CHEMICAL REACTIONS

Reactants and Products

When a **chemical reaction** occurs, the original substances put together, called **reactants,** lose their chemical properties and become different substances called **products** with a different set of chemical properties. Look at the example below:

$$H_2 + O_2 \rightarrow H_20$$

Reactants **product**

In this example, an explosive gas, Hydrogen, combines with a gas that supports combustion, Oxygen, to make a substance that puts out fires, water.

Lesson Checkpoint: What is a reactant?

Energy i

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- The firs n have differen that Hydrog xample of this.
- The second type of evidence has to do with energy. In some cases energy has to be absorbed in order for the reaction to occur and in other reactions, energy is released. When energy is absorbed, it is called an **endothermic reaction**.

- Reactions where energy is released are called **exothermic reactions**. An example of an exothermic reaction would be a rocket taking off. The burning of fuel provides the heat which causes the rocket to lift off.

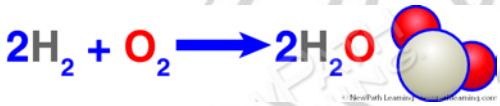
Lesson Checkpoint:
What is the difference between an endothermic and an exothermic chemical reaction?

Types of Chemical Reactions

There are **four types** of chemical reactions:

- In a **synthesis** reaction, two elements combine to make a compound. See the example below.

- In a **decomposition reaction**, a compound is broken down into simpler substances.



In the example above, the reactant, hydrogen peroxide, is broken down into water and oxygen.

- In a **single replacement** reaction, an element takes the place of another element in a compound. See the example below.

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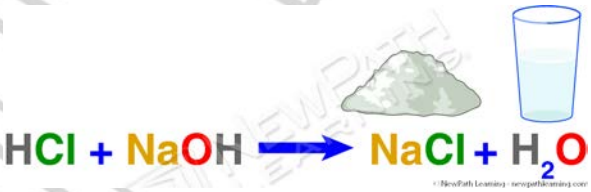
- In a ompound exchange positions with elements in the other compound. See the example below.



In this example Sodium(Na) has taken the place of H and H has taken the place of Na.

Lesson Checkpoint: In which type of chemical reaction does one element take the place of another element?

Mass Remains Constant

According to the **law of conservation of mass**, mass can not either be destroyed or created in a chemical reaction. This means that the total mass of each element does not change during the reaction. See the example below.
H2 + 02----H20

If you count the atoms of each element, you will notice that there are more oxygen atoms on the left side than on the right side. To correctly write this reaction we need to use a **coefficient** or number placed in front of the chemical formula. The reaction below has been **balanced** with the use of coefficients.

In this balanced reaction, there are four atoms of Hydrogen on each side of side of the reaction and two atoms of Oxygen on each side of the reaction.

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Affecting

Some reactions require an initial burst of energy to get the reaction going. This is called **activation energy**. The outcome of a reaction using activation energy could still be endothermic or exothermic.

Once a chemical reaction gets going there are several factors that control the rate at which the reaction occurs.

- Increasing the surface area of the reactants or increasing the temperature usually speeds up a reaction.
- Another way to speed up a reaction is by increasing the concentration or amount of reactants.
- Still another way to move the reaction along is to use a **catalyst** or **enzyme**. These are substances added to the reaction just to speed it up but they are not involved like the reactants. An enzyme brings reactants into contact to speed up the reaction. The enzyme does not change.

Lesson Checkpoint: Name two steps you can take to speed up a chemical reaction.