LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **NOVEMBER 2016**

CH 5506 – TRANSITION ELEMENTS AND NUCLEAR CHEMISTRY

Date: 03-11-2016 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART-A

Answer ALL questions (10x2=20 marks)

1. Write the correct electronic configuration of Cr and Cu.
2. What are variable oxidation states? Give an example.
3. Name the element whose atomic number is 100. Write its electronic configuration.
4. What is the chief source of uranium?
5. Define the term chelate effect.
6. Write the IUPAC name of the following complexes.
   a) $[CoCl(NO_2)(NH_3)_4]Cl$ b) $K_3[Al(C_2O_4)_3]$.
7. What is 'K' electron capture?
8. State Geiger–Nuttall rule.
9. What do you mean by nuclear cross section?
10. What are the different types of nuclear reactions?

PART-B

Answer any EIGHT questions (8x5=40 marks)

11. Explain the biological importance of Cr and Fe.
12. Write short notes on the toxicity of Mercury.
13. Explain how titanium is extracted from its ore?
14. What is lanthanide contraction? Explain its causes and consequences.
15. Discuss the position of lanthanides in the periodic table.
16. How is Sidgewick's EAN rule useful to explain the stability of complexes?
17. What are strong field and week field ligands? Explain them with suitable examples.
18. Write the salient features of crystal field theory.
19. What is binding energy? (2+3)

    Calculate the nuclear binding energy per nucleon (in J) of the following isotopes.

    a) $^{7}_{3}Li$ (7.0160amu) b) $^{35}_{17}Cl$ (34.95952amu) c) $^{209}_{83}Li$ (208.9804 amu).
20. Write the principle and working function of Geiger – Muller counter.
21. Enumerate the differences between nuclear fission and nuclear fusion.
22. Define the following terms: (2+1+2)

    a) Spallation b) Critical mass c) Carbon dating.

PART-C

Answer any FOUR questions (4x10=40 marks)

23. a) Write the synthesis and reactivity of metal vanadates. (5)

    b) Write a note on the toxicity of Cd. (5)

24. a) How are lanthanides separated by solvent extraction method? (5)

    b) Write a note on the colour and spectra of lanthanides. (5)

25. How is CFT used to explain the stability and magnetic properties of coordination complexes? Give its limitations.

26. a) Write a note on spectrochemical series. (5)

    b) Write the demerits of VBT. (5)

27. Explain the applications of radioactive isotopes in the field of agriculture and medicine.

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

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

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