LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – NOVEMBER 2012

# CH 5506 - TRANSITION ELEMENTS AND NUCLEAR CHEMISTRY

Date : 03/11/2012 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

**PART – A**

**Answer ALL questions. (10 x 2 = 20 marks)**

1. How is (CH3)2 Hg prepared? Mention one of its uses.

2. Inspite of its high negative electrode potential, chromium is not a reducing agent. Why?

3. Orbital contributions to magnetic moments of lanthanide ions are significant. Why?

4. f-f transitions are used for fingerprinting of Ln (III) ions. Account.

5. Write down the systematic name for each of the following complexes.

a) K[Cr(oxal)2(H2O)2] .3H2O b) [NiCl(en)2(NH3)]Cl

6. Draw the geometrical and isomers of [RhCl2(en)2]+.

7. What is K-electron capture?

8. What are leptons and hardons?

9. What is critical mass with respect to nuclear fission?

10. Why 238 U is not suitable for nuclear fission reaction?

**PART – B**

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

11. How is potassium dichromate prepared?

12. Discuss the various oxidations states exhibited by titanium. Which is the most stable oxidation state?

13. How are lanthanides separated by on exchange method?

14. What is lanthanide contraction? What are its consequences?

15. Using VB theory explain the geometry and magnetism of [CoF6]3–and [Co(CN)6]3– .

16. What is EAN rule ? Which of these complexes obey EAN rule? i.[Zn(NH3)4]2+ ii. [Co(NH3)6]2+.

17. How are d-orbitals split, when a transition metal ion is placed in an octahedral field?

18. The half life of 220Rn is 54.5 s. What mass of this nucleus is equivalent to 1 millicurie?

19. What is binding energy? How is related to the stability of nuclei?

20. Write a note on shell model of the nucleus.

21. What type of materials can be used as moderators and coolants in a nuclear reactor? Explain.

22. How is radioactive dating carried out using carbon-14?

**PART – C**

**Answer any FOUR questions: (4 x 10 = 40 marks)**

23. How does tungsten occur in nature? How is the metal extracted?

24. Write a note on occurrence, isolation and uses of uranium.

25. Define crystal field stabilization energy. Calculate its value for the following systems and explain.

i. d5 low spin octahedral ii.d5 high spin octahedral.

26. What are the basic postulates of valence bond theory of coordination compounds. What are its

limitations?

27. Explain the functioning of Geiger counter and scintillation counter.

28. a. Explain the principle and application of neutron activation analysis. (5)

b. Write a brief note on nuclear reactors in India. (5)

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