (v) [Cr (NH3)3Cl3]

1. Sucrose decomposes in acid solution into glucose and fructose according to the first order rate law with t1/2 = 3 hrs. What fraction of sample of sucrose remains after 8 hrs?
2. (i) When 2.56 g of sulphur was dissolved in 100 g of CS2, the freezing point lowered by 0.383 K. Calculate formula of sulphur(S8).[kf for CS2 = 3.83 K kg/mol]

(ii) Blood cells are isotonic with 0.9% sodium chloride solution. What happens if we placed blood cells in a solution containing: (a) 1.2 % sodium chloride solution (b) 0.4 % sodium chloride solution

Or

(i) Calculate for the following reaction at 298 K :

2 Al (s) + 3 Cu2+ (0.01 M) 2 Al3+ (0.01 M) + 3 Cu (s) Given : = 1.98 V

(ii) Using the E0 values of A and B, predict which is better for coating the surface of iron [ = 0.44 V] to prevent corrosion and why? [Given : = 2.37 V , = 0.14 V ]