Solubility Rules

SOLUBLE COMPOUNDS	EXCEPTIONS
Almost all salts of Na^+, K^+, NH_4^+	
Salts of nitrate, NO_3^- chlorate, ClO_3^- perchlorate, ClO_4^- acetate, $CH_3CO_2^-$	
Almost all salts of Cl^-, Br^-, I^-	Halides of Ag^+, Hg_2^{2+}, Pb^{2+}
Compounds containing F^-	Fluorides of Mg^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}, Pb^{2+}
Salts of sulfate, SO_4^{2-}	Sulfates of Ca^{2+}, Sr^{2+}, Ba^{2+}, Pb^{2+}

INSOLUBLE COMPOUNDS	EXCEPTIONS
Most salts of carbonate, CO_3^{2-} phosphate, PO_4^{3-} oxalate, $C_2O_4^{2-}$ chromate, CrO_4^{2-}	Salts of NH_4^+ and the alkali metal cations
Most metal sulfides, S^{2-}	
Most metal hydroxides and oxides	$Ba(OH)_2$ is soluble

How to determine if an ionic compound is soluble or insoluble:

- Identify the two ions
- Check the "solubility rules"
  - Soluble ions with no "exceptions" never form precipitates
  - If one of the ions is insoluble, the compound is insoluble
  - Make sure to check for "exceptions"
    - Example: K_2CO_3
  - If a reaction product is insoluble, it will form a precipitate

Are these compounds soluble or insoluble?

1. $NaNO_3$
2. $FeCl_3$
3. $Fe(OH)_3$
4. $BaSO_4$
5. $AgNO_3$
6. $AgCl$
7. K_3PO_4
8. $Fe_3(PO_4)_2$
9. $PbCl_2$
10. $FeSO_4$
11. $(NH_4)_2S$
12. PbS