

## Solubility Rules

1. All common compounds of Group I and ammonium ions are soluble.
2. All nitrates, acetates, and chlorates are soluble.
3. All binary compounds of the halogens (other than F) with metals are soluble, except those of Ag, Hg(I), and Pb. Pb halides are soluble in hot water.)
4. All sulfates are soluble, except those of barium, strontium, calcium, lead, silver, and mercury (I). The latter three are slightly soluble.
5. Except for rule 1, carbonates, hydroxides, oxides, silicates, and phosphates are insoluble.
6. Sulfides are insoluble except for calcium, barium, strontium, magnesium, sodium, potassium, and ammonium.

*Memorize this: **All sodium, potassium, ammonium, and nitrate salts are soluble in water.***

Common Oxidizers (oxidizing agents)	Products formed
MnO <sub>4</sub> <sup>-</sup> in acidic solution	Mn <sup>2+</sup>
MnO <sub>2</sub> in acidic solution	Mn <sup>2+</sup>
MnO <sub>4</sub> <sup>-</sup> in neutral or basic solution	MnO <sub>2</sub> (s)
Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup> in acidic solution	Cr <sup>3+</sup>
HNO <sub>3</sub> , concentrated	NO <sub>2</sub>
HNO <sub>3</sub> , dilute	NO
H <sub>2</sub> SO <sub>4</sub> , hot, concentrated	SO <sub>2</sub>
metal ions	metal ions with lower oxidation #
free halogens	halide ions (ex. Cl <sup>-</sup> )
Na <sub>2</sub> O <sub>2</sub>	NaOH
HClO <sub>4</sub>	Cl <sup>-</sup>
H <sub>2</sub> O <sub>2</sub>	H <sub>2</sub> O

Common Reducers (reducing agents)	Products formed
halide ions (ex. Cl <sup>-</sup> )	free halogen
free metals	metal ions
SO <sub>3</sub> <sup>2-</sup> (sulfite) or SO <sub>2</sub>	SO <sub>4</sub> <sup>2-</sup> (sulfate)
NO <sub>2</sub> <sup>-</sup> (nitrite)	NO <sub>3</sub> <sup>-</sup> (nitrate)
free halogens, dilute basic solution	hypohalite ions (ex. ClO <sup>-</sup> )
free halogens, conc. basic solution	halate ions (ex. ClO <sub>3</sub> <sup>-</sup> )
metal ions	metal ions with higher oxidation #
H <sub>2</sub> O <sub>2</sub>	O <sub>2</sub>
C <sub>2</sub> O <sub>4</sub> <sup>2-</sup>	CO <sub>2</sub>