

Ch. 15: Let's Get Coordinated!!! Lewis Acids and Bases and Coordination Complexes

Lewis Acids/Bases

I. Remember:

- A. Lewis acids are
- B. Lewis bases are

II. Quick points:

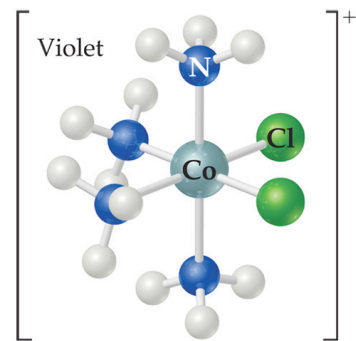
- A. The
- B. This

III. Predicting Lewis Acid/Base Reactions

- A. This should be a _____ . If the reaction that you see doesn't fit any that you have seen before, it's probably this one.
- B.
- C.

IV. Examples:

- A. Boron trichloride gas and ammonia are mixed.
 - 1.
- B. Phosphine (phosphorus trihydride) gas is bubbled into liquid boron trifluoride.
 - 1.



Coordination Complexes

I. Re: Transition Metals

- A. This
- B.
 - 1. _____ must fit two criteria
 - a.
 - b.

2. This complex ion, along with with another ion, form

3. Common ligands:

C. Examples:

- 1. $\text{Fe}(\text{CN})_6^{3-}$
- 2. $\text{Mn}(\text{H}_2\text{O})_4^{2+}$

II. Predicting complex ions

- A. Analyze your reactants:
 - 1. One reactant must be a _____
 - 2. The other reactant must be a _____

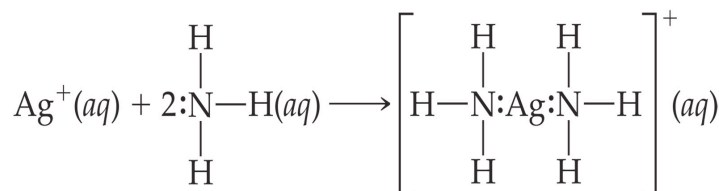
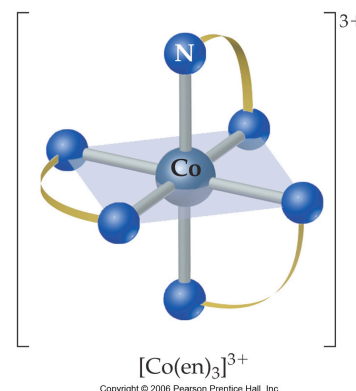
- B.
- C. The _____ to the metal

- D.
- E. Examples:

- 1.
- 2.

III. Naming coordination compounds.

- A. Name



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B. When naming a complex ion:

1.
 - a. Replace the ending of the ligand with an "-o" if the ligand is negative
 - b. If the ligand is neutral, name the ligand as is.
 - c. Exceptions:
2. Use mono, di, tri, etc. to communicate the # of ligands.
3. Then look at the charge of the ion
 - a. If positive, name the metal ion as usual (don't forget Roman numerals!)
 - b. If the complex ion has a negative charge, replace the ending with "-ate"
 - i. exceptions: iron=ferrate; copper=cuprate; silver=argentate; gold=aurate
4. Name the rest of the compound as usual.

C. Examples:

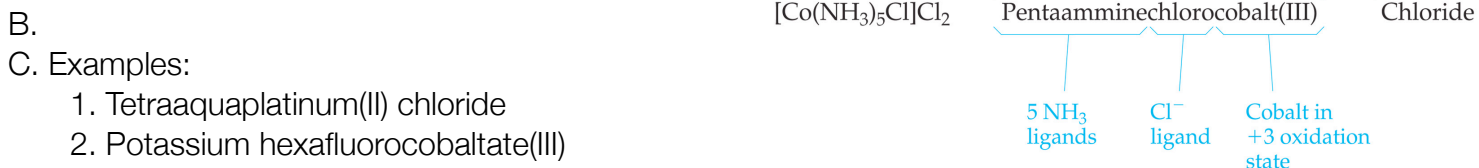
1. $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$
2. $\text{K}_3[\text{Fe}(\text{CN})_6]$

D. Two things to look out for:

- 1.
- 2.

IV. Writing coordination complex formulas:

A. Be AWARE of them...



V. Predicting products

A. If you see the following ligands as a reactant,

- 1.
2. Examples:
 - a. An excess of potassium hydroxide solution is added to a solution of aluminum sulfate.
 - i.
 - b. Aqueous ammonia is added to solid silver chloride
 - i.
 - c. A solution of ammonium thiocyanate is added to a solution of iron (III) chloride.
 - i.
 - d. Solid aluminum nitrate is dissolved in water
 - i.

B.

1. Excess dilute nitric acid is added to a solution containing tetraamminecadmium(II) ion.
 - a.
2. Dilute hydrochloric acid is added to a solution of diamminesilver(I) nitrate.
 - a.

C.

1. Excess concentrated potassium hydroxide solution is added to a precipitate of zinc hydroxide.
 - a.

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2. Sodium hydroxide solution is added to a precipitate of aluminum hydroxide in water.

a.

VI. Colors you will need to memorize

A. Transition metals for colored solutions

1. Memorize the ion colors that are on your color sheet
2. Focus on
3. Memorize the two redox color changes as well.

B. Know the precipitate colors

