Oxtoby Chapter 8 Assignments

Chapter Summary Topics

- ✓ Crystal field theory and *d*-orbital splitting by geometry of the coordination complex
- ✓ Spectrochemical series of ligands and predicting magnetic properties of coordination complex

Chapter Problems

8-55. Three different compounds are known to have the empirical formula $CrCl_3 \cdot 6H_2O$. When exposed to a dehydrating agent, compound 1 (which is dark green) loses 2 mol water per mole of compound, compound 2 (light green) loses 1 mol water, and compound 3 (violet) loses no water. What are the probable structures of these compounds? If an excess of silver nitrate solution is added to 100.0 g of each of these compounds, what mass of silver chloride will precipitate in each case?

8-57. Cobalt(II) forms more tetrahedral complexes than any other ion except zinc(II). Draw the structure(s) of the tetrahedral complex $[CoCl_2(en)]$. Could this complex exhibit geometric or optical isomerism? If one of the Cl^- ligands is replaced by Br^-, what kinds of isomerism, if any, are possible in the resulting compound?

8-59. A coordination compound has the empirical formula $PtBr(en)(SCN)_2$ and is diamagnetic.

A. Examine the *d*-electron configurations on the metal atoms, and explain why the formulation $[Pt(en)_2(SCN)_2][PtBr_2(SCN)_2]$ is preferred for this substance.

B. Name this compound.

8-65. The complex ion $CoCl_4^{2-}$ has a tetrahedral structure. How many *d* electrons are on the Co? What is its electronic configuration? Why is the tetrahedral structure stable in this case?

8-66. In the coordination compound $(NH_4)_2[Fe(OH_2)F_5]$, the Fe is octahedrally coordinated.

A. Based on the fact that F^- is a weak-field ligand, predict whether this compound is diamagnetic or paramagnetic. If it is paramagnetic, tell how many unpaired electrons it has.

B. By comparison with other complexes reviewed in this chapter, discuss the likely color of this compound.

C. Determine the *d*-electron configuration of the iron in this compound.

D. Name this compound.