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M.Sc. - II

INORGANIC CHEMISTRY

CHI-330: Inorganic Reaction Mechanism, Photochemistry and Magnetic Properties of Coordination Compounds

(2013 Pattern) (Semester - III) (4 Credit)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of calculator is allowed.***

Q1) Attempt the following: **[20]**

a) Four coordinated tetrahedral or square planer complexes reacts faster than six coordinated octahedral complexes. Explain.

b) Thermodynamically stable complexes could be kinetically inert or labile. Illustrate with suitable example.

c) How does following modifications affects the rate of substitution reactions in square planer complexes.

i) Adding bulky subtituent to the cis ligand.

ii) Inoresing positive charge on metal complex.

d) Suggest the mechanism for following reaction.

$[Co\ (NH_3)_5\ SCN]^{2+} \rightarrow [Co(NH_3)_5\ NCS]^{2+}$

e) List out the characterestics of outer sphere electron transfer reactions.

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f) Which of the following octahedral substitution reaction is faster? Why?

$[NiCl(NH_3)_5]^+ + H_2O \rightarrow [Ni(H_2O)(NH_3)_5]^{2+} + Cl^-$

$[NiCl(NH_3)_5]^+ + NH_3 \rightarrow [Ni(NH_3)_6]^{2+} + Cl^-$

g) List out the reactions coordinated ligands.

h) Describe the phenomenon of phosphorescence.

i) Find out the R.S. term symbol for Cr^{2+} & Cu^{2+}

j) What do you mean by magnetically dilute and concentrated systems.

Q2) Answer the following: (Any Two) **[10]**

a) Differentiate between intimate and stoicheometric mechanism.

b) How isotope labelling technique is used in studying the kinetics and mechanism of the reactions.

c) What is base hydrolysis? Explain with suitable example.

d) What do you mean by quenching of orbital angular momentum. Provide explaination by VBT and CFT for the same.

Q3) Attempt the following: (Any Two) **[10]**

a) Discuss the mechanism of cis-trans isomerism in octahedral complexes with suitable example.

b) Explain the nudeophilic behaviour of coordinated ligand.

c) Discuss the mechanism of inner sphere electron transfor reaction with suitable example.

d) Predict the magnetic exchange which occurs via the 90^o exchange pathway in the system d^1 - d^1, d^2 - d^2, d^3 - d^3, d^8 - d^8, and d^9 - d^9.

Q4) Write a note on (Any Two): **[10]**

a) Methyl migration and CO insertion reactions.

b) Applications of photochemic reactions of coordination compounds.

c) Complementary and Non complementary reactions.

d) Magnetic properties of mixed valence compounds.

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