

Reg. No. :

Name :

Second Semester B.Sc. Degree Examination, September 2022

First Degree Programme Under CBCSS

Chemistry

Complementary Course II for Zoology

CH 1231.4 – INORGANIC CHEMISTRY

(2020 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

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

1. What are organometallic compounds?
2. Give any two examples for organometallic compounds which are used as antitumour drugs.
3. State the Geiger- Nuttal rule.
4. Define binding energy of a nucleus.
5. How are beta particles produced during radioactive decay?
6. Give the denticity of EDTA.
7. Draw the shape of $[\text{Ni}(\text{CO})_4]$.
8. Write the coordination number of cobalt in $[\text{Co}(\text{en})_2\text{F}_2]\text{ClO}_4$.

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9. Define metalloporphyrins.
10. Give any two examples for essential and trace elements in biological systems.

(10 × 1 = 10 Marks)

SECTION – B

(Answer any eight questions. Each question carries 2 marks)

11. Mention the applications of organometallic compounds in agriculture.
12. Give any two methods for the preparation of organolithium compounds.
13. What is cis-platin? Give its importance.
14. What do you mean by Frankland reagents? Give examples.
15. Define chelates. Account for their extra stability.
16. Distinguish between high spin and low spin complexes.
17. What are the drawbacks of valence bond theory of coordination compounds?
18. Account for the state of hybridization, magnetic property and geometry of hexaammine chromium(III) ion using VBT.
19. What is the relation between n/p ratio and stability of a nucleus?
20. Define mass defect? Give its significance.
21. Calculate the binding energy per nucleon in Joule for O-16 which has a mass of 15.999410 amu. Mass of a proton = 1.007277 amu, mass of a neutron = 1.008665 amu.
22. How many alpha and beta particles are emitted during the conversion of Np-237 to Bi-209?
23. Distinguish between aerobic and anaerobic respiration.

24. What is the importance of trace and essential elements in biological systems?
25. Explain the term iron toxicity.
26. What is meant by carbon fixation? Explain.

(8 × 2 = 16 Marks)

SECTION – C

(Answer any six questions. Each question carries 4 marks)

27. Explain the classification of organometallic compounds.
28. What are the applications of organometallic compounds in medicines?
29. Explain the synthesis and reactions of ferrocene.
30. Illustrate nuclear fission and fusion with the help of suitable examples.
31. An archeological wooden material is subjected to radiocarbon dating. The activity of the sample that is due to ^{14}C is measured to be 11.6 disintegrations per second. The activity of a carbon sample of equal mass from fresh wood is 15.3 disintegrations per second. The half-life of ^{14}C is 5760 years. What is the age of the archeological sample?
32. Outline artificial transmutation and artificial radioactivity using suitable examples.
33. Account for the observation that $\text{K}_3[\text{Fe}(\text{CN})_6]$ is octahedral and paramagnetic while $\text{K}_4[\text{Fe}(\text{CN})_6]$ is octahedral and diamagnetic using VBT of coordination compounds.
34. Discuss the optical and magnetic properties of coordination compounds.
35. Write the IUPAC names of following compounds.
 - (a) $\text{K}_4[\text{Fe}(\text{CN})_6]$
 - (b) $[\text{Cr}(\text{NH}_3)_3(\text{H}_2\text{O})_3]\text{Cl}_3$
 - (c) $[\text{CoCl}_2(\text{en})_2]\text{Cl}$
 - (d) $[\text{Co}(\text{NH}_3)_5\text{NO}_2]\text{SO}_4$

36. Discuss the carbon cycle, along with the steps involved.
37. Distinguish between photosynthesis and respiration.
38. Explain nitrogen fixation. What is the importance of nitrogen fixation?

(6 × 4 = 24 Marks)

SECTION – D

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

39. Discuss the preparation and uses of organomercury, organosilicon and organoarsenic compounds **15**
40. Describe the applications of radioactivity. **15**
41. (a) Outline the principles of ^{14}C dating **8**
(b) What are the environmental aspects of organometallic compounds? **7**
42. Discuss the types structural and stereo isomerism exhibited by coordination compounds using examples. **15**
43. (a) What are the applications of coordination compounds in qualitative and quantitative analysis? Explain **9**
(b) Explain the role of chlorophyll in photosynthesis. **6**
44. (a) Write notes on Haemoglobin and Myoglobin **8**
(b) Discuss the mechanism of O_2 - CO_2 transportation. **7**

(2 × 15 = 30 Marks)