



Chemical Changes

Two Types of Changes

Matter can go through physical and chemical changes. When a **physical change** occurs, the object still keeps its chemical makeup. A physical change can be a change in position, size, or shape. Other physical changes can alter an object's volume or phase of matter. For example, cut a log in half and it looks different physically. But both smaller pieces of the log are still made of wood.

Cutting a log results in a physical change rather than a chemical change.



A **chemical change** occurs when an object changes into a completely different type of matter. For example, if you toss the cut-up log into a campfire and it burns, the wood becomes a new material. It changes into ash and gas. These new materials have different chemical and physical properties than the log did.

Burning wood causes a chemical change to happen.





Evidence of Chemical Changes

During a chemical change, atoms are rearranged in a way that cannot be undone easily. They form different kinds of matter. A chemical change might show as a change in color.

The formation of a gas or solid can also be evidence of a chemical change.

Oxygen triggers many chemical reactions. When oxygen reacts with iron, rust forms. The gray metal turns reddish brown. The new color is evidence of the chemical change. A chemical change can also happen to a sliced apple. The sugars in the fruit react to oxygen in the air. The apple turns brown.

If vinegar is added to a bowl of baking soda, a lot of bubbles will form. These bubbles are carbon dioxide gas. Neither the vinegar nor the baking soda contains this gas. It is formed by a chemical change.



rusted horseshoe



Rust can occur when metal is left outside for long periods of time. A chemical change causes the metal to change color.



Chemical Changes and Energy

Some chemical changes cause the bonds between atoms or molecules to break. Other chemical changes can form new bonds. The forming or breaking of bonds always involves energy. As materials react with each other, they either take in energy or give it off.

Some energy changes can be observed as they occur. For example, logs burning in a campfire undergo the chemical process of **combustion**. During combustion, the burning logs give off energy. The energy can be observed as the heat and light of the fire.



An apple turns brown when it is exposed to air.



A chemical change occurs when you mix baking soda with vinegar.