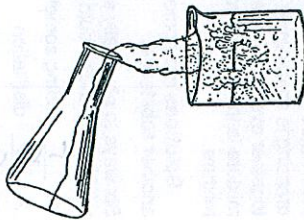


## Properties of Matter

A property is a characteristic that describes matter. Matter has both physical properties and chemical properties.

### Physical Properties

The physical properties of a substance can be observed or measured without chemically changing the substance. Some examples of physical properties are color, luster (shine), malleability (ability to change shape), brittleness, odor, taste, density, texture, hardness, electrical conductivity, heat conductivity, boiling point, melting point, and freezing point.



### Chemical Properties

The chemical properties of a substance determine whether or not it will react chemically. The chemical activity of a substance is defined as how easily the substance reacts with another substance. The chemical activity of elements depends on how easy it is for them to gain or lose electrons and how many electrons they have in their outer shell. The elements are grouped together in the periodic table based on their chemical properties.

Write C or P to indicate whether each of the following is a chemical or physical property.

- C Antioxidants are used as food preservatives in margarine.
- P White phosphorus glows in the dark.
- C White phosphorus ignites easily.
- P Graphite is a good lubricant.
- C Gold does not react with water.
- C Strontium reacts with water.
- P Gallium has a melting point of about 86° Fahrenheit.
- C Iron rusts when it is exposed to air.
- P Diamonds are the hardest substance known to humankind.
- P Silver is a good conductor of electricity.

## Two Kinds of Changes

### Physical Change

A physical change occurs when the appearance of a substance changes, but chemically the substance is the same. The individual molecules do not change, and no new matter is formed. During some physical changes, matter simply changes from one state to another. Evaporating, melting, freezing, and sublimating are examples of physical changes in which matter changes from one state to another. During evaporation, a substance changes from a liquid to a gas. When a substance melts, it changes from solid to liquid. A substance that freezes changes from a liquid to a solid. During sublimation, a substance changes from a solid directly to a gas.

There are other types of physical changes. During some physical changes, an object's size or shape is altered. A physical change also occurs when substances are mixed and something dissolves.

### Chemical Change

Chemical change occurs when a chemical reaction takes place. The substances produced during a chemical reaction are different from the original substances. Energy is involved in all chemical reactions. Here are some signs that a chemical reaction has taken place:

- A solid precipitate forms at the bottom of a test tube.
- Heat or light is produced.
- A gas is produced.
- A color change occurs.

Examine the list of changes below. Write C before each chemical change. Write P before each physical change.

- P erosion of a riverbed by water
- C leaves changing color
- P carving a statue out of marble
- P sanding a piece of wood
- P ice cream melting
- C fireworks exploding
- C baking a cake
- P chocolate melting
- C a flashbulb flashes
- C vinegar is mixed with baking soda
- C cooking waffles
- C lighting a match
- P mothballs disappear over time
- C plants undergo photosynthesis
- C a red mark appears after a drop of hydrochloric acid on marble
- P bee sting produces carbon dioxide gas