

Physical and Chemical Changes

Hurrah for Chemistry!

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SUMMARY

Matter has observable physical properties. Changes to these properties are called physical changes. Matter also has properties that are chemical. Chemical changes result in a new substance being formed and the chemical identity changing.

Physical Properties of Matter

- Matter has properties that can be observed without changing the identity of a substance: density, mass, volume, color, size, etc.

Physical Change

- A physical change is a change in any physical property of a substance, not in the substance itself. In other words, the chemical identity of the matter remains unchanged. But, its physical properties do not.
- Examples of physical changes include:
 - **Changes in color:** dying a substance can change its color, but it does not change the substance into something else.
 - **Breaking a substance:** if you snap something into two pieces, it is still the same substance.
 - **Changes in state:** if water evaporates, it is still water.

Chemical Properties of Matter

- Chemical properties can be observed when the substances identity changes.
- Chemical properties of matter describe how substances can form new substances.
- Examples include
 - **Combustibility** describes how well an object can burn.
 - **Ability to rust** describes how an object reacts to water and oxygen.

Chemical Change

- Chemical properties can be identified by the changes they produce.
- The change of one substance into another substance is called a chemical change.
- A chemical change affects the substances involved in the change.
- During a chemical change, combinations of atoms in the original substances are rearranged to make a new substance.
- Examples of chemical changes include:
 - **Rust forming** on a piece of iron. Oxygen in the air reacted with the iron in a metal to form the rust.
 - **Metal tarnishing** is the result of the oxidation of a metal such as silver or copper.
 - **Substances burning** producing a new substance.

- Not all chemical changes are destructive. Adding heat to some substances causes a chemical change such as cooking an egg or making a cake.

Identifying a Chemical Change

- The only true indication of a chemical change is a new substance that has been formed.
- However, there are other signs that **may** indicate a chemical change has occurred.
 - **Odor** can be produced by some chemical changes.
 - **Temperature** change can occur during a chemical reaction. If it is endothermic, the object will feel cooler. If it is exothermic, the object will feel warmer.
 - **Color** change is often an indication of a chemical change. For example, fruit may change color when it ripens.
 - **Formation of bubbles** often occurs when gasses are produced during a chemical reaction.
 - **Formation of a solid** can occur when two liquids are combined.

