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STUDY MATERIAL SCIENCE

CLASS-VII

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► Heat

Precautions in Using a Laboratory Thermometer

- While -measuring temperature, the laboratory thermometer should be held vertically.
- The thermometer bulb should be surrounded from all sides by the substance whose temperature is to be measured.
- The thermometer reading should be taken while its bulb is still in touch with the substance whose temperature is being measured and by keeping the mercury level along the line of sight.
- The thermometer should not be held by the bulb.
- The thermometer should be carefully handled.
- We should note down the temperature reading by keeping the thermometer bulb immersed in hot water because if the thermometer bulb is taken out of hot water, then its mercury thread will start falling and this will give a wrong reading for the temperature of hot water.

Transfer of Heat

- By conduction (in solid, heat is transferred by conduction)
- By convection (in liquid and gases, heat is transferred by convection)
- By radiation (in free space or vacuum, heat is transferred by radiation)

Let us discuss all the three ways of heat transfer.

1. Conduction

The mode of transfer of heat from hotter part of a material to its colder part or from a hot material to a cold material in contact with it, without the movement of material as a whole, is known as conduction. In all the solids, heat is transferred by the process of conduction.

Conductor and Insulator of Heat

Materials which allow heat to be conducted through them easily are conductors of heat. Those metals such as iron, copper, silver, aluminium, etc., are good conductors of heat.

Bad conductors of heat are those materials which do not allow heat to be conducted through them easily. These materials are also known as insulators of heat. Wood, plastic and glass are insulators of heat.

2. Convection

The mode of transfer of heat from the hotter part of a fluid (liquid or gas) to its colder parts by the movement of the liquid (or gas) itself is known as convection. The transfer of heat by convection can take place only in liquids and gases. It is due to the reason that the particles in liquids and gases can move about freely.

So, the transfer of heat by convection cannot take place in solids because the particles in the solids are fixed at a place and cannot move about freely. It is also not occurred in empty space or vacuum because there are no particles of any kind in empty space which can move and transfer heat.

Convection in Water

Water is a poor conductor of heat. So, due to this reason, it cannot transfer heat by conduction but it transfers heat by the process of convection.

Convection in Air

Air is a very poor conductor of heat, Air transfers heat from its hotter parts to the colder parts by the process of convection.

Sea and Land Breezes

The blowing of sea breeze and land breeze in coastal areas is generally occurred due to the convection of heat in air.

In coastal areas during the day time, the breeze generally flows from the sea towards the land and during the night time, blows from the land towards the sea. Sea and land breezes are actually convection of heat.

During the day, the land heats up more than water. Due to this, the air over the land becomes hotter and lighter and rises up. So, the air from the sea which is cooler and heavier rushes to take the place created by hot rising air. Therefore, a sea breeze blows during the day.

During the night, the land loses heat faster than water and becomes cooler and the air over the sea is now warmer due to which, it rises up and the cooler air over the land rushes to take its place. Therefore, we observe a land breeze at night.