BALANCING CHEMICAL EQUATIONS

The purpose of balancing chemical equations is to make sure the same number of each element exist as reactants and products. Think of it as people entering and leaving a dance. The same number of people should enter the party as leave the party, but over the course of the party, they might change partners.

Parts of a Chemical Equation:

- $N_2 + \mathbf{3}\,H_2 \rightarrow \mathbf{2}\,NH_3$
  - The blue, bolded numbers that are the same size as the letters are coefficients. These tell you how many of that group there are. If there is no number it is assumed to be the number one.
  - The combination of the letters and the subscript numbers are the chemical formulas. It shows how the elements are arranged. These elements are bonded together.

Suggestions for Balancing Chemical Equations:

- List the number of each element on the reactant side and on the product side
- Change the coefficients (the numbers in front of the chemical formula)

Example:

- For the formation of ammonia, the chemical equation is $N_2 + H_2 \rightarrow NH_3$
  - This equation shows two nitrogens entering the party together and two hydrogens entering the party together
  - But only one nitrogen leaves the party and it leaves with three hydrogens! These numbers don't make sense.

	Reactants	Products
Nitrogen	2	1
Hydrogen	2	3

  - A good method is to focus on the easiest element to "fix" and then go from there. We see that there are 2 nitrogens in the reactants and only one in the products. This can be fixed by multiplying the product contacting nitrogen by 2.
  - The new chemical equation is $N_2 + H_2 \rightarrow 2\,NH_3$

	Reactants	Products
Nitrogen	2	2
Hydrogen	2	6

  Since NH_3 is multiplied by a coefficient of 2 there are now 2 nitrogens and 6 hydrogens. The 6 hydrogens come from the 2 multiplied by the subscript of 3.
  - Here we see that the nitrogens are now equal but there are two hydrogens on the reactants and 6 as products. This can be fixed by multiplying the N_2 in the reactants by a coefficient of 3.

	Reactants	Products
Nitrogen	2	2
Hydrogen	6	6

- o The balanced form of this equation is $N_2 + 3H_2 \rightarrow 2NH_3$
    - ▪ Here we see a total of 2 nitrogens (1 grouping of 2) and 6 hydrogens (3 groupings of 2) entering and the same number leaving (2 of a group containing 1 nitrogen and 3 hydrogen)