

**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

M.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – NOVEMBER 2007

**CH 3809 - COORDINATION CHEMISTRY**

**AD 19**

Date : 26/10/2007

Dept. No.

Max. : 100 Marks

Time : 9:00 - 12:00

**PART – A**

Answer **all** the questions

(10 x 2 = 20)

1. What is  $S_NCB$  mechanism in the hydrolysis reaction of octahedral complexes
2. Explain Why the magnetic moment of  $\mu_{obs}$  of  $[FeF_6]^{3-}$  is not equal to the magnetic moment value of  $\mu_{cal}$  (spin only value), whereas in  $[Fe(CN)_6]^{3-}$ ,  $\mu_{obs}$  is equal to  $\mu_{cal}$ .
3. Define CFSE. Calculate CFSE for  $d^6$  low and high spin octahedral system.
4. What is Nephelauxetic effect.?
5. Explain why large numbers of sharp bands of low intensity are observed for  $d^5$  configuration?
6. Derive the ground term configuration of  $d^7$ ?
7. Find the values of x assuming the validity of the 18 electron rule for  $[Co_2(CO)_x(C_2H_2)]$ .
8. Why is the rate of electron transfer reaction slow in the system  $[Co(NH_3)_6]^{2+/3+}$  compared to  $[Fe(CN)_6]^{3-/4-}$  system?
9. What is Ziegler Natta catalyst? What type of chemical reaction can be effected by using this catalyst?
10. Mention two biologically important coordination compounds and their applications.

**PART – B**

Answer any **EIGHT** questions

(8 x 5 = 40)

11. Calculate OSSE and state whether the following oxides are spinel or inverse spinel :  $Mn_3O_4$ ,  $CuFe_2O_4$ ,  $Co_3O_4$ .
12. Differentiate labile and inert complexes using crystal field theory.
13. Discuss any two evidences of crystal field theory'
14. How are terminal and bridging carbonyl group differentiated by IR spectral analysis?
15. Write short notes on spectrochemical series. How molecular orbital theory is used to explain  $OH^-$  is a weak field ligand than  $H_2O$ .
16. Explain static and dynamic Jahn-Teller effect. Why do electronic spectra of  $[V(H_2O)_6]^{3+}$  show only two absorption bands against three predicted for the system?
17. Explain the 'synergic' effect of bonding of carbonyl ligands with the metals.
18. What is trans effect? Explain the theories of trans effect in explaining the mechanism of substitution reaction of square planar complexes.
19. Write notes on i) the Wackers process ii) hydroformylation reaction iii) metathesis reaction.
20. What are supramolecules? Explain the nature and types of interactions of supramolecule.
21. Discuss the structure and functions of the enzyme, carboxypeptidases.
22. Write notes on photosubstitution and photoisomerisation reactions with examples.

**PART C**

Answer any **FOUR** questions

(4 x 10 = 40)

23. How do the d-orbitals split in octahedral and tetrahedral crystal field of ligands? Discuss any two evidences of crystal field theory.
24. Explain with the help of MO theory why  $\text{Cl}^-$  acts as a weak ligand where as  $\text{CN}^-$  acts as a strong ligand in octahedral transition metal complexes.
25. Draw and explain the Tanabe Sugano diagram for  $d^2$ , octahedral configuration of metal ion and explain the possible electronic transitions for weak and strong field ligands..
26. Give an account of the tunneling and bridging mechanisms of electron transfer reaction of metal complexes.
27. Explain the bonding present in ferrocene using MO theory.
28. Explain the functions and structural aspects of superoxide dismutase and carboxy peptidases.

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