When we observe a **chemical change,** there is a difference between a **chemical reaction** and a **chemical equation.**

**A chemical reaction** is what really happens. This can be described using the five senses.

**A chemical equation** is a way of representing that reaction by using formulas to represent each of the chemicals involved.

Some other important terms:

**reactant: (same as reagent)** each of the chemicals that are reacting with one another.

-what you have when you start the reaction.

**product:** the chemicals you get as the reaction proceeds.

Sometimes heat or energy is needed or formed in a reaction.

If heat/energy is present as a reactant, the reaction is **endothermic**, meaning the reaction takes in heat or energy from the environment.

If heat is present as a product, the reaction is **exothermic**, meaning the reaction releases heat into the environment.

Identify the following reactions as endothermic or exothermic.

Identify the following reactions as endothermic or exothermic.

hydrogen (g) + oxygen (g) --> water (g) + heat

_____

Na (s) + H2O (l) --> NaOH (aq) + H2 (g) + energy

_____

N2 (g) + O2 (g) + energy --> NO (g)

_____

sunlight + CO2(g) + H2O(l) --> C6H12O6(aq) + 6O2(g)

_____

2 Types of Equations:

-Word Equations

-Balanced Equations

**Word Equations:**

liquid water-->hydrogen gas + oxygen

(read as liquid water becomes hydrogen gas and oxygen gas)

States might also be identified behind the name of the reactant or product.

water(l)-->hydrogen(g) + oxygen (g)

If you see (aq), this represents aqueous which means the substance was dissolved in water or that it is in solution form.

We use an arrow the show which way the reaction is going. The arrow is read as "becomes" or "yields".

Identify the reactants and products in the following word equations:

| | Reactants | Products |
|---|---|---|
| sodium iodide (aq) + potassium nitrate (aq) --> potassium iodide (s) + sodium nitrate (aq) | | |
| Ethane(s) + oxygen (g) --> carbon dioxide (g) + water(l) | | |

## Balanced Equations:

Why do we need to balance?

The mass of what you make in a chemical reaction, must be the same as the mass of the stuff you started with,

This is states by the **Law of Conservation of Mass:** the mass of the products must equal the mass of the reactants.

example: making chili

the weight of the ingredients = the weight of the chili

To balance chemical equations, we use ratios.

Only coefficients in front of each formula can be used when chemical equations.

You cannot change any of the subscripts of any formulas (this would change the compound)

## Counting Atoms

Before we can look at how to write equations using formulas, we need to know how to properly count atoms.

How many of each of the following elements are there?

$KClO_3$ $AgClO_3$ $2CaCO_3$ $3Na_2CO_3$ $5CuPO_4$

## 4 Steps for Balancing Equations :

1. Get yourself an unbalanced chemical equation. *I might give this to you or I might make you figure it out from the word equation.*

2. Draw boxes around all of the chemical formulas. Never, EVER, change

anything inside the boxes. If you do, you are guaranteed to get the wrong answer.

3. Make an element inventory. This will be in the form of a 2-column table.

One side representing the reactants; the other the products.

4, Write numbers in front of each of the boxes until the inventory for each element is the same in both the reactants and products columns.

Whenever you change a number, be sure to update the inventory table. When all the numbers in the table balance, you are finished.

**Lesson 5-Intro to Chemical Equations**

Balancing Act

1. $Na + MgF_2 \rightarrow NaF + Mg$

2. $Mg + HCl \rightarrow MgCl_2 + H_2$

3. $Cl_2 + KI \rightarrow KCl + I_2$

4. $NaCl \rightarrow Na + Cl_2$