

Changes in the Properties of Matter Physical and Chemical

Matter -anything that takes up space, has mass and has properties that you can observe and describe

Property -something special about an object that makes it what it is

All About Physical Properties

Physical properties can be measured or observed without changing the chemical makeup

All matter has **mass** - the amount of matter in an object

All matter has **volume** – the amount of space an object takes up

All matter has **density** – compares the mass to the volume

Other Examples of Physical Properties:

- One physical property that is found in most matter is that it may be metallic.
 - Most metals are: Shiny, solid, malleable and strong.
 - Nonmetals are: not shiny, are brittle
- **Conductivity** - the ability to pass energy along from one particle to another. (electrical, heat and sound)
- Whether or not a substance is **magnetic** is another physical property.

All About Chemical Properties

Chemical properties describe the ability for react or combine with another matter to form a new substance, a new kind of matter.

Examples of Chemical Properties

- People sometimes use **acid** to tell gold and pyrite apart. (The way the substance reacts to it is a chemical property).
- **Combustibility** – the ability to burn is another chemical property

All About Physical Changes

Physical Change – change in state, shape or size without forming another substance.

Examples of Physical Changes

- Water changing from ice, liquid and vapor.
- Grinding peanuts to make peanut butter
- Mixing together 2 or more kinds of matter
- Separating matter into different parts
- **Mixture** -2 or more parts blended together that keep their own properties and not turn into a new substance (salad, spaghetti, tacos, trail mix, sugar mixed with water, tea) can be made of solids, liquids or gases, can be separated
- Substances that make up mixtures keep their physical & chemical properties
- **Solution** – mixture in which substances are completely blended so that the properties are the same throughout.
- Physical changes can sometimes be easily reversed, but not always.
 - Melted ice cubes can be reversed by cooling until it freezes.
 - Stirring sugar into water can be reversed by letting the water evaporate.
- If a change seems easy to reverse, then it is most likely a physical change. But not all combinations of matter can be separated physically into their parts.

All About Chemical Changes

- Unlike the easy to reverse physical changes, chemical changes don't turn around so easily
- They occur when atoms link together in new ways. These are Chemical **Reactions or changes**.
- During Chemical Reactions, atoms in the substance put together rearrange to form a new substance with different **properties**.
- They have properties different from the original substances.
- Signals that a chemical change occurred: (Listen for non-examples in the video!)
 - gas is produced (bubbles)
 - temperature change
 - energy (light/heat) is released
 - a color change (careful!)
 - a precipitate forms (**precipitate** – a solid formed when two liquids combine)

Examples of Chemical Changes:

- Vinegar mixed with baking soda
- Burning candle (combines physical and chemical changes)
- Rust forms when iron atoms in steel react with oxygen atoms in the air
- Space shuttles engines combine oxygen and hydrogen to make water vapor to release the energy needed to take off.
- Burning is another chemical change.
- Electricity can also cause chemical changes.
- When you eat food, chemical changes take place as you digest it.

In general, chemical changes are difficult to reverse.