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M – 2378

Reg. No. :

Name :

Second Semester B.Sc. Degree Examination, December 2021

First Degree Programme under CBCSS

Chemistry

Complementary Course for Botany

CH 1231.3 : INORGANIC AND BIOINORGANIC CHEMISTRY

(2020 Admission Regular)

Time : 3 Hours

Max. Marks : 80

PART – A

Answer **all** questions. Each question carries **1** mark.

1. Give the formula of Zeise's salt.
2. When a nuclide decays by β -emission, what happens for the N/P ratio?
3. How many heme units are present in haemoglobin molecule?
4. What are isobars?
5. Who discovered natural radioactivity?
6. What is the general formula of Grignard reagent?
7. Which metal ion is present in vitamin B₁₂?

P.T.O.

8. Complete the reaction: $\text{HCHO} + \text{RMgCl} \rightarrow$.
9. Give the IUPAC name of $\text{K}_3[\text{Fe}(\text{CN})_6]$.
10. How many geometrical isomers are possible for a square planar complex of the type Ma_2bc ?

(10 × 1 = 10 Marks)

PART – B

Answer **any eight** questions. Each question carries **2** marks.

11. What are isotones? Give examples.
12. What is a radioactive tracer?
13. What is artificial transmutation?
14. What are organometallic compounds?
15. What is mass defect?
16. Give a method for the preparation of organoboron compound.
17. Explain the photosynthesis process.
18. Give any two synthetic applications of organolithium compounds.
19. What are metalloporphyrins?
20. What is meant by linkage isomerism in coordination compounds?
21. What is Bohr's effect?
22. Explain why tetrahedral complexes are unable to exhibit geometrical isomerism.
23. What are trace elements in bioinorganic chemistry?

24. What is a chelating ligand?
25. What is an ambidentate ligand? Give an example.
26. What are cytochromes?

(8 × 2 = 16 Marks)

PART – C

Answer **any six** questions. Each question carries **4** marks.

27. Discuss the formation of the following complex ions on the basis of VBT :
 - (a) $[\text{Fe}(\text{CN})_6]^{3-}$
 - (b) $[\text{NiCl}_4]^{2-}$.
28. What is binding energy? Calculate the binding energy of helium nucleus in MeV. Mass (in amu) of ${}_1\text{H}^1 = 1.007825$, ${}_0\text{n}^1 = 1.008665$, ${}_2\text{He}^4 = 4.00260$.
29. The activity of C-14 in an old sample of wood is found to be one-fourth of that in a fresh piece of wood. Calculate the age of the wood if the half-life of C-14 is 5730 years.
30. Explain carbon cycle.
31. Calculate age of a uranium mineral that contains 20% w/w ${}^{206}\text{Pb}$. $t_{1/2}$ of ${}^{238}\text{U}$ is 4.5×10^9 years.
32. Biochemistry of iron toxicity.
33. Discuss about the applications of Grignard reagent.
34. Discuss the applications of organometallics in agriculture.
35. Write a short note on the role of chlorophylls in photosynthesis.
36. What are low spin complexes? Explain with suitable examples.
37. Give an account on the applications of coordination compounds in quantitative analysis.
38. Explain the colour of transition metal complexes.

(6 × 4 = 24 Marks)

PART – D

Answer **any two** questions. Each question carries **15** marks.

39. Discuss

- (a) Carbon dating
- (b) Neutron activation analysis
- (c) Modes of radioactive decay.

40. Give a detailed account on the different types of isomerism exhibited by co-ordination complexes.

41. Write a note on

- (a) Nuclear stability.
- (b) Group displacement law.
- (c) Nuclear fusion reaction.

42. Discuss the salient features of the valence bond theory of bonding in coordination compounds. What are the main merits and demerits of VBT?

43. Write a note on :

- (a) Environmental aspects of organometallic compounds.
- (b) Classification of organometallic compounds.
- (c) Applications of organometallics in medicine.

44. Explain the biochemical functions of haemoglobin and myoglobin.

(2 × 15 = 30 Marks)