

Instructions to candidates

Duration: One (01) hour

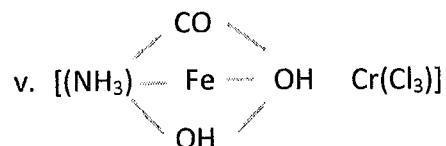
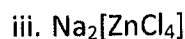
Number of questions: Two (02)

Answer all questions

Total mark allocation: 200 marks



1. a. Name following chemical structures according to IUPAC nomenclature.



(50 Marks)

b. Draw following structures

i. Pentaamminechlorocobalt(III) chloride

ii. Hexaaquairon(III) nitrate

iii. cis-dichlorobis(ethylenediamine)ruthenium(II)

iv. μ -Hydroxobis(pentaamminechromium(III)) chloride

v. Trans [bischlorobisethylenediamine cobalt (III)]

(50 Marks)

2. a. i. Write two major assumptions that you study under crystal field theory?

ii. What are the sub shells of M orbit in an atom?

iii. What are the co-sub shells of d sub shell?

iv. What will happen to the co-sub shells of a metal atom when six ligands bring toward the metal atom along the x,y,z axis?

v. Which co-sub shells of metal atom acquire higher energy in Octahedral field?

vi. Define the crystal field splitting energy of an Octahedral metal complex, illustrating the diagram, with respect to the spherical field.

vii. What are the parameters that depend crystal field splitting energy?

viii. Write the equation for Crystal field stabilizing energy of a metal complex in an Octahedral field, and define all the terms in the equation.

ix. Write the equation for Crystal field stabilizing energy of a metal complex in a Tetrahedral field, and define all the terms in the equation.

x. What is the relationship between Δ_{Oct} and Δ_{Tet} for metal complexes formed from same Ligands and same metal center.

(50 Marks)

b. Suggest the energy diagram of $[\text{Mn}(\text{H}_2\text{O})_6]^{3+}$ and $[\text{Mn}(\text{CN})_6]^{3-}$, using crystal field theory and calculate the crystal field stabilizing energy for each case as a function of Δ_{Oct} (Mn^{3+} ion has four electrons).

(50 Marks)