QP CODE: 24803033

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Reg No : .....

Name : .....

INTEGRATED MSC DEGREE EXAMINATION, MAY 2024

Seventh Semester

INTEGRATED MSC BASIC SCIENCE-CHEMISTRY

CORE - ICH7CR01 - ADVANCED INORGANIC CHEMISTRY 1

2020 Admission Onwards

0AE86590

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. How does chelate effect influence the stability of complexes?
2. Discuss the evidences for metal-ligand covanlency.
3. Differentiate between the splitting of terms in strong octahedral and strong tetrahedral fields.
4. Define the term "spin-only magnetic moment" and explain its calculation for a given transition metal complex.
5. Which of the complex is more stable and why? [Fe(CN)6]4- and [Fe(CN)6]3-
6. Discuss SN1 CB mechanism in base hydrolysis.
7. Explain the use of the concept Optical Rotatory Dispersion (ORD) in coordination chemistry.
8. Explain the principle behind the use of lanthanide complexes as shift reagents in NMR spectroscopy.
9. How does hydroxylation differ from dehydrogenation in the functionalization of alkanes and arenes? Provide a brief explanation.
10. Discuss the role of transition metal catalysts in the borylation of arenes and provide an example of a commonly used catalyst.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Write a note on the sigma and pi bonding character of the ligand NO.
12. Explain the JahnTeller distortion in [Cu(H2O)6]2+.

13. How do electronic spectra, IR spectra, and magnetic moments complement each other in the structural elucidation of cobalt and nickel complexes?

14. Explain Marcus theory.

15. How do electronic factors influence the formation of linkage isomers?

16. Describe the magnetic properties exhibited by lanthanide and actinide complexes.

17. Explain the mechanism of palladium-catalyzed oxidative coupling reactions for the formation of cyclic compounds. Highlight the role of palladium catalysts in mediating C-C bond formation and ring closure.

18. Calculate the crystal field stabilisation energies for a d8 system in octahedral and tetrahedral complexes.Which is more stable?

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Set up the MO energy level diagram for an octahedral complex involving both sigma and pi bonding.

20. Investigate the electronic spectra of complexes with lower symmetries, emphasizing the challenges and nuances involved in interpreting such spectra. Discuss the modifications and considerations required for complexes with lower symmetries compared to those with higher symmetries. Additionally, explore the significance of charge transfer spectra and luminescence spectra in the context of transition metal complexes, providing examples to illustrate their importance and applications.

21. Explain the kinetics and mechanism of substitution reactions in octahedral complexes.

22. Examine the role of solvent and reaction conditions in asymmetric catalysis. Discuss how solvent choice and reaction parameters affect the efficiency and selectivity of asymmetric reactions.

(2×5=10 weightage)