LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **CHEMISTRY**

THIRD SEMESTER – NOVEMBER 2016

CH 3813 - COORDINATION CHEMISTRY

Date: 01-11-2016 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

Part-A

Answer ALL questions. **(10 × 2 = 20)**

1. Why does metal ion with d^3 configuration readily form octahedral complexes?
2. How many peaks are expected for $[Co(H_2O)_3]^{3+}$ in its electronic spectrum?
3. What is the order of halo ligands in the spectrochemical series? Give reasons.
4. Give any two evidences for the covalent nature of bond between metal and ligand in complexes.
5. Mention the disadvantages of cobalt carbonyl catalyst used in the conversion of propylene to butyraldehyde.
6. How is the origin of hydrogen atoms ascertained in the catalytic conversion of ethylene to acetaldehyde?
7. Comment on the complementarity of guest and host molecules to form a supermolecule.
8. What is allosteric effect?
9. What do you mean by anoxygenic photosynthesis?
10. Which condition favours myoglobin to take up O_2 from hemoglobin?

Part-B

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

11. How does crystal field theory explain the *d*-orbital splitting of d-orbitals of tetrahedral complexes?
12. Derive the ground state term for d^3 and d^5.
13. How is Orgel diagram used to explain the electronic spectrum of d^2, d^8, d^7 and d^3 octahedral and tetrahedral complexes?
14. Predict whether the following oxides are spinel or inverse spinel.
    (i) Fe_3O_4 (ii) Mn_3O_4
15. Explain the catalyzed alkene hydrogenation with Tolman catalytic loops.
16. Describe the Smidt reaction of conversion of ethylene to acetaldehyde.
17. Illustrate the CTTM and MLCT processes with suitable examples.
18. Give an account of types and strength of hydrogen bonding in supramolecular species.
19. Explain the oxygen transport in mammalian system.
20. Sketch the structure of SOD and show how it works against oxygen free radicals in biological systems.
21. Discuss the synergic effect of bonding in metal carbonyls.
22. Elaborate the oxo process of an aldehyde formation.

Part-C

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

23. Give an account for the evidences of crystal field theory.

24. Write a brief account of Jahn-Teller effect and discuss this effect on the electronic spectrum with suitable example.

25a. Write the preparation of Ziegler-Natta catalyst and explain the Cossee's mechanism of Ziegler-Natta polymerization of alkene. (7)

b. Mention the salient features of a self-assembly. (3)

26a. Illustrate the various types of π-interactions and their nature in supramolecular assemblies. (5)

b. Outline the two synthetic methodologies adopted to synthesize a macrocycle. (5)

27a. Elaborate the biological activities of carboxypeptidase *A*. (5)

b. Compare and contrast the different types of copper proteins. (5)

28. Discuss Molecular orbital theory to explain the bonding of π-acceptor ligands and π-donor ligands with metals.

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