Changes Around Us

Reversible and Irreversible Changes

Take a rubber band. Stretch it and then release it.

What happens to the rubber band?

Does the stretched band recover its original shape and size on releasing or does its shape change permanently when it is stretched?

It will be observed that the rubber band regains its shape when it is released. Thus, the change that the rubber band undergoes on stretching is a reversible change.

A change is called reversible if a substance that is undergoing the change can be re-obtained. All other changes are called irreversible changes. We will now discuss these changes in detail along with their examples.

Reversible change

A reversible change is the one in which a substance that is undergoing the change can be recovered in its original form.

For example, when ice cubes are kept at room temperature for some time, they melt to give water. If the same tray containing water is kept in a freezer, then the water turns into ice. As the ice cubes are re-obtained when the tray is kept in the freezer, the change is reversible.

Let us watch the following animation to understand reversible changes in a better manner.

Irreversible change

The change in which a substance that is undergoing the change cannot be re-obtained is known as an irreversible change. Hence, it can be said that an irreversible change is the one in which a substance that is undergoing the change cannot be recovered in its original form.

The following animation explains an example of irreversible change.

Take a piece of paper and draw a ball on it and then cut along its outline, as shown in the figure.

Can this change be reversed?

Take two raw eggs and boil one of them. Compare the raw egg with the boiled egg.

What kind of change does the egg undergo on boiling?

The given table classifies a few changes as reversible and irreversible.

Reversible change	Irreversible change
Boiling of water	Cooking of food
Dissolution of sugar in water	Burning of wood
Melting of ice-cubes	Ripening of fruits
Melting of butter	Chopping of wood

Changes in the Properties of a Substance on Heating and Cooling

You may have observed many changes that take place around us. Some of these changes can be reversed and some cannot be reversed. There are many changes that occur when the temperature of a substance is increased or decreased. For example, when water is kept in a freezer, the temperature of the water decreases and it freezes to form ice.

So, can you tell what will happen to a substance when it is heated or cooled? And, is it possible to re-obtain the substance by reversing the change?

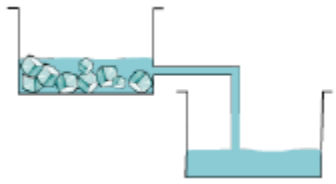
When a substance is heated, it may melt or evaporate. When it is cooled, it may condense or freeze. In some cases it might contract.

Do you know what the terms expansion and contraction mean? How are these terms related to changes in heat energy?

All metals expand when heated and contract when cooled. When heated, there is an increase in the volume of a substance and the process is known as expansion. Again, when cooled, there is a decrease in the volume of a substance and the process is called contraction.

The given animation shows an application of expansion and contraction.

You must have seen the tools that are used to dig soil. The iron blade of such a tool has a ring that attaches it to the wooden handle. Here again, the processes of expansion and contraction are used.



When ice-cubes are kept at room temperature for some time, they form water. If the tray containing water is kept in a freezer, then the water again changes into ice cubes. The formation of water when ice cubes are heated (or when the temperature of the ice cubes is increased) is called melting.

Melting is the process in which the physical state of a substance changes from solid to liquid at its melting point.

Have you observed that when water is sprinkled on a roof during a hot summer afternoon, it soon disappears? When a substance is present in liquid state, a part of it keeps changing into gaseous state by absorbing heat energy from the surroundings and eventually evaporates. This is a temperature dependent process; as temperature increases, the rate of evaporation also increases.

Take a small amount of water and dissolve some salt in it. Keep the solution in sunlight for a few hours. You will observe after some time that all the water evaporates, leaving behind a white powder. This white powder is nothing but salt. Salt is obtained in a similar manner from seawater.