

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

FOURTH SEMESTER – APRIL 2010

CH 4956 / 4953 - ADVANCED COORDINATION CHEMISTRY

Date & Time: 20/04/2010 / 9:00 - 12:00 Dept. No.

Max. : 100 Marks

PART – A

Answer *all* the questions.

(10 x 2 = 20)

1. The g-values of most of the molecules remain a constant and almost same as that for a free electrons. Why?
2. What is the use of dyes in solar energy conversion?
3. Illustrate the decay scheme of ^{57}Co to ^{57}Fe .
4. What is supporting electrolyte? Mention their applications.
5. What is the principle involved in selecting a source for Massbauer spectroscopy?
6. Differentiate migration current and diffusion current.
7. What are optically transparent electrodes? Mention their applications.
8. What are quantum dots? Mention any one application.
9. What is a molecular device? Cite an example.
10. What are pendant arm macrocyclic ligands? Give an example.

PART – B

Answer any **EIGHT** questions.

(8 x 5 = 40)

11. What are the drawbacks in using NMR techniques for coordination compounds??
12. How is the complexing ability of lanthanides with organic molecules exploited to obtain a well resolved spectrum of organic molecules?
13. Draw and explain the hypothetical esr spectrum of $[\text{Cu}(\text{NH}_3)_4]^{2+}$, $I_{\text{Cu}} = 3/2$
 $I_{\text{N}} = 1$. Assume the spin of hydrogen atoms do not couple with spin of electron.
14. Account for a shoulder observed in the electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$
15. Describe the working principle of polarography.
16. Write a note on non-linear optical materials.
17. What are dendrimers? Explain the types of metallo dendrimers?
18. Describe the antenna effect and funneling of electronic energy in supramolecular assemblies.
19. What are photo and electrochemical sensors? Explain the role of supramolecular assemblies in making sensor materials.
20. What is template synthesis? Mention its role on the synthesis of Schiff base macrocyclic ligands.
21. Discuss the host-guest chemical relationship in forming supramolecular assemblies.
22. Mention any five applications of metal complexes for radiotherapy.

PART – C

Answer any **FOUR** questions.

(4 x 10 = 40)

23. Discuss the effect of geometry on the electronic spectra of coordination compounds with examples.
24. Discuss the principles involved in Mossbauer analysis in differentiating the following compounds: i) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ ii) FeCl_3 iii) $\text{K}_4[\text{Fe}(\text{CN})_6]$ iv) $\text{K}_3[\text{Fe}(\text{CN})_6]$
25. Explain the divergent synthesis polypropyleneimine dendrimers.
26. Discuss the role of Ru(II) and Os(II) polypyridyl complexes employed in light harvesting devices.
27. Discuss the functional and structural features of rubredoxins and ferredoxins
28. Compare and contrast the properties of the following classes of host molecules.
 - i) calixarenes
 - ii) spherands
