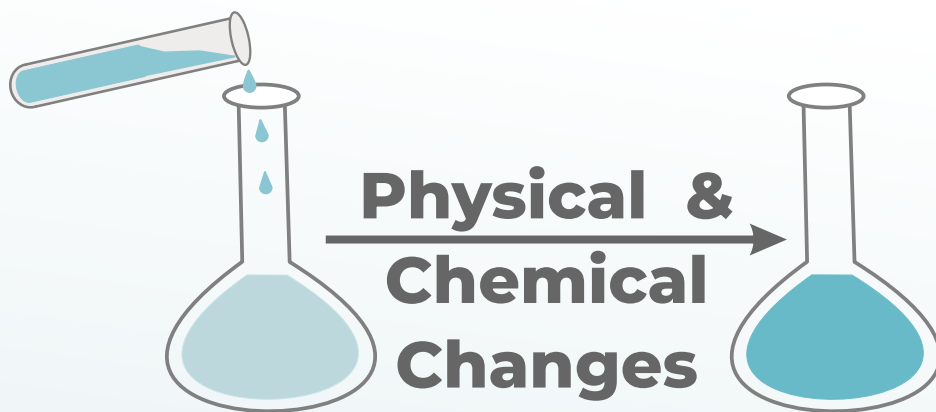


**KEY
POINTS**

INTRODUCTION

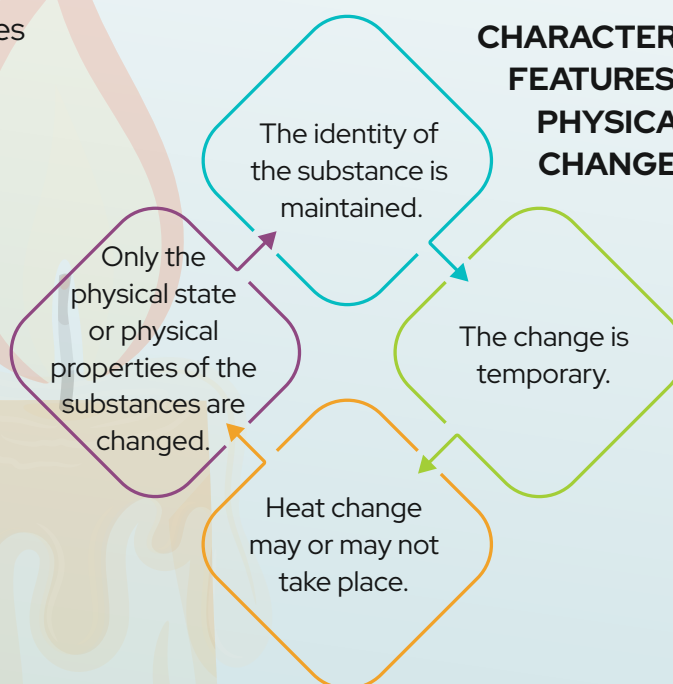
All matter is made up of tiny molecules and when these molecules are changed or moved around, the matter changes its form. Every day, we experience changes in matter. Cooking eggs, burning leaves, freezing water and mixing oil and vinegar to make salad dressing, involve changes in matter.

We classify these changes into two categories

- (i) Physical changes (ii) Chemical changes

PHYSICAL CHANGES

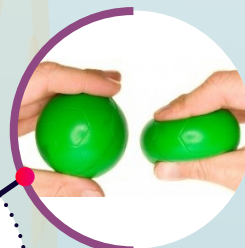
A change in which a substance undergoes a change in its physical properties is called a physical change. A physical change is generally reversible. In such a change, no new substance is formed. Properties such as shape, size, colour and state of a substance are called its physical properties.

**CHARACTERISTIC
FEATURES OF
PHYSICAL
CHANGES**


Boy blowing a balloon



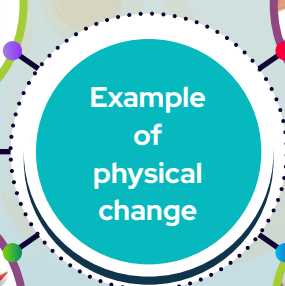
compressing a ball



Breaking of
glassware



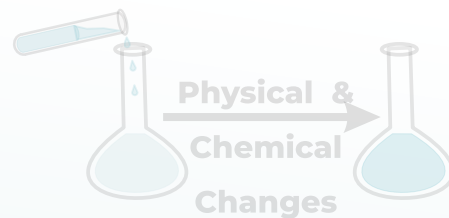
Sharpening
a pencil



Cutting of
vegetables



Melting of
ice cream



REVERSIBLE & IRREVERSIBLE CHANGES

Changes that can be reversed are called reversible changes. Physical changes are often reversible, but not always. You can reverse the physical change that occurs when you melt ice by cooling the water until it freezes again. You cannot reverse the physical change that occurs when wood is sawed into pieces. Changes that cannot be reversed are called irreversible changes.

