

Exam. Code : 210402

Subject Code : 4950

M.Sc. Chemistry 2nd Semester

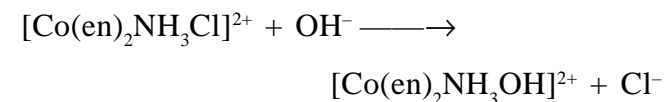
REACTION MECHANISMS & METAL CLUSTERS

Paper : Course-XI

Time Allowed—2 Hours] [Maximum Marks—50

Note :— There are *eight* questions of equal marks.
Candidates are required to attempt any
four questions.

1. (a) Write brief note on :—
 - (i) Dissociative mechanism of substitution reactions.
 - (ii) Interchange mechanism of substitution reactions.
- (b) Suggest appropriate mechanism for the following reaction :



2. (a) Suggest suitable mechanism for substitution reactions of square planar complexes. Also discuss various factors influencing the rate of such reactions.

- (b) Write brief note on substitution reaction of 17 electron species.
3. (a) Explain in detail the outer sphere and inner sphere mechanisms of electron transfer reactions.
- (b) Give one example of ligand exchange reactions via electron exchange. Also suggest suitable mechanism for the reaction.
4. (a) Discuss the main features of Marcus theory of electron transfer reactions.
- (b) Explain suitable mechanism for the following reaction :
- $$[\text{Cr}(\text{H}_2\text{O})_6]^{2+} + [\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+} \longrightarrow$$
- $$[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]^{2+} + [\text{Co}(\text{H}_2\text{O})_6]^{2+} + 5\text{NH}_4^+$$
5. (a) Write brief notes on :
- (i) Two electron transfer reactions
- (ii) Non-complementary electron transfer reactions.
- (b) Briefly discuss the stereochemical nonrigidity in coordination compounds with coordination number five.
6. (a) How will you determine the binary formation constant using pH meter ?

- (b) What do you understand by the stability of coordination metal complexes ? Explain in detail the factors affecting stability of complex.
7. (a) Give the main points of comparison between benzene and borazine.
- (b) Predict the structures of $\text{C}_2\text{B}_4\text{H}_8$, $[\text{B}_{12}\text{H}_{12}]^{2-}$ and $[\text{C}_2\text{B}_9\text{H}_{11}]^{2-}$ with the help of Wade's rules.
- (c) Complete :
- (i) $\text{B}_4\text{H}_{10} + 4\text{OH}^- \longrightarrow ?$
- (ii) $\text{RNH}_3\text{Cl} + \text{BCl}_3 \longrightarrow ? \xrightarrow{\text{NaBH}_4} ?$
- (iii) $[(\text{Cp})\text{Mo}(\text{CO})_3]_2 + (\text{MeAs})_5 \xrightarrow[\text{CHCl}_3]{190^\circ\text{C}} ?$
8. (a) Briefly describe homocyclic inorganic compounds.
- (b) What are high-nuclearity carbonyl complexes ? Describe the procedure for predicting the skeletal structure of HNCCs. Also predict the structures of following carbonyl clusters :
- (i) $[\text{Re}_8\text{C}(\text{CO})_{24}]^{2-}$
- (ii) $[\text{Os}_5(\text{CO})_{16}]$.