

[4]

OR

Discuss the following reactions with examples :

- (a) Anation reactions (b) Cross reactions

UNIT-II

- Q. 2.** (a) Discuss the electronic spectra of $[V(H_2O)_6]^{3+}$
(b) Discuss the spin selection rules for d-d transitions.

OR

Write a note on spin-free and spin-paired equilibria in octahedral complexes with examples.

UNIT-III

- Q. 3.** Discuss the preparation, nature of bonding and structure features of diene complexes.

OR

Discuss the following important properties of transition metal hydride complexes –

- (a) Acidic- Basic character (b) Reaction with ethylene
(c) Reaction with CO_2 (d) Reaction with O_2

UNIT-IV

- Q. 4.** What are alkyldiene complexes? Discuss the structure and bonding of Fischer carbene complexes in detail with orbital diagrams.

OR

What do you mean by fluxional molecule? Explain with examples. Discuss fluxional behaviour of dienyl complexes with suitable examples.

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ROLL NO.....

CHE. 201/21

II SEMESTER EXAMINATION, 2021

M.Sc. (CHEMISTRY)

PAPER-I

TRANSITION METAL COMPLEXE

TIME: 3 HOURS

MAX.- 80

MIN.- 16

Note: The question paper consists of three sections A, B & C. All questions are compulsory.

Section A- Attempt all multiple choice questions.

Section B- Attempt one question from each unit.

Section C- Attempt one question from each unit.

SECTION 'A' **2 × 8 = 16**
Multiple Choice Questions

- Ligand group with minimum trans effect
(a) CN^- (b) C_2H_4 (c) NH_3 (d) H_2O
- If two complexes form a bridged intermediate. the mechanism will be –
(a) Inner-sphere (b) Outer sphere (c) SN_1 (d) SN_2
- Write ground state term for a free ion with d^6 configuration -
- The magnetic moment value of 2.2 BM of complex $[Fe(diph)_3(Clo_4)_3]$ indicates that bonding is -
(a) spin free (b) Spin paired
(c) Both (d) None of these

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5. In the η^3 – allyl group C-C bond lengths are equal due to -----
(fill in the blank)
6. Ferrocene react with Ag^+ or HNO_3 it gets oxidised. Write name and formula of the product.
7. Fill in the blanks –
"The process of fluxionality becomes ----- at low temperature and -----at higher temperature".
8. The correct statement for a Fischer carbene complex is –
(a) the carbene carbon is electrophilic in nature
(b) metal exists in high oxidation state
(c) co-ligands destabilize the complex.
(d) metal fragment and carbene are in the triplet state.

SECTION 'B' $4 \times 6 = 24$

Short Answer Type Questions (Word limit 200-250 words.)

UNIT-I

- Q. 1. Discuss the following with suitable examples –
(a) Labile complexes (b) Inert complexes

OR

Write an explanatory note on Marcus-Hush theory.

UNIT-II

- Q. 2. Draw the Orgel diagrams for d^2, d^8, d^3, d^7 states of transition metal octahedral and tetrahedral complexes.

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OR

Discuss and explain the Nephelauxetic series.

UNIT-III

- Q. 3. Discuss the following chemical properties of metal-allyl complexes with reaction-
(a) Reaction with electrophile
(b) Reaction with nucleophiles

OR

Discuss the method of preparation (any three) of transitional metal hydride complexes.

UNIT-IV

- Q. 4. Discuss the following synthetic routes of transition metal alkyls.
(a) Alkylation by other metal alkyls
(b) Insertion reactions

OR

Write a note on singlet carbene and triplet carbene.

SECTION 'C' $4 \times 10 = 40$

Long Answer questions (Word limit 400-450 words.)

UNIT-I

- Q. 1. What is electron transfer reactions in transition metal complexes? Discuss the mechanisms for electron transfer in Inner sphere type reactions with examples.

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P.T.O.