

Exam. Code : 210402

Subject Code : 4249

M.Sc. Chemistry 2nd Semester

REACTION MECHANISMS AND METAL CLUSTERS

Paper—Course-XI

Time Allowed—Three Hours] [Maximum Marks—50

Note :—Attempt a total of **FIVE** questions, selecting at least **ONE** question from each section while **fifth** can be chosen from any Section. All questions carry equal marks.

SECTION—A

1. What is trans effect ? Which theory of trans effect satisfactorily explains the following order of trans effect of inert ligands :



Discuss in detail how will it determine the formation of cis and trans isomers of $[Pt(NH_3)_2Cl_2]$? Discuss the various routes. 10

2. (a) What do you understand by labile and inert complexes ? Show that inertness of a complex is different from its thermodynamic stability. 4
- (b) Explain acid hydrolysis and dissociative conjugate base hydrolysis. 6

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SECTION—B

3. (a) Explain in detail the outer sphere reactions. 5
(b) Give an example of reaction occurring partly through outer-sphere path and partly through inner-sphere path. 2
(c) Explain the path followed by reduction of $[\text{Co}(\text{acac})_2\text{en}]^+$ by $\text{Cr}^{+2}(\text{aq})$. 3
4. (a) Give a detail account of ligand-bridge electron transfer reactions. 5
(b) Discuss briefly Marcus cross-relation and its significance in explaining outer sphere reactions. 5

SECTION—C

5. (a) Define stereochemical non-rigidity and explain it in complexes with C.N. 5. 5
(b) Explain isomerization and racemization of trischelate complexes. 5
6. (a) What do you mean by stepwise and overall formation constant? Derive the relation between stepwise stability constant and overall stability constant for reaction completing in six stages. 5
(b) Explain metal carbonyl scrambling with at least two examples. 5

SECTION—D

7. (a) What are boranes and carboranes ? Give the classification of boranes. 7
- (b) Discuss briefly isopolyanions and heteropolyanions. 3
8. (a) What is isolobal analogy ? Give some applications of isolobal analogy. 5
- (b) Discuss the preparation and structure of tetrasulphur tetranitride. Why is it called thermochromic solid ? 5