

## Solubility Table

**\*\*Soluble = Aqueous (aq)**

**\*\*Slightly or Marginally Soluble = Solid (s)**

1. Nitrate ( $\text{NO}_3^{-1}$ ) salts are soluble.
2. Ammonium ( $\text{NH}_4^{+1}$ ) and Group I Alkali metal ( $\text{Li}^{+1}$ ,  $\text{Na}^{+1}$ ,  $\text{K}^{+1}$ ,  $\text{Cs}^{+1}$ ,  $\text{Rb}^{+1}$ ) salts are soluble.
3. Chloride, Bromide, Iodide ( $\text{Cl}^{-1}$ ,  $\text{Br}^{-1}$ ,  $\text{I}^{-1}$ ) salts are soluble, except for salts with  $\text{Ag}^{+1}$ ,  $\text{Pb}^{2+}$  and  $\text{Hg}_2^{2+}$ .
4. Sulfate ( $\text{SO}_4^{2-}$ ) salts are soluble, except  $\text{Ba}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Pb}^{2+}$ , and  $\text{Hg}_2^{2+}$ .
5. Soluble Hydroxides are  $\text{LiOH}$ ,  $\text{NaOH}$  and  $\text{KOH}$ . Marginally soluble:  $\text{Ba}(\text{OH})_2$ ,  $\text{Sr}(\text{OH})_2$  and  $\text{Ca}(\text{OH})_2$ . The rest are slightly soluble.
6. Carbonates ( $\text{CO}_3^{2-}$ ), Sulfides ( $\text{S}^{2-}$ ), Chromates ( $\text{CrO}_4^{2-}$ ) and Phosphates ( $\text{PO}_4^{3-}$ ) are slightly soluble. (All with ammonium or Group 1 Alkali metals are soluble.)

## Balancing Redox Reactions

- 1) Write the half reactions. (one for oxidation, one for reduction)
- 2) For each half reaction:
  - a) Balance the electrons, by looking at the oxidation number of the elements that are oxidizing or reducing. (Make sure these elements are first balanced! Add  $e^-$  to the side that is the most positive.)
  - b) Balance all other atoms except H and O. ( If necessary, put in other compounds from the original reaction.)
  - c) Balance O by adding  $\text{H}_2\text{O}$ .
  - d) Balance H by adding  $\text{H}^+$ .
  - e) Make sure all elements and charges balance.
- 3) Multiply the half reactions by numbers so that each has the same number of electrons.
- 4) Add half reactions and cancel what you can.
- 5) **If in basic solution:**
  - a) Notice how many  $\text{H}^+$  are left. Add the same amount of  $\text{OH}^-$  as  $\text{H}^+$ , to both sides of the reaction.
  - b) The  $\text{OH}^-$  and  $\text{H}^+$  that are on the same side make  $\text{H}_2\text{O}$ .
  - c) Cancel any  $\text{H}_2\text{O}$  that will cancel.
- 6) Make sure all charges and atoms balance. The End!