

Transfer of Heat

Heat flows from a hot object to a cold object or heat flows from an object at the higher temperature to another object which is at a lower temperature. This flow of heat is known as the transfer of heat.

E.g. → If you dip a steep spoon into a cup of hot tea, then we will find that the temperature of spoon rises and it becomes hot. In this case, some of the heat contained in hot tea has been transferred to spoon which is placed inside it.

When the two objects attain the same temperature, then the flow of heat stops. This means that no heat will be transferred from one object to another if the temperature of the two objects is the same.

There are 3 ways through which heat can be transferred from a hot object to a cold object.

- (i) By conduction (in solid)
- (ii) By convection (in liquid and gases)
- (iii) By radiation (in free space or vacuum)

(i) 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 & Insulator of Heat

- * Materials which allow heat to be conducted through them easily are conductors of heat. These metals are 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.
E.g. → Wood, plastic & glass.

Uses of Good & Bad Conductors of Heat

① We generally wear wollen clothes in winter as being an insulator, both wool and air together prevent the heat from our bodies from escaping out, keeping our body warm.

- ② We cover the ice with a jute cloth and sawdust as they are bad conductors of heat and prevent ice from gaining heat from the surroundings and melting.
- ③ The double walls of refrigerators having space inside which is filled with an insulating material, prevent the heat of the surroundings from reaching the inside of the refrigerator.
- ④ The two thinner blankets during the winter season are very much effective because the air layer trapped between the thinner blankets creates insulation and provides the protection from cold.

(11)

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 fluid itself is known as convection. It takes place in liquids & gases only due to the reason that the particles in liquids and gases can move about freely.

Convection in Water

Water being a poor conductor of heat cannot transfer heat by conduction but

so 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

Sea and land breezes are actually convection of heat.

Sea Breeze

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 & heavier rushes to take the place created by hot rising air. Therefore, a sea breeze blows during the day.

Land Breeze

During 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.

Radiation

The mode of transfer of heat through which heat energy from a hot body to a cold body by means of heat rays without any material medium between them is known as radiation.

Eg → The sun's heat reaches the earth by the process of radiation.

NOTE * During hot days, people prefer to wear white or light coloured clothes because light coloured clothes absorb less heat from the sun hence keep us cool.

* Dark coloured objects absorb heat better and also emit heat better than light coloured objects.

HOME ASSIGNMENT

Short Answer question-

- (a) What is transfer of heat?
- (b) Name the different methods of heat transfer.
- (c) Which transfer of heat method is used by -
 - (i) Solid (ii) Liquid (iii) Gas.
- (d) Define conductor with example in context of heat.
- (e) Define insulator with example in context of heat.

- (f) Define convection.
- (g) Define Radiation.
- (h) Define conduction.

Long Answer question -

(a) Give reason. Why?

- ① We wear dark coloured clothes in winter and light coloured in summer.
- ② Ice is kept in jute cloth.
- ③ Two thin blankets kept one over another makes you feel more warm than one thick blanket.
- ④ We wear woollen clothes in winter.
- ⑤ Refrigerators keeps the objects placed in -side it cold.

(b) Explain the phenomenon of land and sea breezes.

(c) Explain the concept of transfer of heat.