6 Keeping food and drink warm

To keep food and drink warm we need to keep it away from cold air.

Now that we know there are three ways in which heat can travel – conduction, convection and radiation, we can find ways of controlling how heat moves. This is vital if we want to keep things warm (or cool).

Insulating eggs

The bigger the difference in temperature between two objects, the faster the hotter one will lose heat. For example, warm food has a much higher temperature than the air in a room. As a result, it can lose heat rapidly.

If you pick up a hot boiled egg with a paper tissue, for example, the heat will quickly move through the tissue and make it too hot to hold. The egg will lose heat so fast that it will cool down very quickly.

To keep an egg hot, the egg needs to be insulated. The thicker the material, the more it insulates, so one simple solution is to make a cover thicker (Picture 1).

The stay-hot flask

Keeping drinks or food hot for long periods of time is difficult. The Scottish scientist Sir James Dewar was the inventor of the principle of the stay-hot flask we now call a **VACUUM FLASK** (Picture 2). He set out to stop heat being exchanged between the inside and outside of a flask. His answer was to make a glass flask with two walls, and then to suck all of the air out of the space between the walls. Heat could not pass by conduction through the empty space. Dewar then put a very thick **CORK** stopper in the top of the flask. Cork is a very good insulator, so little heat was lost through the opening. Because heat was not lost at the top, no convection occured.

Dewar then tackled the problem of radiation. He coated the glass with silver

▼ **(Picture 1) Insulating covers may be made of thick cloth, knitted wool and other materials. The temperature difference between the inside and the outside can be checked with a thermometer.**

