

Seat No.	
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M.Sc. (Part-I) (NEP) (Semester - I) (CBCS)
Examination, March - 2023
CHEMISTRY
CH.101 : Inorganic Chemistry - I
Sub. Code : 87849

Day and Date : Wednesday, 21-06-2023

Total Marks : 80

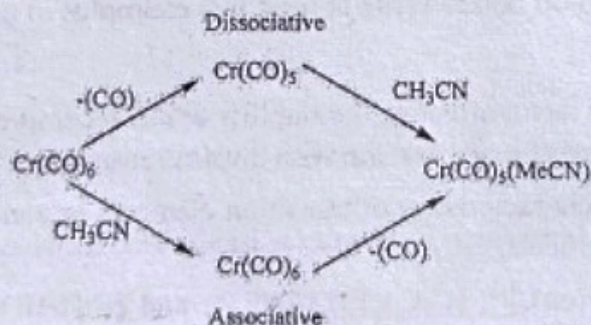
Time : 02.30 p.m. to 05.30 p.m.

- Instructions :
- 1) Attempt in all five questions.
 - 2) Question number one is compulsory.
 - 3) All questions carry equal marks.
 - 4) Attempt any two questions from section-I and any two questions from section-II
 - 5) All sections should be written in the same answer book.
 - 6) Figures to the right indicate full marks.
 - 7) Neat labeled diagram should be drawn wherever necessary.

Q1) Answer the followings :

[16]

- a) The CFSE for a low-spin octahedral complex of a d^7 ion is _____ Δ_o .
- b) What hapticities are possible for benzene?
- c) Give condition to be satisfied by a metal to act as a catalyst?
- d) Among following which ion has highest paramagnetic character?
(a) Mn^{2+} (b) Cr^{3+} (c) Sc^{3+} (d) Cu^{2+}
- e) What is the co-ordination number in octahedral geometry?
- f) The EAN for iron in $Fe(CO)_5$ is _____.
- g) Which path is probable for the following reaction (Use 18e rule)?



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- h) The kinetic stability of a complex depends on _____.
- i) Why metal complexes of monodentate ligands are less stable than the corresponding complexes of chemically similar polydentate ligands.
- j) What is meant by fission yield?
- k) What is overall stability constant?
- l) What is d-d transition?
- m) "Trimethyl boron is known to be an organometallic compound". Why?
- n) The $\text{Fe}(\text{CO})_5$ on treatment with NaOH gives _____.
- o) Stretching frequency of carbonyl upon complex formation decreases. True or false?
- p) Draw structure of $\text{CO}_2(\text{CO})_8$.

SECTION - I

- Q2)** a) What is hydroformylation reaction? Explain the mechanism of hydroformylation reaction of but-1-ene using $\text{CO}_2(\text{CO})_8$ as catalyst. [8]
- b) Write equations of overall stability constants and stepwise stability constants for forming complexes up to ML_4 . Write a relation between them. [4]
- c) Give examples of Lewis base derivatives of carbonyls. [4]
- Q3)** a) Discuss the various methods for preparing metal carbonyl compounds with suitable examples. [8]
- b) Explain in details the factors affecting crystal field stabilization energy value with illustrations. [4]
- c) How will you classify organometallic compounds on the basis of nature of metal-carbon bond? Write at least two examples of each class. [4]
- Q4)** a) Describe the factor affecting the stability of metal complexes with special reference to nature of metal ion with illustrations. [8]
- b) Discuss the characteristics of transition elements in comparison to non-transition elements. [4]
- c) Arrange $[\text{Cr}(\text{en})_3]^{3+}$, $[\text{CrCl}_6]^{3-}$, $[\text{CrF}_6]^{3-}$, and $[\text{Cr}(\text{NH}_3)_6]^{3+}$ in order of increasing stability with reason. [4]

SECTION-II

- Q5) a)** Discuss the general characteristics of the d-block elements with respect to the electronic configuration, magnetic properties, colour and complex formation. [8]
- b) What is nuclear reaction? How do they differ from chemical reaction? [4]
- c) What is 18-electron rule? How counting of electron in a compound is one on the basis of different methods? [4]
- Q6) a)** What is Jahn Teller distortion? Explain Jahn Teller distortion in Octahedral complexes with suitable examples? [8]
- b) Outline chemical properties of metal carbonyl compounds. [4]
- c) What is Q-value? What are types of nuclear transformations? [4]
- Q7) Write note on any three of the following:** [16]
- a) Synthesis of metal cyanide complexes.
- b) Thermodynamic stability versus kinetic stability
- c) Oxidative Addition reaction
- d) Carbonyl Hydrides.
- e) Isomerization and polymerization.

