

## Ch-6-Physical and Chemical Changes

Physical Changes

Chemical Changes

Rusting of Iron

Crystallization

## Physical Change

A physical change is a change, in which shape, size, appearance or state, of a substance is altered, but its chemical composition remains same. Only a physical change of matter takes place. No new substance is formed. It is usually reversible that is why the original substance can be obtained. There is no change in mass of substances.

Examples:

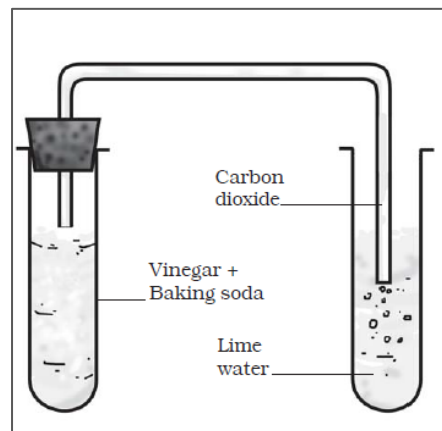
1. Dissolution sugar, salt etc in water
2. Interchanging state of water: Ice  $\leftrightarrow$  Liquids  $\leftrightarrow$  water vapours
3. Boiling of water (any liquids)
4. Melting of solids

## Chemical Change

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. It is irreversible in nature. There is change in mass of substances.

### Activity

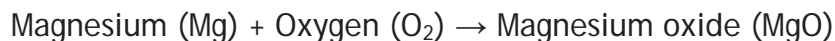
Take about a teaspoonful of vinegar in a test tube. Add a pinch of baking soda to it. You would hear a hissing sound and see bubbles of a gas coming out. Pass this gas through freshly prepared lime water. What happens to the lime water? When carbon dioxide is passed through lime water, calcium carbonate is formed, which makes lime water milky. The turning of lime water into milky is a standard test of carbon dioxide.



Let us study another example of a chemical change

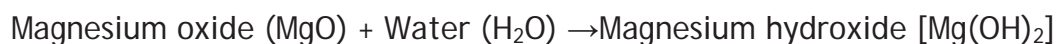
Get a thin strip or ribbon of magnesium. Clean its tip with sandpaper. Bring the tip near a candle flame. It burns with a brilliant white light. When it is completely burnt it leaves behind a powdery ash.

The change can be represented by the following equation:



Collect the ash and mix it with a small amount of water. Stir the mixture (aqueous solution) well. Test the mixture with blue and red litmus papers. It will turn red litmus blue. This is because magnesium hydroxide formed is basic.

This change can be written in the form of the following equation:



Magnesium hydroxide is the substance formed by mixing magnesium oxide with water.

### Some examples of chemical change

- Explosion of firecrackers
- When food gets spoiled,

## Rusting of Iron

Iron when exposed to moist air for a long time acquires a brown flaky coating. This substance is called rust. This process requires presence of air and water. Rust is a general term for iron oxides formed by the reaction of iron with oxygen. It is extremely slow process.

The chemical formula:  $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$  (n= no. of water molecules)

The process of rusting can be represented by the following equation:

Iron (Fe) + Oxygen ( $\text{O}_2$  from the air) + water ( $\text{H}_2\text{O}$ )  $\rightarrow$   $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$  (Rust)

### Conditions for Rusting of Iron

- The presence of water and oxygen are essential for the rusting of iron.
- Impurities in the iron, the presence of water vapour, acids, salts and carbon dioxide hastens rusting.
- Pure iron does not rust in dry and carbon dioxide free air. It also does not rust in pure water, free from dissolved salts.
- Metals like chromium, zinc and magnesium prevent rusting to a great extent and alkalis also help to prevent rusting.

### Prevention

Prevent iron articles from coming in contact with oxygen or water.

- Apply a coat of paint or grease.
- Deposit a layer of a metal like chromium or zinc on iron. The process of depositing a layer of zinc on iron is called galvanization.
- Stainless steel is an alloy which is made by mixing iron with carbon and metals like chromium, nickel and manganese. These can be used instead of metals as these alloys have properties of the metals from which they are made.

## Crystallization

It is a slow precipitation of crystals from a solution of a substance. It can also refer to solids-liquids separation of substances.

### Activity

Take a beaker and add one fourth of the beaker with water and a few drops of dilute sulphuric acid. Heat the water. When it starts boiling add copper sulphate powder slowly while stirring continuously. Continue adding copper sulphate powder till no more powder can be dissolved. Filter the solution. Allow it to cool. Do not disturb the solution when it is cooling. Look at the solution after some time. You will see the crystals of copper sulphate.

