

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



M.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – NOVEMBER 2019

CH 3813 – COORDINATION CHEMISTRY

Date: 02-11-2019

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

Part-A

Answer ALL questions.

(10 × 2= 20)

1. Mention any three factors affecting the magnitude of Δ_o .
2. What is spectrochemical series? Mention any two significances.
3. What is meant by pi acceptor ligand? Cite an example.
4. Obtain the energy in kJ for $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ showing an absorption maximum at $20,000 \text{ cm}^{-1}$.
5. What is oxidative addition reaction? Give an example.
6. Compare the reactivity of ferrocene, nickelocene and vanadocene. Give reasons.
7. What are the types of charge transfer reactions? Give examples.
8. What is meant by supramolecular assembly?
9. Name any two metalloproteins and specify their functions.
10. Differentiate type I, II and III of copper proteins.

Part-B

Answer any EIGHT questions.

(8 × 5= 40)

11. Calculate CFSE for d^4 and d^8 , low and high spin, octahedral complexes.
12. Explain the variations in ionic size and lattice energy of first row transition elements and their correlation with CFSE.
13. The electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ is asymmetric while it is symmetric for $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$. Account.
14. Explain the synergic effect of metal-ligand bonding in metal carbonyls.
15. Which d^n configurations show quenching of orbital angular momentum if they form octahedral, high and low spin complexes? Give reasons.
16. What is trans effect? Explain the order of halo ligands in the trans effect series.
17. Explain the innersphere and outersphere mechanism of electron transfer reaction of metal complexes.
18. How is ORD study of metal complexes used to predict the absolute configuration of metal complexes?
19. Discuss the bonding in ferrocene.
20. Discuss the types of photochemical reactions with suitable examples.
21. Briefly explain the biological role of cytochromes based on the structure.
22. Discuss the role of metal complexes in photosystem I and II.

Part-C

Answer any **FOUR** questions.

(4 × 10= 40)

23. Discuss the postulates of Crystal field theory and d-orbital splitting of metal with octahedral and square planar geometry.
24. What are spinels and inverse spinels? Predict whether the following oxides as spinel or inverse spinel. (i) ZnFe_2O_4 (ii) NiFe_2O_4
25. Explain the bonding in $[\text{Co}(\text{NH}_3)_6]^{3+}$ using MO theory.
26. How is Orgel diagram used to explain the electronic spectrum of d^1 to d^9 high spin octahedral and tetrahedral complexes?
27. Explain the role of metal complexes as catalyst in the following reaction.
(a) hydroformylation reaction (b) hydrogenation of alkene
28. Discuss the mechanism of oxygen transport.
