DEPARTMENT OF CHEMISTRY ENGINEERING
UIET, C.S.J.M. UNIVERSITY, KANPUR
CHEMISTRY (ECE, CHM-S101)

Semester: 22-23 | FIRST MID SEMESTER EXAMINATION | Year: MAY, 2023

Time: 1.5h | Maximum Marks: 30

1.All questions are compulsory

Section-A

a) The hybridization and geometry of $[Ni(CN)_4]^{2-}$ molecule is
a. SP^3 Tetrahedral b. dsp^2 pyramidal c. dsp^2 squareplanar d. SP^3d^2 octahedral

b) CFSE value of $[Cr(H_2O)_6]^{2+}$ complex
(a) -1.8 Δo (b) -1.6 Δo (c) -1.2 Δo (d) -0.6 Δo

c) The compound $Cr(H_2O)_6Cl_3$ possesess ..... isomerism
a. hydrate isomerism b. linkage isomerism c. coordination isomerism d. ionisation

d) The crystal field theory considers the metal-ligand bond to be a _____ bond.
(a) covalent (b) coordinate (c) ionic . (d) vanderwaal

e) Which carbocation is most stable
(a) (CH3)3 C+ (b) (CH3)2 C+ (c) CH3CH2+ (d) CH3+

f) For SN^1 reaction 1 stands for
(a) one step (b) first order (c) one nucleophile (d) one leaving group reaction.

g) The rate of hydrolysis reaction is faster for SN^2 reaction
(a) Tertbutyl chloride (b) methyl chloride (c) ethyl chloride (d) isopropyl chloride

h) Which acid has more acidic character?
(a) acetic acid (b) fluoroacetic acid (c) bromoacetic acid (d) chloroacetic acid

i) The magnitude of Δo increases as the charge on the metal ion-----
(a) decreases (b) increases (c) zero (d) remain same

Section-B

2. 9 Marks (Three question of 3 marks each) [3x3]

a. What is ionisation isomerism? How you can prove $Co(NH_3)_5$ Br SO_4 is ionisation isomer.

b. What is Inductive effect? Why phenol is acidic in nature?

c. why KMnO4 is violet colour-explain? Draw and explain the crystal field splitting diagram of Octahedral complex.

Section-C [2x6]

3. 12 Marks (Two question of 6 marks each, each question may / maynot have parts)

a. (i) Write down the hybridization, structure & magnetic property of $[Ni(CO)_4]$ and $[Fe(CN)_6]^{4-}$ molecule.

(ii) Write short notes on ozonolysis reaction & elimination reaction.

b. (i) Write down the mechanism, rate equation and stereochemistry of SN1 & SN2 reaction.

(ii) What is markonikoff and anti markonikoff addition-explain with example?

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Year: 1st year
Semester: 2022-23
All question are compulsory

Time: 3h
Maximum Marks: 50

Section-A

10 marks (10 question of 1 mark each)

1. What is hyper conjugation?
2. What is chelating ligand?
3. What is red shift & blue shift?
4. What is hydrogen bond?
5. What is the effect of catalyst on reaction rate.
6. What is transport number?
7. What is Lambert Bear's law?
8. Why aniline is less basic -explain?
9. Write down Kohlrauch's law of independent migration of ions.
10. What is Elimination reaction?

Section-B

20 marks (5 question of 4 marks each)

1. Show the hybridization, structure & magnetic property of $[Ni(CN)_4]^{2-}$ & $K_3[Fe(CN)_6]$.
2. How you can prove $Co(NH_3)_5 Br SO_4$ is ionisation isomer. Write down the possible transitions for UV-Vis spectroscopy with example.
3. Derive de-Broglie equation. Draw and explain the crystal field splitting diagram of octahedral complex.
4. Compare the basicity of the following amine in liquid forms. $(CH_3)_3 N$, $(CH_3)_2 NH$, CH_3-NH_2 . CuSO4 is colour less but $CuSO_4.5H_2O$ is blue colour-why?
5. Draw the MO diagram of B_2 molecule. Mesotarteric acid is optically active or inactive-why?

Section-C

20 marks (2 question of 10 marks each, Each question should have two parts)

1(a) What is enantiomer & diastereomer? Draw & explain the stability of the different conformation of n-Butane.

1(b) How propose five steps mechanism for the formation of HBr? Prove that $t_{1/2}$= 0.693/k for a first order reaction.

2(a) Write down the mechanism, rate equation and stereochemistry of SN1 reaction. Write short notes on ozonolysis reaction

2(b). What is markonikoff and anti markonikoff addition-explain with example? Draw the jablonski diagram and explain IC, ISC, Fluorescence & Phosphorescence.