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TM244549U

Reg. No :.....

Name :.....

MASTER'S DEGREE (C.S.S) EXAMINATION, MARCH 2024

2022 ADMISSIONS REGULAR

SEMESTER IV -M. Sc. Chemistry

CH4E01TM20 - Advanced Inorganic Chemistry

Time : 3 Hours **Maximum Weight : 30**

Part A

I. Answer any Eight questions. Each question carries 1 weight **(8x1=8)**

1. Diagrammatically represent the Molecular Orbital Energy levels for an Octahedral complex involving sigma bond contribution from ligands.
2. The reducible representation of tetrahedral point group is A1+T2 .Using character table of Td point group determine the possible hybridizations.
3. State and explain Kramer's rule in EPR spectroscopy
4. Describe the process of nitrogen fixation.
5. Recall the disadvantages of using nanomaterials.
6. Discuss sol-gel method for the synthesis of ZnO nanoparticles.
7. Illustrate a method for the synthesis of gold nanoparticles by chemical and green method.
8. Outline the classification of hybrid composites.
9. Discuss how surface area and porosity are important with regard to MOFs.
10. Illustrate with examples inorganic tubes, polygons and cages.

Part B

II. Answer any Six questions. Each question carries 2 weight **(6x2=12)**

11. Explain the method of descending symmetry.
12. Construct SALC in tetrahedral complexes.
13. Outline d-d transition selection rules in electronic spectra.
14. Define g value. Identify the factors effecting g value. Explain the determination of g value in EPR spectroscopy.
15. Write a note on the applications of Raman spectra of inorganic species.
16. Describe any one method for the synthesis of following materials a) polymer nanocomposite b) Aluminum oxide nanoparticles c) Silver nanoparticles.
17. Describe different types of clay products.
18. Explain any two methods for the synthesis of MOFs.

Part C

III. Answer any Two questions. Each question carries 5 weight **(2x5=10)**

19. a) Construct the molecular orbital diagram of AB4 molecule with σ bonding. b) Explain the hybridization scheme in tetrahedral molecule with pi bonding.
20. Explain application of infrared spectroscopy in the structural elucidation of coordination compounds.
21. Explain the medical applications of nanomaterials. Identify the advantages and disadvantages of using nanomaterials in medicine.

22. Discuss about the design of metal organic frameworks. Explain post synthetic modification of MOFs by a)Imine condensation b) Amide coupling c) Nano-particle encapsulation