CHEMICAL REACTIONS

Chemical reactions happen when one or more substances change to form one or more new substances. We call the things that change the **reactants** and the things that are formed **products**. We can also communicate what happens during a chemical reaction using what is called a chemical equation. It helps to describe the changes that take place.

OBSERVING CHEMICAL CHANGES

Usually in middle school science, we can determine whether a chemical change has taken place by making some simple observations.

1. measure or observe the disappearance of one of the reactants
2. measure or observe the formation of one or more new materials
3. measure energy changes (production or removal of heat energy) associated with the breaking and forming of chemical bonds.

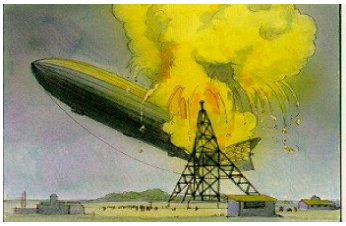
COMMUNICATING CHEMICAL CHANGES

In the following reaction, hydrochloric acid (HCl) and sodium hydroxide (NaOH) react to form two new substances, sodium chloride (NaCl, "table salt") and water (H_2O). Since new substances are produced, we can say that a chemical change (chemical reaction) has taken place. Notice that heat is released during this chemical reaction. The production of heat is caused by the breaking and formation of new chemical bonds between the different.

(REACTANTS)				**(PRODUCTS)**				
HCl	**+**	**NaOH**	**→**	**NaCl**	**+**	**H_2O**	**+**	**heat**
2 hydrogen atoms 1 chlorine atom 1 sodium atom 1 oxygen atom				2 hydrogen atoms 1 chlorine atom 1 sodium atom 1 oxygen atom				

According to the **LAW OF CONSERVATION OF MATTER**, matter can not be created or destroyed. So the number of atoms on the reactant side must be equal to the number of atoms on the product side.

In the following balanced equation hydrogen gas reacts with oxygen gas to produce water. Note that the coefficient "2" Is needed before each hydrogen molecule (H_2) for the equation to be correctly balanced according to the law of conservation of matter.

2 H_2	**+**	**O_2**	**→**	**2 H_2O**	**+**	**heat**	**+**	**light**
4 hydrogen atoms 2 oxygen atoms				4 hydrogen atoms 2 oxygen atom				

You may be familiar with this reaction from class. Burning hydrogen in the presence of oxygen caused a great deal of heat and light energy to be released. This is the reason the zeppelin Hindenburg burned in a ball of flames while trying to land. It is thought that static electricity caused the hydrogen to ignite and burn uncontrollably.