 LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**M.Sc.** DEGREE EXAMINATION - **CHEMISTRY**

THIRD SEMESTER – NOVEMBER 2012

# CH 3809 - COORDINATION CHEMISTRY

Date : 03/11/2012 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

# Part – A

*Answer* ***all*** *the questions: (10 x 2 = 20)*

1. Calculate the spin only magnetic moment of d4, high and low spin octahedral system.
2. Why does metal with d8configuration readily form square planar complexes?
3. Is MnCr2O4 likely to have a normal or inverse spinel structure?
4. What is the electronic configuration of [Mn(NCS)6]4- if the magnetic moment of complex is 6.06 Bohr magneton.
5. Why is the stretching frequency of C—O high for terminal carbonyls compared to bridging metal carbonyls?
6. Why does electronic spectra of [Ni(en)3]2+ show three absorption bands?
7. Why the electron transfer reaction is slow between the complexes of [Fe(CN)6]4- and [Co(NH3)6]3+?
8. What is Nephelauxetic effect?
9. What is Wilkinson catalyst? Which type of reaction is easily activated by this catalyst?
10. What are the main functions of chlorophyll in photosynthesis?

# Part – B

*Answer any* ***eight*** *questions: (8 x 5 = 40)*

1. Explain the d orbital splitting of octahedral complexes using crystal field theory.
2. Write a brief note on static and dynamic JahnTeller effect.
3. What are the evidences supporting Crystal field theory? Explain with examples.
4. Which dn configurations show quenching of orbital angular momentum if it forms octahedral, high and low spin complexes?
5. Derive the ground term of d4 and d5.
6. Discuss the associative and dissociative mechanisms of substitution reactions in metal complexes.
7. Describe the mechanistic pathway of hydroformylation of alkene using catalyst.
8. How is optical rotatory dispersion study useful to determine the absolute configuration of chiral complexes?
9. What is trans effect? How is this effect helpful in synthesizing steroisomers?
10. What are supramolecular assemblies? Describe any one method to assemble such a system.
11. Explain photoaquation and photoisomerisation reactions with examples.
12. Briefly explain the role of metal ion in the hydrolytic breakdown of protein by carboxy peptidase.

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# Part – C

*Answer any four questions: (4 x 10 = 40)*

1. Explain with the help of MOT why Cl- acts as a weak ligand whereas

CN- acts as a strong ligand in octahedral transition metal complexes.

1. How is Orgel diagram helpful in explaining the electronic spectrum of d1-9, high spin octahedral and tetrahedral complexes.
2. Discuss in detail the mechanisms of outer and inner sphere electron transfer in metal complexes.
3. a) Explain the synergic effect of metal-ligand bonding in metal carbonyls.

b) Explain the variations in the stretching frequency of the isoelectronic species, Cr(CO)6, [V(CO)6]- and [Mn(CO)6]+.

1. Discuss the bonding in ferrocene on the basis of molecular orbital energy level diagram.
2. Discuss the essential structure of haemoglobin and explain its cooperativity in its oxygenation.

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