BALANCING EQUATIONS

Here we will look at how to "balance"an equation. Let's look at the following example:

$$H_2 + O_2 + H_2O$$
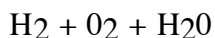
On the reactant side of the equation there are 2 H's; on the product side there are also 2. We would say that the hydrogen atoms are balanced... there are equal numbers on each side.

Now let's look at the 0's. There are two O's on the reactant side of the equation; however there is only one 0 on the product side. Since atoms can't just vanish, the reaction can not occur as written... it must be <u>balanced</u>.

We can not change the subscripts (the little numbers following the symbols, because that would change the chemicals involved) we can only add what we call coefficients. Here is how we would balance the above equation.

STEP 1

First we need to get 2 O's on the right (because we have 2 O's on the reactant side). We can get 2 O's on the right by adding a coefficient of 2 in front of the H_2O.

$$H_2 + O_2 + 2 H_2O$$
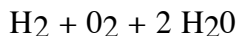
The 2 tells us to double everything that follows it. The $2H_2O$ means that we now have 4 H's and 2 O's in the H_2O. This balances the number of O's on each side.

STEP 2

The O's are now balanced, but by putting the 2 in front of the H_2O we have caused the H's to become

unbalanced. We have 4 H's on the right and only two on the left. To solve this problem we will simply put a coefficient of 2 in front of the H_2 giving us:

$$2 H_2 + O_2 -----> 2 H_2O$$
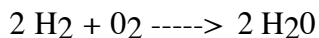
Now the equation is balanced. This is an informed trial and error method of balancing a chemical equation.

STUDENT PRACTICE

KEY POINT:

When balancing chemical equations remember; you can only add or change coefficients... ***NEVER THE SUBSCRIPTS.***

1. Balance each of the following reactions:

$$N_2 + O_2 -----> NO_2$$

$$Ag + S -----> Ag_2S$$

$$Mg + HCl -----> MgCl_2 + H_2$$

$$Al + O_2 -----> Al_2O_3$$

$$CH_4 + O_2 -----> CO_2 + H_2O$$

$$O_2 -----> O_3$$

$$H_2SO_4 + NaOH -----> Na_2SO_4 + H_2O$$