LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

SIXTH SEMESTER – **APRIL 2013**

CH 6607/CH 6601 - COORDINATION CHEMISTRY

Date : 27/04/2013 Dept. No. Max. : 100 Marks
Time : 1:00 - 4:00

PART-A

Answer ALL the questions: **(10×2=20 marks)**

1. Represent schematically the d-orbital splitting in the case of a d^6 system, considering both low and high spin octahedral complexes.
2. Mention the orbitals that are involved in the formation of four coordinated complexes. Write an example for each of those complexes.
3. How does the basicity of the inert ligand influence the dissociation Co-X bond (X-halide) in a hexacoordinate complex?
4. Why is the rate of aquation of $[Co(NH_3)_5Cl]^{2+}$ is much slower than that of $[Co(NH_3)_4Cl_2]^{+}$.
5. How does the oxidation process help in the synthesis of a metal complex?
6. How is tris-(thiourea) copper (I) sulphate prepared?
7. Write the IUPAC name and structure of Wilkinson's catalyst.
8. Mention any two significant roles played by the metal present in Wilkinson's catalyst in the catalytic reactions.
9. What happens when $[Mn_2(CO)_{10}]$ is reduced by hydrogen?
10. What do you understand by 'in vivo' and 'in vitro' nitrogen fixation?

PART – B

Answer any EIGHT questions: **(8×5=40 marks)**

11. A certain manganese(III) octahedral complex has the following parameters: Δ_o= 21100 cm^{-1} and E_p = 27700cm^{-1} What is the spin state of the complex? Calculate also the c.f.s.e. and the spin only magnetic moment.
12. Discuss the consequences of Jahn-Teller distortion.
13. What are normal spinels and inverse spinels? Citing an example for each, account for their nature.
14. Outline the salient features of the hydrolysis of $[Co(NH_3)_5Cl]^{2+}$.
15. Describe any three characteristic features of tunneling mechanism exhibited by metal complexes.
16. What are sigma and pi bonding and anti-bonding molecular orbitals? Give their corresponding group theoretical symbols.
17. Describe 'thermal decomposition' as a method of synthesis of a complex.
18. What are Schiff base complexes? Write a method of preparation of such a metal complex.

19. Explain 18- electron rule, considering two organometallic compounds as examples.
20. Describe briefly the preparation and characteristics of an alkylidene.
21. Write a note on contrast agents in MRI.
22. Highlight the structural and functional features of catalase.

PART-C

Answer any FOUR questions: **(4×10=40 marks)**

23. Discuss the evidence for covalency of M-L bond in complexes.
24. (a) Describe d-orbital splitting in square planar metal complexes.
    (b) Outline the characteristic of inner sphere mechanism.
25. Give an account of the mechanistic aspects of dissociative and associative types of square planar complexes.
26. Discuss the structure and bonding in ferrocene.
27. Describe the importance and mechanism of Ziegler-Natta catalysis.
28. Write notes on:
    (a) Template synthesis and
    (b) Carboxypeptidase A.

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