

PHYSICAL VS. CHEMICAL PROPERTIES

Name _____

A physical property is observed with the senses and can be determined without destroying the object. For example, color, shape, mass, length and odor are all examples of physical properties.

A chemical property indicates how a substance reacts with something else. The original substance is fundamentally changed in observing a chemical property. For example, the ability of iron to rust is a chemical property. The iron has reacted with oxygen, and the original iron metal is changed. It now exists as iron oxide, a different substance.

Classify the following properties as either chemical or physical by putting a check in the appropriate column.

	Physical Property	Chemical Property
1. blue color		
2. density		
3. flammability		
4. solubility		
5. reacts with acid to form H_2		
6. supports combustion		
7. sour taste		
8. melting point		
9. reacts with water to form a gas		
10. reacts with a base to form water		
11. hardness		
12. boiling point		
13. can neutralize a base		
14. luster		
15. odor		

PHYSICAL VS. CHEMICAL CHANGES

Name _____

In a physical change, the original substance still exists, it has only changed in form. In a chemical change, a new substance is produced. Energy changes always accompany chemical changes.

Classify the following as being a physical or chemical change.

- Sodium hydroxide dissolves in water. _____
- Hydrochloric acid reacts with potassium hydroxide to produce a salt, water and heat. _____
- A pellet of sodium is sliced in two. _____
- Water is heated and changed to steam. _____
- Potassium chlorate decomposes to potassium chloride and oxygen gas. _____
- Iron rusts. _____
- When placed in H_2O , a sodium pellet catches on fire as hydrogen gas is liberated and sodium hydroxide forms. _____
- Evaporation _____
- Ice melting _____
- Milk sours. _____
- Sugar dissolves in water. _____
- Wood rotting _____
- Pancakes cooking on a griddle _____
- Grass growing in a lawn _____
- A tire is inflated with air. _____
- Food is digested in the stomach. _____
- Water is absorbed by a paper towel. _____

- I. Physical Property:
 - A. Definitions – a characteristic of a pure substance that can be observed without changing its identity.
 - B. Examples of Physical Properties: Changes in state, hardness, texture, color, solubility, density, attraction to a magnet.
 - C. Size dependent properties – properties that depend on the amount of the object, ex. Length, width, height, volume, and mass.
 - D. Size independent properties – properties that are independent of the amount of the object, ex. Density, color, state, temperature.
- II. Chemical Property:
 - A. Definition: a characteristic of a pure substance that describes its ability to change into another substance – change its identity.
 - B. Examples: Burning (combustion), reactivity with other chemicals, tarnishing.
- III. Physical Change:
 - A. Definition: a change that results in a change in appearance or form but not identity.
 - B. Example: change in state, bending, crushing, breaking, being cut in half
- IV. Chemical Change:
 - A. Definition: a change that results in a change in the identity of a substance.
 - B. Example: burning, cooking, reacting with an acid.
 - C. Chemical reaction is a change in matter that produces one or more new substances.
 - D. Chemical changes occur when bonds (attractions that holds compounds together) break and new bonds form.
 - E. Evidence of chemical changes: formation of a new substance and a change in energy.
 1. Formation of a precipitate (solid formed from two solutions)
 2. Change in color
 3. Production of a gas – bubbles or odor
 4. Change in heat or light
 - a. Endothermic reaction – energy is absorbed, feels colder to touch (“Endo” = “in to”)
 - b. Exothermic reaction – energy is released, feels hotter to touch. (“Exo” = “out of”)
- V. Law of Conservation of Mass – Matter cannot be created or destroyed, but only transferred or transformed. As shown by Lavoisier, the amount of matter you start with is the same amount you end with. For example, if you start with a piece of paper and burn it, the mass of the piece of paper will be the same as the mass of all the ash and smoke at the end of burning.