Solubility Rules

1. All common compounds of Group I and ammonium ions are soluble.
2. All nitrates, acetates, perchlorates and chlorates are soluble.
3. All binary compounds of the halogens (other than F) with metals are soluble, except those of Ag^{+}, Hg^{+}, and Pb^{+2}. Pb^{+2} halides are soluble in hot water.)
4. Ag^{+} salts are insoluble except those of rule 1 and 2 above.
5. All sulfates are soluble, except those of Ba^{2+}, Sr^{2+}, Ca^{2+}, Pb^{2+}, Ag^{+}, and Hg^{+} . The latter three are slightly soluble.
6. Except for rule 1, carbonates, hydroxides, sulfites, oxides, silicates, chromates and phosphates are insoluble.
7. Sulfides are insoluble except for Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}, and rule 1.

Gases

It is very helpful to be able to recognize the formulas for those gases that may be used or produced during the course of a chemical reaction. The way to indicate that a compound is a gas when you write a chemical equation is to place (g) after the formula, such as $HCl_{(g)}$.

Here is a list of some of the more common gases:

F_2, Cl_2, H_2, N_2, O_2, SO_2, SO_3, CO, CO_2, H_2S, NO, NO_2,

NH_3, P_2O_3, P_2O_5, SiF_4, HCl, HBr, HI, HF, N_2O_5, N_2O_3, N_2O

H_2CO_3 decomposes to CO_2 and H_2O. H_2SO_3 decomposes to SO_2 and H_2O. NH_4OH decomposes to NH_3 and H_2O

This table summarizes the solubility rules above

Compounds	Solubility
Group I and NH_4^{+}	Soluble
Salts of NO_3^{-}, acetates, ClO_3^{-} and ClO_4^{-}	Soluble
Salts of Cl^{-}, Br^{-}, I^{-}	Soluble except Ag^{+}, Pb^{2+}, and Hg_2^{2+}
Ag^{+} salts	insoluble
SO_4^{2-} salts	Soluble except Ag^{+}, Pb^{2+}, and Hg_2^{2+}, Ca^{2+}, Ba^{2+} Sr^{2+}
OH^{-}	InSoluble
S^{2-}	Insoluble except grp I and II
CO_3^{2-}, CrO_4^{2-}, PO_4^{3-} , oxalates and F^{-}	Insoluble