

M.Sc. CHEMISTRY
THIRD SEMESTER
INORGANIC CHEMISTRY III
MSC – 303 [SPECIAL REPEAT]
[USE OMR FOR OBJECTIVE PART]

**SET
A**

Duration: 1:30 hrs.

Full Marks: 35

Time: 15 mins.

(Objective)

Marks: 10

Choose the correct answer from the following:

1X10=10

- Which one of the following chelating ligand can use to eliminate harmful radioactive metal from the body forming water soluble complex-
 - NH₃
 - Ethylene diamine
 - Ethylene diamine tetra acetic acid
 - Oxalate
- Which one of the following is called as π -donor and π -acceptor ligand
 - C₂H₂
 - CO
 - NH₂⁻
 - F⁻
- Find the denticity of the given molecules: NH₃, O₂, H₂O
 - Monodentate, Monodentate and Monodentate
 - Monodentate, Tridentate and Bidentate
 - Monodentate, Bidentate and Tridentate
 - Tetradentate, Monodentate and Tridentate
- Explain the order of stability of the following complexes- (A) [M(EDTA)]²⁺, (B) [M(NH₃)₆]²⁺ and (C) [M(en)₃]²⁺
 - A>B=C
 - A>B>C
 - A>B<C
 - A<B<C
- Substitution reaction of trans-[Pt A₂LX] complex gives-
 - Trans product
 - Cis product
 - Mixture of Cis- and Trans product
 - None of the above
- Ziegler-Natta catalyst consists of
 - Solution of TiCl₃ and Al(C₂H₅)₃ in hydrocarbon solvent
 - Solution of TiCl₄ in hydrocarbon solvents in presence of Al(C₂H₅)₃
 - TiCl₃ and (C₃H₇)₃
 - None of the above
- The general mechanism of cobalt carbonyl catalysed hydroformylation reaction was proposed by
 - Heek and Breslow
 - Waker
 - Monsanto
 - None of the above

8. The reactions of benzene are mainly electrophilic substitution, but as coordinated ligand, it undergoes
- a. Free radical reaction
 - b. Nucleophilic substitution
 - c. Redox reactions
 - d. None of the above
9. The associatively activated substitution even in 18- electron complex with NO ligand is feasible *because*
- a. The linear NO ligand switches to angular NO ligand
 - b. The angular NO ligand switches to linear NO ligand
 - c. It becomes a 22- electron system
 - d. None of the above
10. 1,2 insertion reaction
- a. Takes place with the reduction in the oxidation number of the metal
 - b. It is reverse of β -hydride elimination
 - c. It is migratory insertion
 - d. None of the above

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(Descriptive)

Time : 1 hr. 15 mins.

Marks : 25

[Answer question no.1 & any two (2) from the rest]

1. a. Explain the two factor that affecting on stability of Chelating ligand complex. Give one example for each. 3+2=5
b. Give an account of the steps involved in the Fisher-Trops reaction.
2. a. Explain how nature of leaving group affects on SN² reaction of square planar complex with one example. 3+2+1+5=10
b. Define the term anation reaction with one example.
c. Define acid hydrolysis. Discuss the mechanism of acid hydrolysis with diagrammatic representation of dissociation.
3. a. Define the term macrocyclic ligand. Draw the Structure of Crown-6. 2+3+3+2=10
b. Why [Ni(en)₃]²⁺ is 10¹⁰ times more stable than [Ni(NH₃)₆]²⁺ ?
c. Write down the sequence of elementary steps that are involved in the following reactions-
- $$[\text{Co}(\text{NH}_3)_5\text{CO}_3]^+ + \text{H}_3^{18}\text{O}^+ \longrightarrow [\text{Co}(\text{NH}_3)_5\text{H}_2\text{O}]^+ + 2\text{H}_2^{18}\text{O} + \text{CO}_2$$
- d. Write a short note on Polyether.
4. a. Discuss briefly Waker Oxidation with the specific role played by Pd(II) salt. 5+5=10
b. Outline the plausible mechanism for the Zeigler-Natta Process by Cossee and Arlman. How was this view supported?
5. a. What is oxidative addition? How does it differ from reductive elimination? 4+3+3=10
b. Discuss the conditions under which benzene undergoes nucleophilic substitution.
c. Give a brief account of carbonylate complexes as nucleophile.

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