

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

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

**SIXTH SEMESTER – NOVEMBER 2015**

**CH 6607 - COORDINATION CHEMISTRY**

Date : 12/09/2015

Dept. No.

Max. : 100 Marks

Time : 01:00-04:00

**Part – A**

**Answer ALL the questions:**

**(10 × 2=20 marks)**

1. Give the reason for smaller crystal field splitting of tetrahedral complexes than that of octahedral complexes.
2. The  $\Delta_o$  for  $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$  is found to be 58.0 kcal/mole. Calculate its CFSE.
3. List the factors which influence the rate of nucleophilic substitution reaction in the metal complexes.
4. What are photoredox reactions? Give an example.
5. Define trans- effect.
6. What are Schiff bases? Give an example.
7. Vaska's complex? Mention its importance.
8. Calculate the number of M-M bonds present in  $[\text{Ir}_4(\text{CO})_{12}]$ .
9. Define apoenzyme.
10. What is chelation therapy? Mention a chelating agent used in chelation therapy.

**PART-B**

**Answer any EIGHT questions:**

**(8 × 5=40 marks)**

11. Enumerate the assumptions of crystal field theory.
12. The dipole moment of  $\text{H}_2\text{O}$  (1.85D) is more than that of  $\text{NH}_3$  (1.47D), Even though  $\text{NH}_3$  shows stronger splitting of d-orbital than  $\text{H}_2\text{O}$  does. Substantiate.
13. Describe the characteristics and mechanism of  $\text{S}_{\text{N}}1\text{CB}$  reaction.
14. Explain photoisomerization reaction with a suitable example.
15. Write a note on dissociative mechanism of an octahedral complex.
16. Give an account of polarization theory of trans-effect.
17. Explain the synthesis of copper(II) phthalocyanine.
18. What is 18-electron rule? Explain its significance with two examples.
19. List the applications of organometallic compounds.
20. What is hydroformylation reaction? Explain the mechanism.
21. Write a note on the enzymatic action of carboxypeptidase A.
22. What are contrast agents? Write their role in magnetic resonance imaging.

**PART – C**

**Answer any FOUR questions:**

**(4 × 10=40 marks)**

23. a) What are spinels and anti spinals? Explain with an example for each.  
b) Explain Jahn – Teller effect and its consequences.
24. a) Explain the effects of crystal field splitting on ionic radii and lattice energy of transition metal halides.  
b) Define trans-effect and explain its application with suitable examples.
25. What is Wilkinson's catalyst? Write its significance and explain the stepwise mechanism of hydrogenation of olefin using Wilkinson's catalyst.
26. a) Write any five applications of metal carbonyls.  
b) Write a note on catalases.
27. Describe *in vivo* and *in vitro* nitrogen fixation in detail.

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