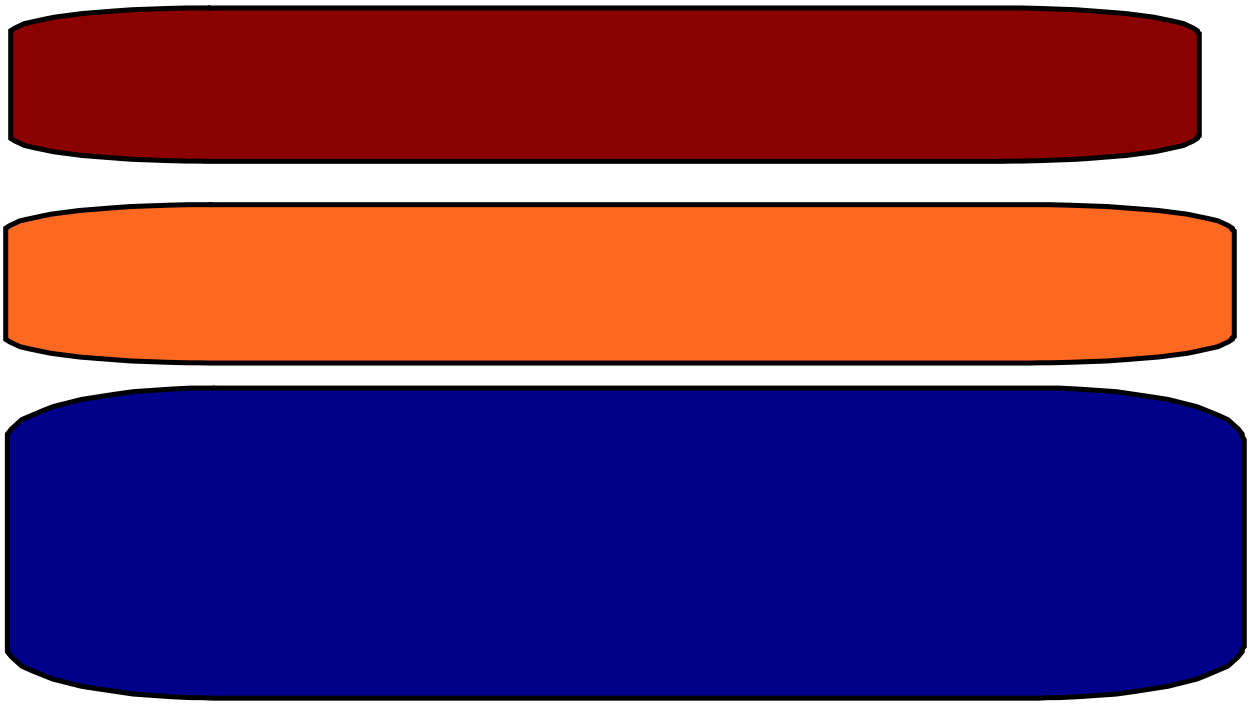
Warm-Up

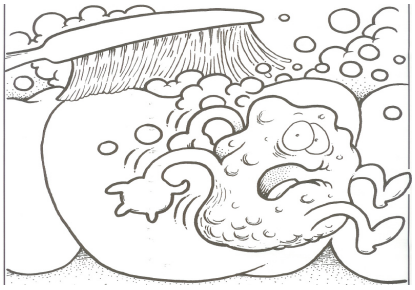
What is the difference between ionic, polyatomic and molecular compounds?



Chemical Reactions

http://www.youtube.com/watch?v=LjbJELjLgZg&NR=1&feature=fvwp

What Chemical Reactions do you conduct every morning?



The flouride compounds in your toothpaste react with compounds in your teeth to produce new, harder compounds that can resist decay.

Acids and other chemicals in your digestive system react with food to produce the nutrients that your body needs.

Word Equations

Word equations are used to represent chemical reactions. It indicates what reacts and what is produced.

All the reactants ---> All the products

Reactant 1 + Reactant 2 ---> Product 1 + Product 2

Examples:

Iron + Oxygen ---> Iron(III) Oxide

Copper + Silver Nitrate ---> Silver + Copper(II) Nitrate

Aluminum + Hydrochloric Acid ---> Hydrogen Gas + Aluminum Chloride

The mixing of elements and chemicals cause a variety of things to occur, from color changes to EXPLOSIONS!!

