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

**Solution + Chemical Kinetics + Co-Ordination**

1. Multiple choice Questions: [ 1 x 20 = 20 ]
2. The boiling point of a 0.2 m solution of a non-electrolyte in water is: (Kb for water = 0.52 K kg/mol).

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| --- | --- | --- | --- |
| a) 100 | b) 100.52 | c) 100.104 | d) 100.26 |

1. The magnetic moment of [Ni(CN)4] 2 – is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1.82 B.M. | b) 2.82 B.M. | c) 4.42 B.M. | d) 5.46 B.M. |

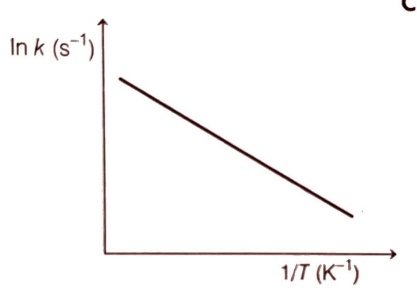
1. Which of the following is affected by catalyst?

|  |  |  |  |
| --- | --- | --- | --- |
| a) H | b) G | c) Ea | d) S |

1. The number of ions formed on dissolving one molecule of FeSO4.(NH4)2SO4.6H2O in water is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3 | b) 4 | c) 5 | d) 6 |

1. Arrhenius equation can be represented graphically as follows; the (i) intercept and (ii) slope of the graph are :



|  |  |  |  |
| --- | --- | --- | --- |
| a) (i) ln A (ii) Ea/R | b) (i) A (ii) Ea | c) (i) ln A (ii) Ea/R | d) (i) A (ii) Ea |

1. For the reaction : N2 + 3 H2 → 2 NH3, if = 2 x 10 – 4 mol L – 1 s – 1 , the value of would be

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3 x 10 – 4 mol L – 1 s – 1 | b) 4 x 10 – 4 mol L – 1 s – 1 | c) 6 x 10 – 4 mol L – 1 s – 1 | d) 1 x 10 – 4 mol L – 1 s – 1 |

1. Which of these does not influence the rate of reaction?

|  |  |
| --- | --- |
| a) Nature of the reactants | b) Concentration of the reactants |
| c) Temperature of the reaction | d) Molecularity of the reaction |

1. For which order half-life period is independent of initial concentration?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Zero | b) First | c) Second | d) Third |

1. The unit of rate constant depends upon :

|  |  |  |  |
| --- | --- | --- | --- |
| a) rate of reaction | b) order of reaction | c) molecularity of reaction | d) all of these |

1. The IUPAC name of K2 [Ni(CN)4] is :

|  |  |
| --- | --- |
| a) potassium tetracyanonickelate (II) | b) potassium tetracyanatonickelate (III) |
| c) potassium tetracyanatonickel (II) | d) potassium tetracyanonickel (III) |

1. The coordination number of platinum in [Pt (NH3)4 Cl2] 2+ is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2 | b) 4 | c) 6 | d) 8 |

1. The existence of two different coloured complexes with the composition [Co (CH3)4 Cl2] + is due to :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Ionization isomerism | b) Linkage isomerism | c) Geometrical isomerism | d) Coordination isomerism |

1. What is the number of unpaired electrons presents in the present square planar [Pt(CN)4] 2 – ion?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0 | b) 1 | c) 4 | d) 6 |

1. The oxidation number of Co in [Co (NH3) (NO2)3] is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) + 3 | b) 0 | c) 3 | d) + 6 |

1. The Molarity of a solution containing 5 g NaOH in 250 mL solution is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.1 M | b) 0.5 M | c) 1 M | d) 2 M |

1. In which case Raoult’s law is not applicable?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1 M NaCl | b) 1 M Urea | c) 1 M Glucose | d) 1 M Sucrose |

1. Which has the least freezing point?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1 % sucrose | b) 1 % NaCl | c) 1 % CaCl2 | d) 1 % Glucose |

1. Which of the following is not a colligative property?

|  |  |
| --- | --- |
| a) Depression in freezing point | b) Osmotic pressure |
| c) Elevation in freezing point | d) Increase in freezing point |

1. If the initial concentration is reduced to 1/4th in a zero order reaction, then the time taken for half the reaction to complete:

|  |  |  |  |
| --- | --- | --- | --- |
| a) remains the same | b) reduces to one-fourth | c) increases 4 times | d) Doubles |

1. In which of the following does the central metal atom exhibits an oxidation state of + 3?

|  |  |  |  |
| --- | --- | --- | --- |
| a) K2 [Ni(CN)4] | b) K4 [Fe(CN)6] | c) [Fe(C2O4)3] 3 – | d) [Cu(NH3)4] 2+ |

**Section – B [ 2 X 4 = 8 ]**

1. Write down the IUPAC name of the complex [Pt (en)2 Cl2] 2+. What type of isomerism is shown by this complex?
2. The rate constant for the first order decomposition of N2O5 is given by the following equation. Calculate Ea for this reaction.

Log k = 23.6 – .

1. 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.

**Section – C [ 3 X 4 = 12 ]**

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.

Or

A reactant has a half-life of 10 minutes : (i) Calculate the rate constant for the first order reaction.

(ii) What fraction of the reactant will be left after an hour of the reaction has occurred?

1. 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).
2. What will be the correct order for the wavelengths of absorption in the visible region for the following:

[Ni (NO2)6] 4 – , [Ni (NH3)6] 2+ , [Ni (H2O)6] 2+

**Section – D [ 5 X 2 = 10 ]**

1. (i) Why is boiling point of 1 M NaCl solution more than that of 1 M glucose solution?

(ii) A non-volatile solute ‘X’ (Molar mass = 50 g/mol) when dissolved in 78 g of benzene reduced its vapour pressure to 90 %. Calculate the mass of ‘X’ dissolved in the solution.

(iii) Calculate the boiling point elevation for a solution prepared by adding 10 g of MgCl2 to 200 g of water assuming MgCl2 is completely dissociated. (Kb for water = 0.512 K kg/mol ; Molar mass of MgCl2 = 95 g/mol).

1. (i) What are pseudo first order reactions? Give one example of such reactions.

(ii) For the reaction ; 2 N2O5 (g) → 4 NO2 (g) + O2 (g) at 318 K, Calculate the rate of reaction if rate of disappearance of N2O5 (g) is 1.4 x 10 – 3 m/s.

(iii) For a first order reaction derive the relationship t99 % = 2 t90 %

Or

Using VBT , Explain the following in relation to the complexes given below: [Mn (CN)6] 3+ , [Co (NH3)6] 3+ , [Fe Cl6] 4 – .

(i) Type of Hybridization (ii) Inner or outer orbital complex

(iii) Magnetic behaviour (iv) Spin only magnetic moment value