

Chapter 03

Children, have you ever assisted your mother in the kitchen? You must have noticed she is able to make many things at a time because she is able to use the hot utensils with ease. How is that possible? Well let's find out!

A frying pan becomes hot when kept on a flame. It is because the heat from the burner flame passes to the utensils. When the pan is removed from the fire, it slowly cools down. Why does it cool down?

It cools down because the heat is transferred from the pan to the surroundings. So you can see that in both cases, the heat flows from a hotter object to a colder object or hotter area to the cooler area.

This process where heat is transferred from hotter object to colder objects is known as conduction.

Do all substances conduct heat easily? How is that she able to hold this hot pan with ease? Let us explore.

Activity 4.7

Heat water in a small pan or a beaker. Collect some articles such as a steel spoon, plastic scale, pencil and divider. Dip one end of each of these articles in hot water.

Wait for a few minutes. Touch the other end. The materials which allow heat to pass through them easily are conductors of heat. For examples, aluminum, iron and copper.

So how heat is transferred in solids?

In solids, we know that the molecules are held tightly next to each other. So when an iron rod / or any metal is heated, the heat is transferred between the molecules quickly. Hence the temperature of the metal increases quickly.

Some of you might have experienced that during pooja/ offering to God, we do aarti/ light candles. When the metal with aarti/camphor gets heated and we can't hold it for long. Hence we use another plate to keep the aarti so as to not to burn our hand. These metals are good conductors of heat.

The materials which do not allow heat to pass through them easily are poor conductors of heat such as plastic and wood.

Poor conductors are known as **insulators**. The water and air are poor conductors of heat.

The panhandles are made of wood or insulated material. The heat does not pass through them and hence even though the pan is hot, we can shift them easily.

TRANSFER OF HEAT IN LIQUIDS/FLUIDS/GASES

To understand the transfer of heat in liquids let us do a simple activity.

Take a round bottom flask (if flask is not available, a beaker can be used).

Fill it two-thirds of water. Place it on a tripod, Wait till the water in the flask is still. Place a crystal of potassium permanganate at the bottom of the flask gently using a straw.

Now, heat the water by placing the candle just below the crystal

When water is heated, the water near the flame gets hot. Hot water becomes lighter and rises up. The cold water from the sides moves down towards the source of heat. This water also gets hot and rises and water from the sides moves down again. This process continues till the whole water gets heated. This mode of heat transfer is known as **convection**.

HEAT TRANSFER IN GASES

How does the heat travel in air? In which direction does the smoke go?



When we light a candle, the air near the heat source gets hot and rises. The air from the sides comes in to take its place. In this way the air gets heated. The following activity confirms this idea.

People living in the coastal areas experience an interesting phenomenon.

During the day, the land gets heated faster than the water. The air over the land becomes hotter and rises up. The cooler air from the sea rushes in towards the land to take its place. The warm air from the land moves towards the sea to complete the cycle. The air from the sea is called the **sea breeze**.

To receive the cooler sea breeze, the windows of the houses in coastal areas are made to face the sea.

At night the activity is completely reversed. The seawater cools down more slowly than the land. So, the cool air from the land moves towards the sea. This is called the **land breeze**.

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