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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 20 23 ONLY)

SUB CODE 23PCY204

REG.NO. :

N.G.M. COLLEGE (AUTONOMOUS): POLLACHI

END-OF-SEMESTER EXAMINATIONS: APRIL AND 2024

COURSE NAME M.Sc. **MAXIMUM MARKS: 75**

SEMESTER II **TIME: 3 HOURS**

INORGANIC CHEMISTRY-II COORDINATION CHEMISTRY

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS. **(K1)**

1. Which of the following geometries leads to the highest crystal field splitting in d-orbitals?
   A. Tetrahedral B. Octahedral C. Square Planar D. Trigonal Bipyramidal
2. What is the primary factor influencing the magnitude of the crystal field splitting in a coordination complex?
   A. Nature of ligands B. Metal oxidation state C. Temperature D. Coordination number
3. What is the primary thermodynamic aspect of complex formation?
   A. Enthalpy change B. Entropy change C. Gibbs free energy change D. Internal energy change
4. Inert complexes exhibit substitution reactions with:
   A. Fast rates B. Slow rates C. No substitution D. Unpredictable rates
5. In outer sphere electron transfer reactions, which of the following factors does NOT influence the reaction rate?
   A. Solvent polarity B. Temperature C. Nature of the bridging ligand D. Concentration of reactants

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES **(K2)**

6. What is the spectrochemical series?
7. Define Orgel correlation diagrams
8. Show the primary purpose of the spectrophotometric method in studying complexes?
9. Expand labile complexes and provide an example.
10. Explain the Marcus-Hush theory.

SECTION – B (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. **(K3)**

11. a) Discuss the factors that affect the value of 10Dq (CFSE) in transition metal complexes.

(OR)

b) Explain the concept of site selections in spinels and antispinels.

12. a) Examine the selection rules for electronic spectra in transition metal complexes.

(OR)

b) Describe the key features of the nephelauxetic series and its relevance in transition metal complexes**.**

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13. a) Discuss the methods for determining the stability constant and composition of complexes

(OR)

b) List the basic principle of the spectrophotometric method .

14. a) Apply the mechanistic pathways (Associative, Dissociative, and SNCB) for substitution reactions.

(OR)

b) Interpret the trans effect in square planar complexes.

15. a) Compare outer sphere and inner sphere electron transfer reactions in octahedral complexes.

(OR)

b) Find the photo-redox reactions in coordination complexes and provide an example.

SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K4 (Or) K5)

16. a) Describe the CFSE for high spin and low spin complexes

(OR)

b) Elaborate on the Jahn-Teller effect and its consequences in transition metal complexes.

17. a) Discuss the concept of the Sugano-Tanabe energy level diagrams and their application.

(OR)

b) summarize the factors influencing these parameters and their role in determining the electronic structure of the complexes.

18. a) Elaborate on methods for the determination of stability constants and composition of complexes.

(OR)

b) Determined the phenomenon of quenching of orbital magnetic moments in metal complexes.

19. a) Compare and contrast the acid and base hydrolysis of octahedral complexes.

(OR)

b) Outline the applications trans effect in complexes

20. a) Point out the role of the bridging ligand in inner sphere electron transfer reactions.

(OR)

b) Discuss the applications and mechanisms of photo-substitution and photo-isomerization reactions in coordination complexes.