For example, what would happen when any of the Alkali Metals were mixed with water???

https://www.youtube.com/watch?v=eaChisV5uR0

Review

In the following chemical reaction, what are the reactants and what are the products?

$$6CO_2 + 6H_2O + \text{sunlight} \rightarrow C_6H_{12}O_6 + 6O_2$$

Any idea what this chemical reaction is?

“In a chemical reaction the total mass of the reactants is always equal to the total mass of the products.”

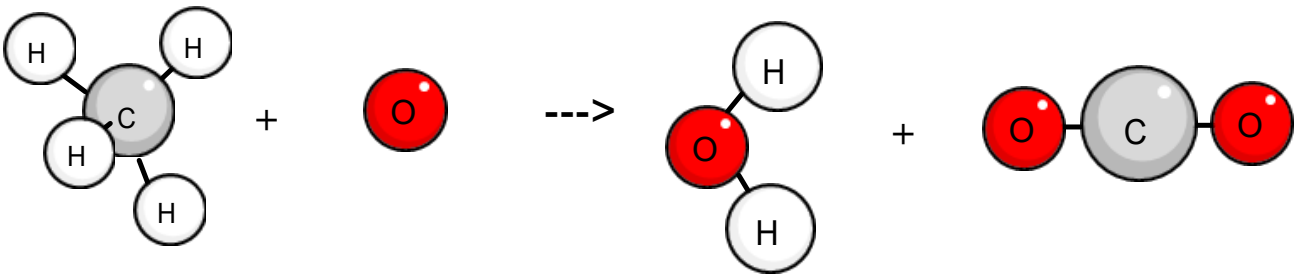
In a chemical change, the atoms of the compounds are not changes but rearrangements.

The number and type of each atom before the reactions is the ***same*** as after the reaction. Compounds are broken apart and new ones are formed.

Example:

Methane + **Oxygen** → **Water** + **Carbon Dioxide**

CH_4 *O_2* *H_2O* *CO_2*



The reactants are two molecules of oxygen gas (O_2) and one molecule of methane (CH_4). As the molecules collide, a chemical reaction occurs that produces two molecules of water (H_2O), and molecule of carbon dioxide (CO_2), heat, and light.

Balancing Chemical Equations

Remember that Chemistry is an international language. This allows scientists to share their findings with others from all over the world.

Word Equations - Indicates the reactants and products of a reaction. (NOT International)

Skeleton Equations - Indicates the formulas for the reactants and products involved in the reaction.

Coefficient - The large numbers in an equation that indicates the number of molecules of each compound needed.

Subscript - The small numbers in a chemical formula

So.... looking back at our previous example...

Before we label this equation we need to balance it.

$CH_4 + O_2 \rightarrow H_2O + CO_2$

Begin by counting the number of atoms in the reactants.

Carbon Atoms -
Hydrogen Atoms -
Oxygen Atoms -

Then count the number of atoms in the products.

Carbon Atoms -
Hydrogen Atoms -
Oxygen Atoms -

If each of the elements present have the same number of atoms in the products AND reactants, then we are done. In this case however, we need to balance the equation.

The only way to do this is by adding numbers to the front of some of the elements and molecules. These numbers are the "coefficients" We do this until all the elements have the same amount of atoms in the reactants and the products.

When we add coefficients, the only thing to keep in mind is that we must multiply all the elements in that group by the coefficient. If there is a subscript, it also gets multiplied by the coefficient.

For example:

$2CO_3$ would mean that there are 2 Carbon atoms and 6 Oxygen atoms.

Example:

Methane + Oxygen → Water + Carbon Dioxide

$$CH_4 + 2O_2 \rightarrow 2H_2O + CO_2$$

Word Equation **Skeleton Equation**

Coefficients **SUBSCRIPTS**

Steps for Balancing

1. Write the **word equation** for the reaction
2. Write the **skeleton equation** for the reaction
3. **Count** the number of **atoms** of reactants and products
4. Balance the number of atoms by using **coefficients**
5. Reduce if possible

Practice

Balance the following equations

$$Fe + O_2 \longrightarrow Fe_2O_3$$

$$H_3AsO_4 \longrightarrow As_2O_5 + H_2O$$

$$(NO_3)_2 \longrightarrow (NO_3)_3$$

Balancing Equations from Word Equations

copper(II) oxide + hydrogen --> copper + water

Try these ones...

lead(II) nitrate + potassium iodide -->

lead (II) iodide + potassium nitrate

calcium + water --> calcium hydroxide

+ hydrogen gass