



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION - CHEMISTRY

FIFTH SEMESTER – NOVEMBER 2015

CH 5511 - TRANS ELEM. & NUCLEAR CHEMISTRY

Date : 05/11/2015

Dept. No.

Max. : 100 Marks

Time : 09:00-12:00

PART – A

Answer **ALL** questions:

(10 x 2 = 20 marks)

1. What are variable oxidation states?
2. Explain why most of the transition metals form coloured compound.
3. Differentiate ores and minerals.
4. What is self-reduction process?
5. What is actinide series?
6. Name any two minerals of lanthanides.
7. Define induced radioactivity.
8. What are pi-mesons and K-mesons?
9. What are moderators? Give an example.
10. What is spallation reaction? Give an example.

PART – B

Answer any **EIGHT** questions:

(8 x 5 = 40 marks)

11. Explain the preparation and applications of tungsten bronzes.
12. How is titanium extracted from its ores?
13. Discuss the Ellingham diagram.
14. Explain the metallurgy of chromium.
15. How is vanadium extracted from its ores?
16. Explain the electronic spectra of lanthanide compounds.
17. Explain the chemical properties of hydrides and oxides of uranium.
18. U^{235} gives 4770 disintegrations $\text{min}^{-1}\text{mg}^{-1}$. Calculate the decay constant (λ) and half-life of U^{235} (1 year = 3.15×10^7 s).
19. Discuss the shell model of nucleus on the basis of closed shells of magic number.
20. Describe the working of G.M. counter.
21. Explain the principle of a nuclear reactor.
22. Give the applications of nuclear medicine.

PART – C

Answer any **FOUR** questions:

(4 x 10 = 40 marks)

23. (a) Explain the preparation of (i) TiCl_3 (ii) $\text{K}_2\text{Cr}_2\text{O}_7$.
(b) Explain M-M bonding and cluster compounds.
24. (a) How is tungsten extracted from its ores?
(b) Explain the magnetic separation and electrostatic precipitation of pretreatment of ore.
25. (a) Describe how lanthanides are separated by ion-exchange chromatography.
(b) What is lanthanide contraction? How does it affect the properties of the lanthanides?
26. (a) Explain the radioactive displacement law.
(b) Describe the functioning of scintillation counter and ionization chamber.
27. (a) Describe the principle and applications of neutron activation analysis.
(b) Discuss the atomic power projects in India.
28. (a) Differentiate between atom bomb and hydrogen bomb.
(b) Explain the construction, working and applications of a nuclear reactor.

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