

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIFTH SEMESTER – NOVEMBER 2018

CH 5506 – TRANSITION ELEMENTS AND NUCLEAR CHEMISTRY

Date: 30-10-2018

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

Part – A

Answer all the questions

10 x 2 = 20

1. Highlight any two unique properties of first row transition elements with an example.
2. Give the name and electronic configuration of the lanthanide that is radioactive.
3. What are the isotopes used as nuclear fuels?
4. Write the IUPAC name of the following complexes: i) $K_3[Fe(CN)_6]$ ii) $[Cu(NH_3)_4]SO_4$
5. What is linkage isomerism? Cite an example.
6. What is EDTA? Give the chemical formula.
7. The relative atomic mass of copper is 63.5. Calculate the percentage of the isotope of $^{63}_{29}Cu$ and $^{65}_{29}Cu$ present in it.
8. What is Geiger-Nuttall law?
9. What are fissile and fertile isotopes? Give an example for each.
10. What is the role of Tc^{99m} in radiopharmaceuticals?

Part – B

Answer any eight questions

8 x 5 = 40

11. Discuss the properties of exhibiting variable oxidation state and catalytic properties of first row transition elements with suitable examples.
12. How is uranium extracted from its ores?
13. Discuss any five common properties of Fe, Co and Ni group elements.
14. How are individual lanthanides separated by ion exchange chromatographic method?
15. Discuss the stereo isomerism exhibited by 4 and 6 coordinated complexes.
16. Calculate EAN for i) $K_4[Fe(CN)_6]$ ii) $[Cr(NH_3)_6]^{3+}$
17. Calculate CFSE for d^4 , low spin octahedral and d^7 tetrahedral complexes.
18. Write a brief note on radioactive group displacement law.
19. Explain the nuclear fusion and fission reactions with suitable examples.
20. Describe the principles and applications of Neutron Activation Analysis.
21. How is the activity of radioisotope measured by using GM counters?
22. Describe the principle involved in radio-carbon dating.

Part – C

Answer any four questions

4 x 10 = 40

23. Write a brief note on i) the toxicity of Cd and Pb ii) biological role of any one zinc containing enzyme.
(5+5)
24. a) What is lanthanide contraction? Discuss its consequences in affecting the properties of other elements.
b) How are carbides classified? Give chemical equations to support the classifications. (5+5)
25. How does valence bond theory explain the geometry of diamagnetic, $K_4[Fe(CN)_6]$ and paramagnetic, $K_4[FeCl_6]$?
26. How do d-orbitals of metal ion split up in forming octahedral complexes?
27. Describe the working principle of nuclear reactor.
28. i) Discuss in detail any three factors affecting nuclear stability of the nucleus. (6)
ii) The observed mass of $^{56}_{26}Fe$ is 55.9375 amu. The mass of proton and neutron are 1.00732 and 1.00866 amu respectively. Calculate the binding energy per nucleon in Mev. (4)

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