Lecture 11B: Balancing Equations

** Remember **

The atoms in a chemical reaction are neither created nor destroyed; they are just rearranged.
Therefore, YOU MUST ACCOUNT FOR ALL ATOMS!

Balancing equations is done by trial and error. However these rules might help:

1. Count the number of atoms of each element in the reactants and products.
   - It might be easier to keep polyatomic ions as a single unit when balancing.
   - ALWAYS write water as **H(OH)**.

2. Use coefficients in <u>front</u> of the formulas to balance equations.
   NEVER change the subscripts!!
   - If no coefficient is written, it is assumed to be 1.
   - Begin by balancing the elements that only appear once on each side. (usually the metal elements)
   - Save oxygen for next to last.
   - Save hydrogen for last.

3. Double check to make sure each atom is balanced.

4. Check to see if the coefficients are in the lowest ratio.

Examples: Rewrite each equation as a balanced equation

1. _____ O_2 + _____ H_2 $\rightarrow$ _____ H_2O

2. _____ Al + _____ N_2 $\rightarrow$ _____ AlN

3. _____ $AgNO_3$ + _____ H_2S $\rightarrow$ _____ Ag_2S + _____ HNO_3

4. _____ MnO_2 + _____ HCl $\rightarrow$ _____ $MnCl_2$ + _____ H_2O + _____ Cl_2

5. _____ $Zn(OH)_2$ + _____ H_3PO_4 → _____ $Zn_3(PO_4)_2$ + _____ H_2O

Balancing Equations – Reactant and Product Trees used for Counting Atoms:

1.

Reactants	Products

2.

Reactants	Products

3.

Reactants	Products

4.

Reactants	Products

5.

Reactants	Products