LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **APRIL 2015**

CH 5506 – TRANSITION ELEMENTS AND NUCLEAR CHEMISTRY

Date : 29/04/2015 Dept. No. Max. : 100 Marks
Time : 09:00-12:00

PART – A

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

1. Explain why most of the transition metals form coloured compound.
2. What is ferrochrome?
3. What are lanthanides? Why are they so called?
4. Name any two minerals of actinides.
5. What is EAN?
6. What is chelate effect? Explain.
7. Define radioactivity. Give unit of radiation.
8. What are pi-mesons and K-mesons?
9. What are analytical techniques? Give an example.
10. Mention any two nuclear power projects in India and give their role.

PART – B

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

11. Discuss the toxic effects of cadmium and mercury.
12. How is tungsten extracted from its ores?
13. What is lanthanide contraction? Explain any one consequence of it.
14. Explain the isolation of uranium.
15. Explain spectrochemical series. Mention the significance of the series.
16. Explain geometrical isomerism with two examples.
17. What are the salient features of Pauling's theory and explain the hybridization, geometry and magnetic properties of complex ions $[CoF_6]^{3-}$ and $[Co(CN)_6]^{3}$ based on Pauling's theory.
18. The activity of the hair of an Egyptian mummy is 7.0 $min^{-1}g^{-1}$ of carbon. Find the age of the mummy ($t_{0.5}$ of ^{14}C = 5770 years; disintegration rate of fresh sample of ^{14}C = 14 $min^{-1}g^{-1}$).
19. Describe the functioning of scintillation counter.
20. Explain n/p ratio.
21. What type of materials can be used as moderators and coolants in a nuclear reactor? Explain.
22. Discuss neutron activation analysis.

PART – C

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

23. (a) Discuss the toxic effects of lead.
    (b) Explain the preparation of $K_2Cr_2O_7$.
    (c) Explain the biological importance of any two transition elements. (3+3+4)

24. (a) Describe how lanthanides are separated by ion-exchange chromatography.
    (b) Explain synthesis of any one man-made element. (5+5)

25. (a) Explain the postulates of VB theory of coordination compounds.
    (b) Describe optical isomerism of octahedral complexes. (5+5)

26. (a) Discuss any three evidences to support crystal field theory.
    (b) Calculate the CFSE for octahedral high and low spin for d^4, d7 configurations. (5+5)

27. (a) Write a note on liquid drop model of the nucleus.
    (b) Explain the radioactive decay. (5+5)

28. Explain the construction and working of a nuclear reactor. (5+5)

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