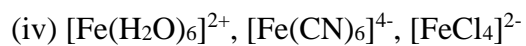
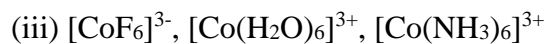
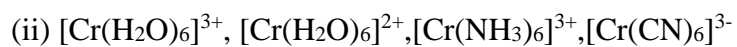
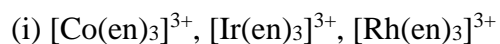


1. Identify the species present in aqueous solution of potash alum upon dissociation.
2. Predict the type(s) of isomerism shown by the following complexes. Also draw the structures or formula of the possible isomers.
 - (a) $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$
 - (b) $[\text{Co}(\text{NH}_3)_4(\text{NO}_2)\text{Cl}]\text{Cl}$
 - (c) $[\text{Pt}(\text{NH}_3)(\text{py})(\text{Cl})(\text{Br})]$ (py = pyridine)
 - (d) $[\text{Co}(\text{en})_3]\text{Cl}_3$ (en = ethylenediamine)
 - (e) $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_6]$
 - (f) $[\text{Rh}(\text{PPh}_3)_2(\text{CO})(\text{NCS})_2]$
 - (g) $[\text{Cr}(\text{NH}_3)_6][\text{Cr}(\text{SCN})_6]$
3. Draw the possible coordination modes of glycine to a metal ion?
4. Suggest a simple analytical test to distinguish between the hydrate isomers of $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$
Three possible hydrate isomers are $[\text{CrCl}_2(\text{H}_2\text{O})_4]\text{Cl} \cdot 2\text{H}_2\text{O}$, $[\text{CrCl}(\text{H}_2\text{O})_5]\text{Cl}_2 \cdot \text{H}_2\text{O}$, $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$.
5. Draw the geometrical isomers of $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$ and $[\text{Co}(\text{dien})_2]^{3+}$ and appropriately designate them.
6. Draw the possible stereoisomers for $\text{MA}_2\text{B}_2\text{C}_2$. Which one of these have enantiomer.
7. Apply the concept of crystal field theory to a set of *p*-orbitals for a specific interaction along Z-axis. Draw the splitting diagram with labelling and energy values.
8. Consider the coordination complexes (a) NaFeCl_4 and (b) $\text{K}_4[\text{Fe}(\text{CN})_6]$, and answer the following questions. Atomic number of Fe = 26.
 - (a) Show the crystal field splitting diagram with appropriate labelling and filling up of the electrons in these orbitals.
 - (b) Calculate the Crystal Field Stabilization Energy (CFSE) for both the compounds (you may ignore the pairing energy).
 - (c) Calculate the spin only magnetic moments for both the complexes.

9. Which of the following complexes will have larger crystal field splitting (Δ) in the given series? Give exact explanation for your choice.



10. The complexes $[\text{NiCl}_2(\text{PPh}_3)_2]$ and $[\text{PdCl}_2(\text{PPh}_3)_2]$ are paramagnetic and diamagnetic respectively. Predict their structures from this observation.