HEAT TRANSFER

We defined heat as a particular type energy than can be transferred from one body or place to another due to temperature difference. There are three ways in which heat energy can be transferred from one object or place to another.

1. Conduction: This is the process which involves direct contact between the two bodies involved. Here, heat energy is transferred along stationary solid materials. The heated particles remain in position.

Objects that allow heat to pass them easily are called good conductors of heat or simply conductors. Examples include metals. Mercury is a liquid metal therefore conduction occurs very well in mercury.

Materials that do not allow heat to pass through them are called bad conductors or insulators.

Conduction occurs in solids, liquids and gases though it is more pronounced in solids. It occurs in liquids and gases at slow rates

1. Convection: This is the process in which heat is transferred between fluids (i.e. liquids and gases) by the movement of the (heated and non-heated) fluids. This means that convection can occur in liquids and gases but never in solids.

When a liquid is heated in a container, the molecules of the liquid move up and down in a circular manner giving rise to a phenomenon called convectional current.

Convectional current can be natural or forced.

The natural convectional current is caused by the difference in temperature gradient in the fluids. Land and sea breeze are examples of natural convection.

Forced convection can be achieved through external agents such as electric fans, air conditioners etc.

The cooling of the radiator is by convection.

1. Radiation: This is the mode of heat transfer that does not require a material medium. The major difference between radiation and other modes of heat transfer is that radiation does not require a material medium while the others require material media.

Substances that transmit (or emit) radiation are called diathermanous.

Substances that absorb radiation are called adiathermanous.

The instrument used to detect radiation is called the Bolometer.

THERMOS FLASK

This is a two walled flask. In between the walls is a vacuum. The flask is designed to prevent heat loss or heat gain by conduction, convection and radiation.

The inner part of the vacuum is lined with silver. The vacuum prevents heat loss/gain by conduction and convection while the silver lining prevents heat loss/gain by radiation.

This flask was invented in 1724 by James De Waal

THERMAL CONDUCTIVITY

The nature of the substance

Surface area

Temperature gradient

K is a constant called the thermal conductivity of the substance.

is known as the temperature gradient.

The unit of thermal conductivity is Joules per second per meter per kelvin

.

The instrument used to measure the thermal conductivity of a substance is called a Katharometer.