

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

B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIFTH SEMESTER – November 2009

**CH 5506 - TRANSITION ELEMENTS AND NUCLEAR CHEMISTRY**

Date & Time: 5/11/2009 / 9:00 - 12:00

Dept. No.

Max. : 100 Marks

**PART- A**

**Answer ALL the questions**

**(10 x 2 = 20 marks)**

1. What are chelate ligands? Give an example for a hexadentate ligand.
2. Write the IUPAC name of the following coordination compounds
  - i)  $K_3[Al(C_2O_4)_3]$
  - ii)  $NH_4[Cr(NCS)_4(NH_3)_2]$
3. What are breeder reaction ?
4. What is meant by critical mass of an atom bomb?
5. What is Soddy- Fajan rule?
6. Define nuclear binding energy.
7. Why do lanthanides form a closely knit group of similar chemical and physical properties?
8. How does thorium react with oxygen and hydrogen?
9. What are interstitial compounds? Give example
10. How does titanium occur in nature?

**PART –B**

**Answer any EIGHT questions**

**(8 x 5 = 40 marks)**

11. Explain induced radioactivity by  $\alpha$  particle.
12. Write a note on electron capture reaction and scintillation counters.
13. Explain nuclear stability by n/p ratio.
14. How  $^{99m}Tc$  used as a nuclear medicine.
15. Write the mechanism of nuclear fission reaction.
16. What relationship exists between crystal field splitting and pairing energy in determining whether the complex will be high spin or low spin?
17. Name different kinds of isomerism possible in co-ordinate complexes. Give one example of each kind.
18.  $[Ni(CN)_4]^{2-}$  is diamagnetic and square planar whereas  $[NiCl_4]^{2-}$  is paramagnetic and tetrahedral. Explain it with valence bond theory.
19. Write notes on biological role of iron and copper.
20. Discuss organometallic compounds of cobalt and zinc.

21. Write notes on the oxidation states of actinides?
22. Explain the magnetic properties and colour of lanthanides.

**PART-C**

**Answer any FOUR questions**

**(4 x10 = 40 marks)**

23. Discuss the ion-exchange and solvent extraction method of separation of lanthanides.
24. How is tungsten extracted from its ore?
25. What is meant by radioactive series? Explain Uranium series.
26. Discuss the splitting of d- orbitals in the octahedral and tetrahedral complexes.
27. Describe the bonding in  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$  and  $[\text{Fe}(\text{CN})_6]^{3-}$  in terms of valence bond theory and crystal field theory.
28. Explain any two types of nuclear reaction and mention the difference between them.

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