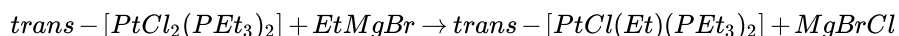


## 9.6: Chapter 6

### 6.1

Oxide ions are weak-field ligands and transition metal ions assume high-spin states.  $\text{Fe}^{3+}$  ions have  $d^5$  electron configurations and the LFSE is zero either in the octahedral or in tetrahedral coordination. On the other hand,  $\text{F}^{2+}$  ions tend to enter octahedral holes, because the LFSE for the octahedral coordination by six oxide ligands is larger than the one for tetrahedral coordination by four oxide ligands. This is one of the reasons why magnetite  $\text{Fe}_3\text{O}_4$  has an inverse spinel structure  $\text{B}^{3+}[\text{A}^{2+}\text{B}^{3+}]\text{O}_4$ .

### 6.2

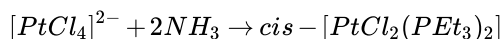
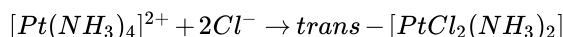


### 6.3

- $\text{CpV}(\text{CO})_4$
- $[\text{CpFe}(\text{CO})_2]_2$

### 6.4

The trans effect of  $\text{Cl}^-$  is larger than that of  $\text{NH}_3$ . Therefore, it is possible to synthesize geometrical isomers selectively by choosing starting compounds.



### 6.5

Unless  $[\text{Cr}^{36}\text{Cl}(\text{NH}_3)_5]^{2+}$  forms by the addition of an isotope ion  $^{36}\text{Cl}$  to the aqueous solution of the reaction  $[\text{CoCl}(\text{NH}_3)_5]^{2+} + [\text{Cr}(\text{OH})_2]^{2+} \rightarrow [\text{Co}(\text{OH})_2(\text{NH}_3)_5]^+ + [\text{CrCl}(\text{OH})_2]^{2+}$ , it is concluded that the chloride ion coordinated to cobalt transfers to chromium by the inner-sphere mechanism via a bridged structure  $[(\text{NH}_3)_5\text{-Co-Cl-Cr}(\text{OH}_2)_5]^{4+}$ .

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