Examples of reversible changes:

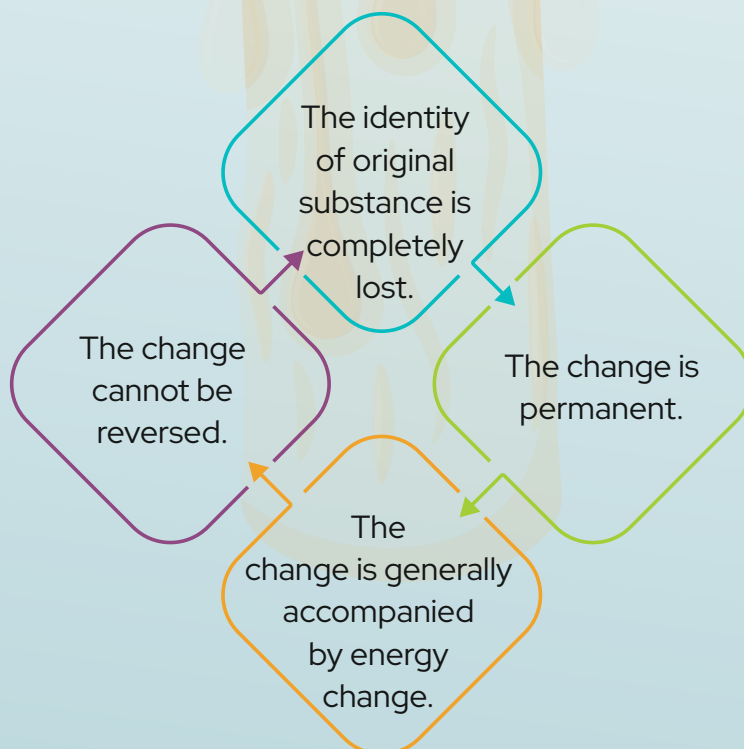
- › Stretching of a rubber band.
- › Blowing up a balloon.
- › Shaping clay into different shapes.

Examples of irreversible changes:

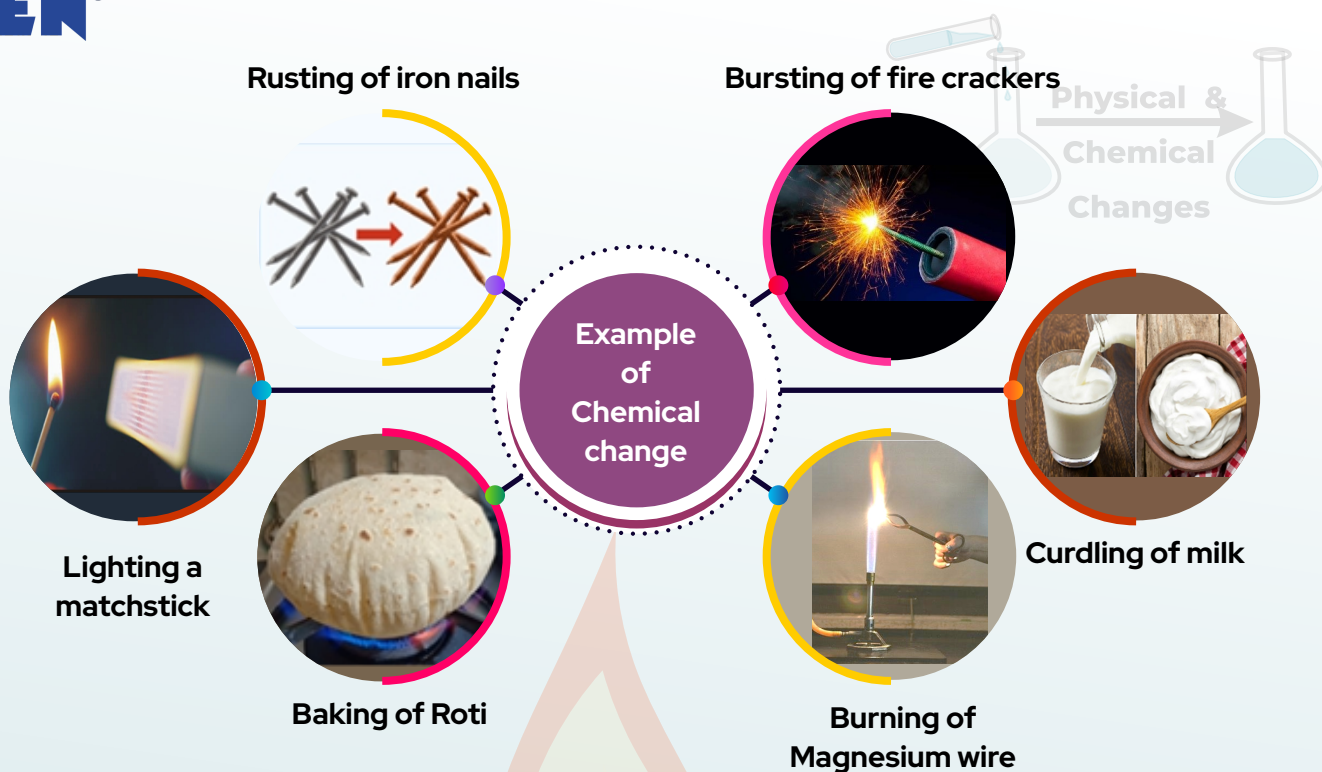
- › Rusting of iron.
- › Mixing an acid with a base, producing water and salt.
- › Frying an egg.
- › Lighting a matchstick.

