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Reg. No. :

Name :

Fourth Semester B.Sc. Degree Examination, May 2021.

Career Related First Degree Programme under CBCSS

Chemistry

Complementary Course – IV for Biochemistry & Industrial Microbiology

CH 1431.7 – BIOINORGANIC AND ELECTROCHEMISTRY

(2013, 2015 – 18 Admission),

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer all questions. Each question carries 1 mark.

1. Explain Markownikoff's addition with an example.
2. Give the IUPAC nomenclature of the compound $[\text{CoCl}(\text{NO}_2)(\text{en})_2]$.
3. What are nucleophiles? Give one example.
4. Define equivalent conductance.
5. What are electrochemical cells? Give one example.
6. Draw the graph of conductometric titration of strong acid against strong base.
7. What are the important applications of reference electrodes?
8. Explain Bohr Effect.

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9. Give the mass fragmentation of an alkene corresponds to the peak at m/z 42.
10. What are inner d orbital complexes?

(10 × 1 = 10 Marks)

SECTION – B

Short answer type

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

11. How CO_2 transported in the human body?
12. What is electrochemical series?
13. How coordination compounds differ from double salts?
14. What are primary and secondary valance's of central metal atom in a complex?
15. Explain retro Diel's Alder reaction with an example.
16. What are metalloporphyrins? Give one example.
17. Why it is not possible to measure the limiting molar conductivity of a weak electrolyte experimentally?
18. The standard electrode potential for Daniell cell is 1.1V. Calculate the standard Gibbs free energy for the reaction $\text{Zn}_{(s)} + \text{Cu}^{2+}_{(aq)} \rightarrow \text{Zn}^{2+}_{(aq)} + \text{Cu}_{(s)}$.
19. Explain chelate effect with an example.
20. What is meant my standard EMF of the cell?
21. What is Hoffmann elimination?
22. Explain isotopic abundance in mass spectrometry with an example.
23. What is benzyne? How it can be generated?

24. Explain the free radical addition of HBr on unsymmetrical alkene with an example.
25. Define Kohlrausch's law.
26. What is Walden inversion?

(8 × 2 = 16 Marks)

SECTION – C

Short Essay

Answer any six questions. Each question carries 4 marks.

27. $[\text{NiCl}_4]^{2-}$ is paramagnetic while $[\text{Ni}(\text{CO})_4]$ is diamagnetic even though both are tetrahedral geometry. Justify.
28. Differentiate $\text{S}_\text{N}1$ and $\text{S}_\text{N}2$ mechanisms.
29. Write short note on potentiometric titrations.
30. Describe mechanism of dehydration of alcohols.
31. Discuss the different laws associated with electrolysis.
32. What is Saytzeff rule? Explain with an example.
33. What are the major components of a mass spectrometer?
34. Write short note on carbon fixation.
35. Differentiate reversible and irreversible cells with examples.
36. List the various types of structural isomerism possible for coordination compounds, giving one example each.
37. What is SHE? Discuss its application in the determination of electrode potential.
38. Calculate the molar conductance at infinite dilution of NH_4OH given that \wedge°_m for NaCl, NaOH and NH_4Cl are 126.4, 248.1 and 129.8 $\text{ohm}^{-1}\text{cm}^2\text{mol}^{-1}$.

(6 × 4 = 24 Marks)

SECTION – D

Long Essay

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

39. Write an essay on aromatic electrophilic substitution reactions.
40. (a) Derive the Nernst equation for the calculation of EMF of the cell. (10)
- (b) Calculate the EMF of the zinc-silver cell at 25°C when $[Zn^{2+}] = 0.1M$ and $[Ag^+] = 10M$. Given E_{cell}^0 at 25°C 1.56 volt (5)
41. Discuss the fragmentation and characteristic features of mass spectrum of
- (a) Cycloalkanes
- (b) Alcohols.
42. What is transport number? How it can be determined experimentally?
43. What is CFT? Discuss the splitting of d orbitals in octahedral and tetrahedral fields.
44. Explain the biological importance of haemoglobin and myoglobin with possible mechanisms.

(2 × 15 = 30 Marks)