



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – APRIL 2016

CH 3809 - COORDINATION CHEMISTRY

Date: 26-04-2016
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

Part-A

Answer ALL questions.

(10 x 2= 20)

1. How does crystal field theory support the formation of high and low spin complexes?
2. Why do d^8 metal ions form square planar complexes?
3. Derive the ground state term symbol for d^2 electronic configuration
4. What is Curie's law of magnetic interaction?
5. How many bands are expected in the electronic spectrum of $[V(H_2O)_6]^{3+}$?
6. Why is CN considered as a strong field ligand?
7. How do IR spectra of terminal and bridging carbonyls differ?
8. What is Wilkinson's catalyst? Mention its application.
9. Give an example for electron exchange reaction.
10. What are copper proteins? Mention their specific roles.

Part-B

Answer any EIGHT questions.

(8 x 5= 40)

11. How do the d-orbitals split up in tetrahedral environment of ligands?
12. How does crystal field theory support the variation of ionic radii of first row transition elements.
13. Explain the variations in the stretching frequency of
(i) $Cr(CO)_6$ (ii) $[V(CO)_6]^-$ (iii) $[Mn(CO)_6]^+$
14. Explain oxidative addition reaction of metal complexes with an example.
15. Predict whether the octahedral, d^4 and d^7 metal complexes possess only spin magnetic moment or spin and orbital magnetic moment.
16. Write a brief note on the types of reaction in metal complexes.
17. How does ORD study help in determining the absolute configuration of metal complexes?
18. What is trans effect? Explain its synthetic applications.
19. Explain double and triple decker complexes. Give an example,
20. Draw the structure of $[Ni(dmg)_2]$. Why this complex formed only in weakly basic medium?
21. Discuss the biological role of carboxypeptidase A.
- 22 a. Why is CrO_4^{2-} ion, a d^0 complex coloured?
b. Why is the rate of the reaction slow between $[Co(H_2O)_6]^{3+}$ and $[Co(H_2O)_6]^{2+}$ slow?

Part-C

Answer any FOUR questions.

(4 x 10= 40)

23. How does MO theory support the order of halo ligands in the spectrochemical series?
24. What is Jahn-Teller effect? How does crystal field theory help in predicting distortion of the octahedral geometry of d^{1-10} configuration?
25. Discuss the features of Orgel diagram and Tanabe-Sugano diagram.
26. Discuss the principle involved in characterizing the EPR spectrum of $[Cu(salen)_2]^+$ complex.
27. Give a detailed account of inner- and outer sphere electron transfer mechanisms followed by coordination compounds.
28. Discuss the cooperativity behaviour in the mechanism of oxygen transport by haemoglobin.
