

## Chemistry Lecture #14: Elements and Compounds

Mixtures are materials that can be easily separated into its components by physical means. For example, a sand and water mixture can be separated by filtration. And a salt water mixture can be separated by heating the mixture and boiling off the water.

But there are some types of matter that cannot be separated into additional components by physical means. These types of matter are called *substances*.

Substances fall into two categories: compounds and elements.

Compounds are substances that cannot be broken into additional components by physical means. However, they can be broken apart by chemical means, such as electricity, extreme heat, and treatment with another substance.

For example, water is a compound, and we know it is made of hydrogen and oxygen. We can subject water to all manner of physical treatment, such as filtration and moderate heating. But neither process will cause water to separate into hydrogen and oxygen.

But if we subject water to chemical treatment, it will separate into oxygen and hydrogen. For example, if you pass electricity through water, hydrogen and oxygen gas will be produced. Extremely high temperatures will also cause water to decompose into hydrogen and oxygen. And if water is placed in contact with

iron heated to a high temperature, the oxygen from water will bond with the iron and liberate hydrogen gas.

Compounds can be chemically broken apart into *elements*.

An element is similar to a compound in that it too cannot be broken apart into additional components through physical means. However, elements also cannot be broken apart by chemical means. No treatment of any type can cause an element to decompose into additional substances.

An element is the simplest form of matter that cannot be broken into simpler substances. Compounds are made out of elements.

We now have our basic categories of matter. Matter falls into two groups: substances and mixtures. Substances cannot be separated into further components by physical means. Mixtures are substances that have been blended together but are not chemically bonded. Mixtures can be separated into substances, and substances can be blended to form mixtures.

There are two categories of mixtures: heterogeneous and homogeneous. You can only see one phase in a homogeneous mixture. You can see two or more phases in a heterogeneous mixture.

There are two types of substances: compounds and elements. Compounds can be broken into elements by chemical means. Elements cannot be broken into simpler substances. Elements can chemically combine to form compounds.