CHEMICAL CHANGES

A change in which one or more new substances are formed is called a chemical change. A chemical change is also called a chemical reaction. The changes are irreversible and the substances may change their colour, smell or taste. Such a change is called a chemical change. Chemical changes occur when two or more substances combine and react with each other and produces new substances.



CHARACTERISTIC FEATURES OF CHEMICAL CHANGES



CHEMICAL REACTION

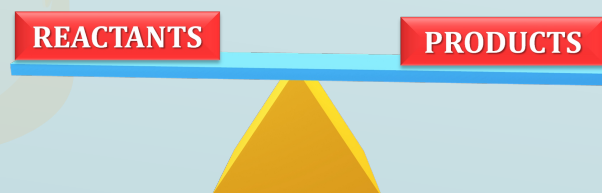
- The process in which a substance or substances undergo a chemical change to produce new substances, with entire new properties are known as chemical reaction.
- **Reactant:** The substance / substances, which takes part in a chemical reaction.
- **Products:** The new substance / substances formed as a result of a chemical reaction are called products. The arrow indicates the direction of the change and is read as "yields" or "products".
Reactants → Products

CHEMICAL EQUATION

- A chemical equation is a shorthand way of describing the events that occur in a chemical change or reaction.
- The method of representing a chemical reaction with the help of symbols and formulae of the substances involved in it is known as a chemical equation.

Balancing of chemical equations

- According to the law of conservation of mass, the total mass of product must be equal to the total mass of the reactants (as mass can neither be created nor destroyed). This is possible only if the number of atoms of each element is equal on the two sides of the equation.
A balanced chemical equation verifies law of conservation of mass. The law of conservation of mass was given by Antoine L. Lavoisier.



Law of conservation of mass

IDENTIFYING REACTIONS

Characteristics of a chemical reaction:

- Heat, light or any other radiation (like, ultraviolet) may be given off or absorbed.

- Sound may be produced.

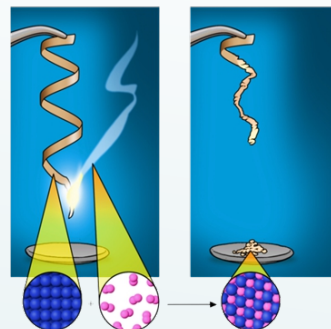
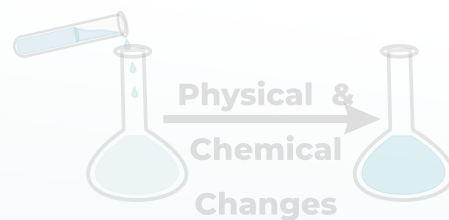


- A change in smell may take place or a new smell may be given off.



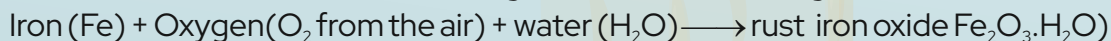
- A colour change may take place.

- A gas may be released.



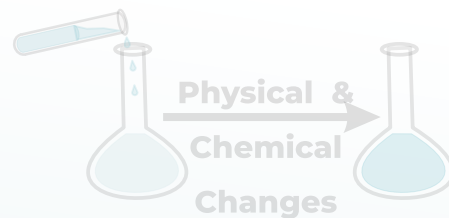
RUSTING

- When a piece of iron is left in moist air for some time, a red-brown solid is deposited over it. Iron combines with the oxygen and moisture (i.e. water vapour) of the air to form a new substance called rust—the red brown solid. The forming of rust is called rusting.



FACTORS WHICH PROMOTE CORROSION

- For rusting the presence of both oxygen and water (or water vapour) is essential. In fact if the contact of moisture in air is high, which means if it is more humid, rusting becomes faster.



PREVENTION OF RUSTING

- **By painting** : The corrosion of a metal can be prevented simply by painting the metal surface by grease or varnish that forms a protective layer on the surface of the metal which protect the metal from moisture and air.
- **Electroplating** : It is a very common and effective method to check corrosion. The surface of metal is coated with chromium, nickel or aluminium etc. by electrolysis also called electroplating. If the surface of metal is electroplated by zinc, it is known as **galvanisation** and in case tin metal is used, then the process is called **tinning**.
- Stainless steel is made by mixing iron with carbon and metals like chromium, nickel and manganese. It does not rust.

CRYSTALLISATION

- The process of cooling a hot, concentrated solution of a substance to obtain crystals is called crystallisation. Crystallisation is a process that separates a pure solid in the form of its crystals from a solution. It is an example of physical change. Some solids decompose or get charred on heating to dryness during evaporation. But such impurities get removed in crystallisation. Crystallisation is a better technique than evaporation to dryness.

Mother liquor

- A liquid which is obtained after crystallization.



Formation of crystals of copper sulphate

Uses of crystallisation

- Purification of salt that we get from sea water.
- Separation of crystals of alum (phitakari) from impure sample.