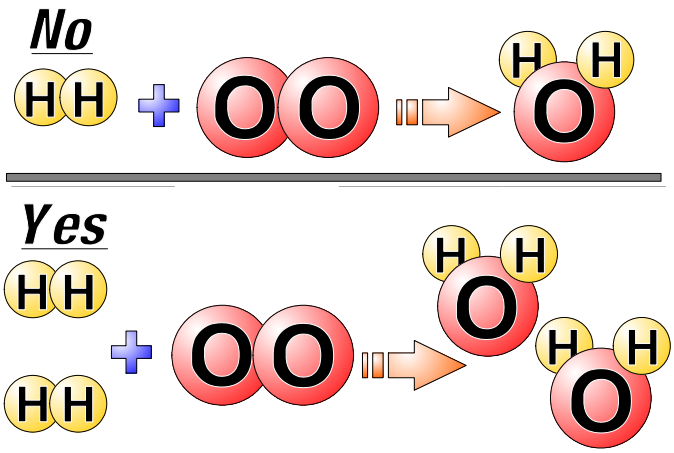
Balancing Equations

During a chemical change, there is no change in mass. A properly written chemical equation shows this. The equation below is not properly written. It does not show conservation of mass.

$$H_2 + O_2 \rightarrow H_2O$$
$$2 + 32 \neq 18$$



$$2H_2 + O_2 \rightarrow 2H_2O$$
$$2(2) + 32 = 2(18)$$

The reason the equation doesn't work is simple. There are two atoms of oxygen in the reactants, but only one in the product. If two molecules of hydrogen react with a molecule of oxygen to form two molecules of water, there are no atoms missing and mass is conserved. The number of molecules is shown with a number to the left of the formula known as a coefficient. A coefficient behaves like a multiplier. It's not necessary to check the mass to get a properly written equation. Counting atoms is sufficient. When the equation for the formation of water is written properly, $2H_2 + O_2 \rightarrow 2H_2O$, there are 4 hydrogen atoms and two oxygen atoms on both sides of the equation and the mass of the reactants is the same as the mass of the products. Making the number of atoms equal on both sides of the equation is all that is needed. The process is called balancing.

Balance the equations below by writing the correct coefficient in the space before each formula. Coefficient "1" need not be written.

1. ____ H_2 + ____ $Cl_2 \rightarrow$ ____ HCl
2. ____ $Ca(NO_3)_2$ + ____ $H_2SO_4 \rightarrow$ ____ $CaSO_4$ + ____ HNO_3
3. ____ Fe + ____ $Cl_2 \rightarrow$ ____ $FeCl_3$
4. ____ Fe + ____ $O_2 \rightarrow$ ____Fe_2O_3
5. ____ Zn + ____ HCl $\rightarrow$ ____ $ZnCl_2$ + ____ H_2
6. ____ Cu + ____ $AgCH_3COO \rightarrow$ ____$Cu(CH_3COO)_2$ + ____ Ag
7. ____ H_2SO_4 + ____ NaOH $\rightarrow$ ____Na_2SO_4 + ____ H_2O
8. ____ N_2 + ____ $H_2 \rightarrow$ ____ NH_3
9. ____ CH_4 + ____ $O_2 \rightarrow$ ____ CO_2 + ____ H_2O
10. ____ S + ____ $O_2 \rightarrow$ ____ SO_3