**The Solubility Rules**

1. Alkali metal (Group IA) compounds are soluble.   
  
2. Ammonium (NH4+) compounds are soluble.   
  
3. Nitrates (NO3-), chlorates (ClO3-), and perchlorates (ClO4-) are soluble.   
  
4. Most hydroxides (OH-) are insoluble.

The exceptions are the alkali metal hydroxides and Ba(OH)2.   
Ca(OH)2 is slightly soluble.

5. Most chlorides (Cl-), bromides (Br-) or iodides (I-) are soluble.

The exceptions are those containing Ag+, Hg+2, and Pb+2.

6. Carbonates (CO3-2), phosphates (PO4-3) and sulfides (S-2) are insoluble.

The exceptions are the alkali metals and the ammonium ion.

7. Most sulfates (SO4-2) are soluble.

CaSO4 SrSO4 and Ag2SO4 are slightly soluble.   
BaSO4, HgSO4 and PbSO4 are insoluble.

**An Example of Identifying a Precipitate**   
  
A solution of barium chloride is mixed with a solution of potassium sulfate and a precipitate forms. Write the reaction and identify the precipitate.   
  
Barium chloride and potassium sulfate are both ionic compounds. We would expect them to undergo a double displacement reaction with each other. 

BaCl2 + K2SO4 http://dept.harpercollege.edu/chemistry/chm/100/dgodambe/thedisk/chemrxn/arrow.jpg BaSO4 + 2 KCl

By examining the solubility rules we see that, while most sulfates are soluble, barium sulfate is not. Because it is insoluble in water we know that it is the precipitate. As all of the other substances are soluble in water we can rewrite the equation. 

BaCl2(aq) + K2SO4(aq) http://dept.harpercollege.edu/chemistry/chm/100/dgodambe/thedisk/chemrxn/arrow.jpg BaSO4(s) + 2 KCl(aq)