

Exam. Code : 107402

Subject Code : 2213

B.Sc. Bio-Technology 2nd Semester

INORGANIC CHEMISTRY-B

Paper—BT-3

Time Allowed—3 Hours]

[Maximum Marks—40

SECTION—A

All questions are compulsory. Each question carries 1 marks.

1. Give two examples of metal carbonyls which do not obey 18-electron rule.
2. How many bridging carbonyls are present in $\text{Fe}_2(\text{CO})_9$ and $\text{Ir}_4(\text{CO})_{12}$?
3. Draw the structure of dicyclohexano[18] crown-6 and cryptand [3.3.3].
4. Write a short note on ion-cavity concept.
5. Draw the structure of porphyrin.
6. Define tridentate ligands. Give one example.
7. Write chemical equations involved in photosynthesis.
8. What is Hill constant ? What is the significance of this parameter ?

SECTION—B

Attempt any five questions. Each question carries 4 marks.

1. How does infrared spectroscopy help in explaining bonding in metal carbonyls? Can this technique distinguish between the terminal and bridging CO groups in metal carbonyls? Explain.
2. Give two methods to prepare dinitrogen metal complexes. What is the nature of bonding in linear M-N-N group? Also compare the bonding of M-N-N with M-C-O group.
3. What do you understand by phase transfer catalysis? Also discuss its applications.
4. Define cryptand. Give two examples. Also give two methods to prepare cryptands.
5. Derive relationship between stepwise and cumulative stability constants.
6. Explain the following :
 - (a) $[\text{Ni}(\text{en})_3]^{2+}(\text{aq})$ is more stable than $[\text{Ni}(\text{NH}_3)_6]^{2+}(\text{aq})$.
 - (b) $[\text{Fe}(\text{CN})_6]^{3-}$ is more stable than $[\text{Fe}(\text{CN})_6]^{4-}$.
7. Briefly describe the role of zinc containing enzymes in the biological systems.
8. Explain the terms cooperativity effect and Bohr's effect. What explanation is offered for cooperativity effect in hemoglobin?

SECTION—C

Attempt any two questions. Each question carries 6 marks.

1. (a) How will you prepare $\text{Fe}(\text{CO})_5$? Write the possible products obtained when $\text{Fe}(\text{CO})_5$ reacts with :
(i) OH^- and (ii) PPh_3 . 3
- (b) Discuss the 18-e rule. Apply 18-e rule to predict the stability of each of the following complexes :
(i) $[\text{Mn}(\text{CO})_5(\text{C}_2\text{H}_4)]^+$
(ii) $[(\pi\text{-C}_5\text{H}_5)\text{Fe}(\text{CO})_3]$. 3
2. Discuss two methods to prepare crown ethers. Also discuss the factors affecting the selectivity of crown ethers. 6
3. (a) What do you understand by the kinetic and thermodynamic stability of co-ordination metal complexes? 4
- (b) Chelation increases the stability of the complex. Explain. 2
4. Draw and discuss the structure of chlorophyll. Describe the important role played by this biomolecule in biological systems. 6