



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIFTH SEMESTER – APRIL 2013

CH 5506 - TRANSITION ELEMENTS AND NUCLEAR CHEMISTRY

Date: 10/05/2013
Time: 9:00 - 12:00

Dept. No.

Max. : 100 Marks

PART – A

Answer ALL questions.

(10 x 2 = 20 marks)

1. Write any two Zinc containing enzymes and mention their biological roles.
2. Give the uses of Titanium and Chromium borides.
3. Filling of 4f sublevel is not regular in the lanthanide series. Why?
4. How is Einsteinium synthesized?
5. Write down the systematic name for each of the following complexes:
a. $K[Cr(oxal)_2(H_2O)_2].3H_2O$ b. $[Pt(H_2NCH_2CH_2NH_2)_2Cl_2]Cl_2$
6. Name one bidentate and one polydentate ligand.
7. What is K-electron capture?
8. State radioactive displacement law.
9. What is spallation?
10. Why is technetium 99 m used for diagnostic purposes?

PART – B

Answer any EIGHT questions.

(8 x 5 = 40 marks)

11. Give an account of toxicity of mercury.
12. How are tungsten bronzes prepared? Account for their conductivity.
13. How are lanthanides separated by ion exchange method?
14. Write briefly on complexes formed by lanthanides.
15. What is meant by spectrochemical series? Explain.
16. What are chelates? Why are chelated complexes more stable than similar complexes with monodentate ligands?
17. Discuss the optical isomerism exhibited by coordination compounds.
18. Give the salient features of Shell model of the nucleus.
19. Describe the construction and working of GM counter.
20. What is binding energy? How is it related to the stability of nuclei?
21. Write a note on isotopic labeling studies.
22. Explain the principle and application of neutron activation analysis.

PART - C

Answer any FOUR questions

(4 x 10 = 40 marks)

23. Write the names and formulae of any two ores of chromium and explain how chromium is extracted from these ores.
24. Describe the two processes by which uranium is extracted from its ore.
25. How do valence bond theory and crystal field theory account for the fact that $[CoF_6]^{3-}$ is paramagnetic while $[Co(NH_3)_6]^{3+}$ is diamagnetic though both are octahedral ?
26. a. Calculate the crystal field stabilization energy in terms of Δ_o for a d^8 system in octahedral and tetrahedral complexes. Which is more stable? (5)
b. List out the major drawbacks of VBT. (5)
27. Describe the liquid drop model for nuclear structure. How does it explain fission process?
28. Give an account of a nuclear fission reactor.

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