Thermos flask is a special type of bottle which keeps hot liquid hot and cold liquids cold for a long time.

Construction:-

1. It is double walled glass bottle made up of thin glass which is kept inside a metal or plastic case.
2. The inner surface of both the walls are made shiny or silvery.
3. Air is removed from the space between the walls to create vacuum at the opening through which it is removed is later sealed.
4. The mouth of the flask is closed with a cork or plastic stopper.
5. There is a non-conducting support between the flask and the case.

Working principle: A thermos flask is designed so as to reduce gain or loss of heat by conduction, convection or radiation to a minimum.

The features of a thermos flask are:

1) The vacuum between the double walls of the flask prevents heat transfer by conduction or convection.
2) Glass, cork and rubber are bad conductors of heat due to which heat neither escapes from within nor enters from the outside.
3) The brightly polished walls of glass minimize heat transfer by radiation.

Thus, heat transfer by the three modes of transmission is minimized and temperature of the liquid inside the flask is maintained for a longer time.

Applications :

① **Thermos Flask :** A thermos flask keeps drinks hot or cold, close to its temperature for longer period of time by minimizing heat loss or heat gain.

(a.) It consists of a double walled glass shell having a vacuum between the walls. Both the walls are silvered on the vacuum side. Heat cannot enter or leave the inner flask by conduction or convection through the vacuum.

(b.) A very small quantity of heat can be gained or lost by the flask by radiation but this is reduced to minimum because of silvering. A little heat is transmitted through this glass wall at neck and the cork stopper.

② **Greenhouse :** • Greenhouse is generally made of glass sheets or polycarbonate plastic. It is used to grow plants in cold climates.

- The solar radiation easily passes through the transparent roof and walls and is absorbed by the floor (earth).
- The warm air is enclosed and is not allowed to escape.
- As the structure is not open to the atmosphere, the warmed air cannot escape via convection due to presence of roof and walls, so the temperature inside the greenhouse rises.
- The inside temperature also rises due to conduction. The heat loss is negligible.