

Activity 4 - Making a Sentence

Read

To react or not to react? THAT is the question!

Chemical changes are a result of chemical reactions. All chemical reactions involve a change in substances and a change in energy. Neither matter or energy is created or destroyed in a chemical reaction—only changed. There are so many chemical reactions that it is helpful to classify them into 4 general types which include the following:

SYNTHESIS REACTION

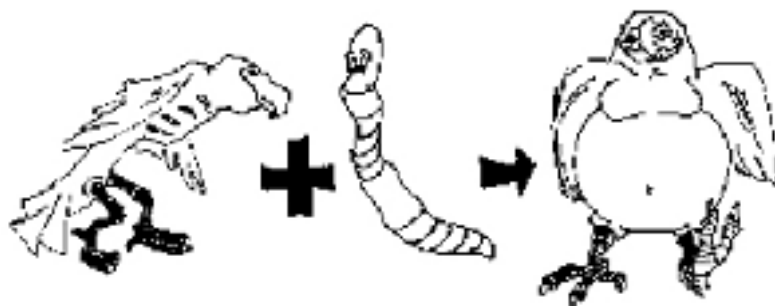
In a synthesis reaction two or more simple substances combine to form a more complex substance. Two or more reactants yielding one product is another way to identify a synthesis reaction.

For example, simple hydrogen gas combined with simple oxygen gas can produce a more complex substance: water!

The chemical equation for this synthesis reaction looks like:



To visualize a synthesis reaction look at the following cartoon:



In the cartoon, the skinny bird (reactant) and the worm (reactant) combine to make one product, a fat bird.

DECOMPOSITION REACTION

In a decomposition reaction a more complex substance breaks down into its more simple parts. One reactant yields 2 or more products. Basically, synthesis and decomposition reactions are opposites.

For example, water can be broken down into hydrogen gas and oxygen gas. The chemical equation for this decomposition reaction looks like:



To visualize a decomposition reaction look at the following cartoon:



In this cartoon the egg (the reactant), which contained the turtle at one time, now has opened and the turtle (product) and egg shell (product) are now two separate substances.

SINGLE DISPLACEMENT REACTION

In a single displacement reaction a single uncombined element replaces another in a compound. Two reactants yield two products. For example when zinc combines with hydrochloric acid, the zinc replaces hydrogen. The chemical equation for this single displacement reaction looks like:



To visualize a single displacement reaction look at the following cartoon:



Notice, the guy in the grey shirt steals the date of the other guy. So, a part of one of the reactants trades places and is in a different place among the products.

DOUBLE DISPLACEMENT REACTION

In a double displacement reaction parts of two compounds switch places to form two new compounds. Two reactants yield two products. For example when silver nitrate combines with sodium chloride, two new compounds--silver chloride and sodium nitrate are formed because the sodium and silver switched places. The chemical equation for this double displacement reaction looks like:



To visualize a double displacement reaction look at the following cartoon:



In this cartoon, the two fellows wearing the hats trade hats with each other. So, in the chemical reaction, a part of one reactant trades places with a part of another reactant. In other words, one part of each reactant got switched with each other.

ENERGY OF CHEMICAL REACTIONS

Chemical reactions always involve a change in energy. Remember: in a chemical reaction, atoms are rearranged from their original molecules to form new molecules. To do this, it is necessary to break the bonds between atoms in the old molecules and form new bonds between atoms to make new molecules. Breaking bonds takes energy. When new bonds form, energy is given off.

If more energy is needed for breaking the old bonds than is given back when the new bonds form, the chemical reaction will absorb or take in heat or energy. This is called an **endothermic reaction**.

When the new bonds formed give back more energy than what was required to break the old bonds, the chemical reaction will give off or release energy, often as heat. This is called an **exothermic reaction**. The heat given off often causes the product(s) to feel hot. Any reaction that involves combustion (burning) is an exothermic chemical reaction.

Questions – Activity 4 Read

1. List four main types of chemical reactions.
2. Briefly describe what happens in each of those reaction types.
3. What is the main difference between an endothermic reaction and an exothermic reaction?