

Properties of Matter

A property describes how an object looks, feels, or acts

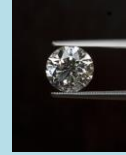
Can be physical or chemical

Physical Properties of Matter

Determined by observations that **do not** cause a change in the identity of the matter.



The shape of a leaf.



The hardness of a diamond.

Intensive Properties:

Do not depend on the amount of matter present

Ex: color, texture, density
melting/freezing point

- Malleability - The ability of a substance to be beaten into thin sheets.
- Ductility - The ability of a substance to be drawn into thin wires.

Extensive Properties:

Involves the amount of matter present

Ex: mass, volume, shape

Physical Change

Changes the form or appearance of the substance but does not change the identity of the substance



Tearing Paper

Examples:

- Cutting
- Dissolving
- Any change of state process
- Distilling – separating a mixture by selectively boiling off one part at a time



Chemical Properties of Matter

Observed only when the identity of a substance changes.

Ex: flammability, reacts with acid



The ability of wood to burn.

Reactivity is a common chemical property

- Reactive to oxygen
- Reactive to air
- Reactive to water...

• Notice that chemical properties aren't EASY to observe, unlike physical properties.

Chemical Change

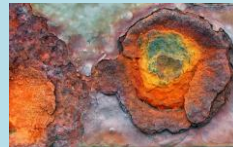
Causes the chemical composition of a substance to change creating a new material with new properties

Ex: burning, reacting with ...

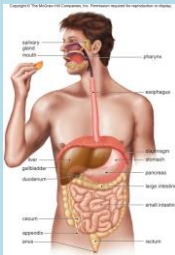


Reacting with oxygen = oxidation

Ex: Iron + Oxygen = rust



- Gasoline burning
- Cake baking
- Food digesting



Examples of Chemical Changes

Soured milk smells bad because bacteria have formed new substances in the milk.



Effervescent tablets bubble when the citric acid and baking soda in them react in water.



The hot gas formed when hydrogen and oxygen join to make water helps blast the space shuttle into orbit.

The Statue of Liberty is made of shiny, orange-brown copper. But the metal's interaction with carbon dioxide and water has formed a new substance, copper carbonate, and made this landmark lady green over time.



Signs of a Chemical Change

- Change in temperature
- Change in color
- Production of gas
- Formation of a precipitate (a solid that forms and settles out of a liquid mixture)



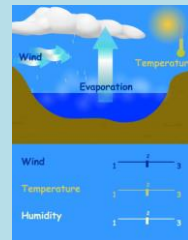
Comparing Physical and Chemical Properties		
Substance	Physical property	Chemical property
Helium	less dense than air	nonflammable
Wood	grainy texture	flammable
Baking soda	white powder	reacts with vinegar to produce bubbles
Powdered sugar	white powder	does not react with vinegar
Rubbing alcohol	clear liquid	flammable
Red food coloring	red color	reacts with bleach and loses color
Iron	malleable	reacts with oxygen
Tin	malleable	reacts with oxygen

Chemical or Physical Property?

- | | |
|--------------------------------------|---|
| a) combustibility
<i>chemical</i> | f) ductility
<i>physical</i> |
| b) hardness
<i>physical</i> | g) failure to react with water
<i>chemical</i> |
| c) density
<i>physical</i> | h) tendency to corrode
<i>chemical</i> |
| d) mass
<i>physical</i> | i) malleability
<i>physical</i> |
| e) melting point
<i>physical</i> | j) odor
<i>physical</i> |

Physical or Chemical Change?

- Water evaporates from the ocean.
physical



Physical or Chemical Change?

- The yolk of an egg, which contains sulfur, causes tarnish to form on silver.
chemical



Physical or Chemical Change?

- The ice on a lake melts to become water in the lake.
physical



Physical or Chemical Change?

- Charcoal in a fire turns to ash after several hours.

chemical



Physical or Chemical Change?

- A pencil is sharpened in a pencil sharpener, leaving behind shavings.

physical



Physical or Chemical Change?

- A battery makes electricity to turn on a flashlight.

chemical



Physical or Chemical Change?

- A bicycle rusts when left in the rain.

chemical



Physical or Chemical Change?

- A shirt is accidentally torn in the washing machine.

physical



Physical or Chemical Change?

- A log is split in two by an axe.

physical