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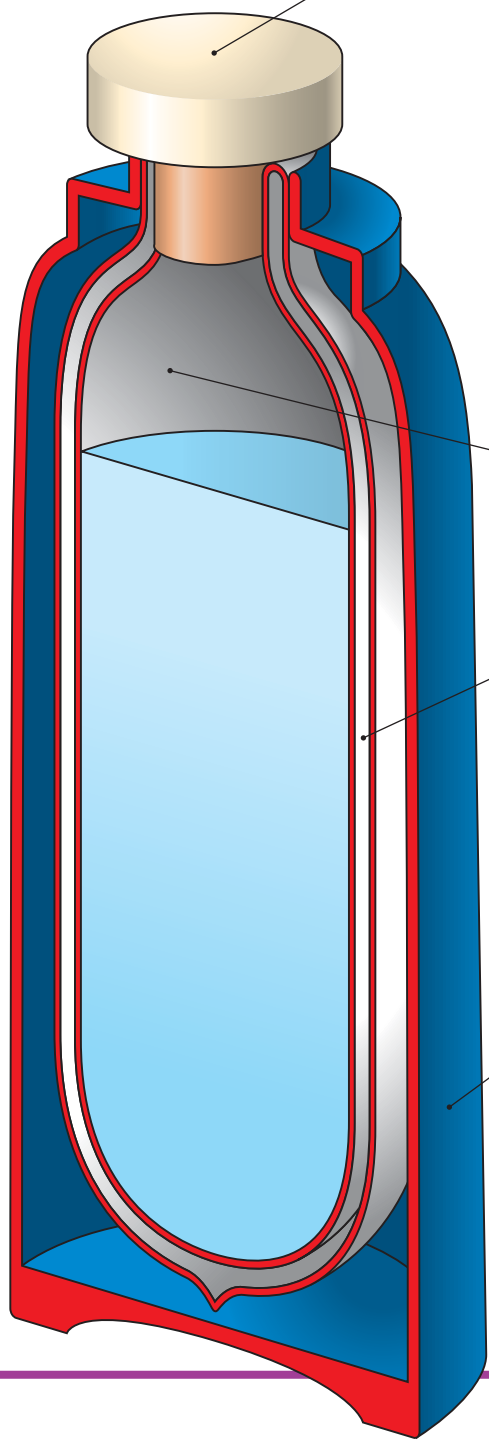
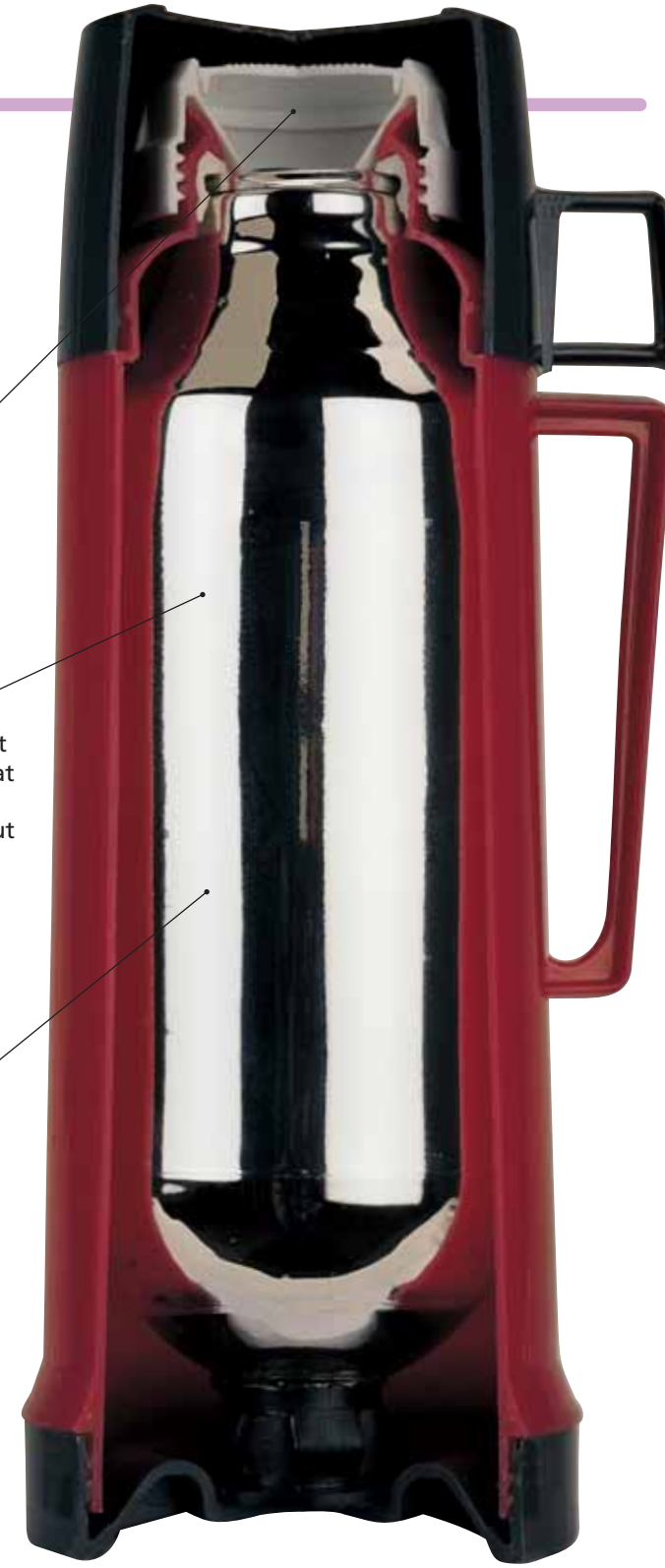
so that any heat radiated would be bounced back.

In this way, by understanding how heat is transferred, Dewar was able to keep the contents of the flask warm (or cold) for many hours.

(Picture 2) How a vacuum flask works.





Summary

- **Hot food and drink lose heat by conduction, convection and radiation.**
- **Increasing the insulation around them and adding a cover keeps food and drink hot for longer.**
- **A vacuum flask slows radiation, convection and conduction and keeps food and drink hot for many hours.**

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