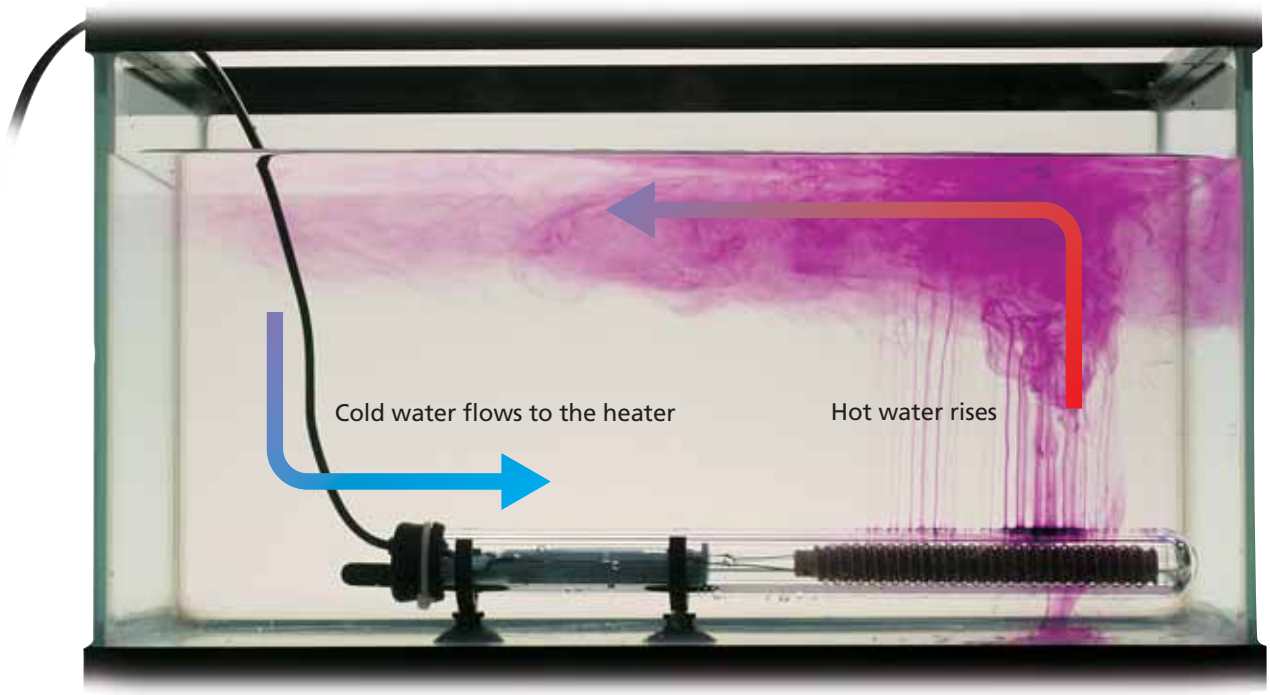
6 Hot liquids rise, cold liquids sink

When a liquid becomes warm, it gets lighter and rises; when it cools, it becomes heavier and sinks.



▲ (Picture 1) The purple dye in this tank shows what happens when water is heated. The warmed water is less dense and so it rises, then spreads out over the surface. As water rises above the heater, other, colder water is pulled in to take its place. The process is called convection.

When a liquid warms up it swells, and when it gets cold it shrinks. When the liquid swells, each particle takes up more space, but the total number of particles does not change. We say the liquid is now lighter, or less **DENSE**. Once it is lighter, the liquid rises just like a float bobs up to the surface of a pond.

The opposite happens when a liquid cools. The particles in a cool liquid take up less space, and so it tends to sink.

Hot water rises

When a hot liquid rises, other, cooler liquid flows in to take its place. You can clearly see how this happens when a heater is placed at the bottom of a tank (Picture 1). A purple dye has been used to show what is happening. As water over the heater is warmed it becomes less dense and rises. Cold water flows in and is heated in turn. This sets up a kind of natural stirring motion.

The same happens when you heat a saucepan of water. The water at the

bottom of the pan gets hot and rises to the surface, while colder water sinks down to take its place.

Cold water sinks

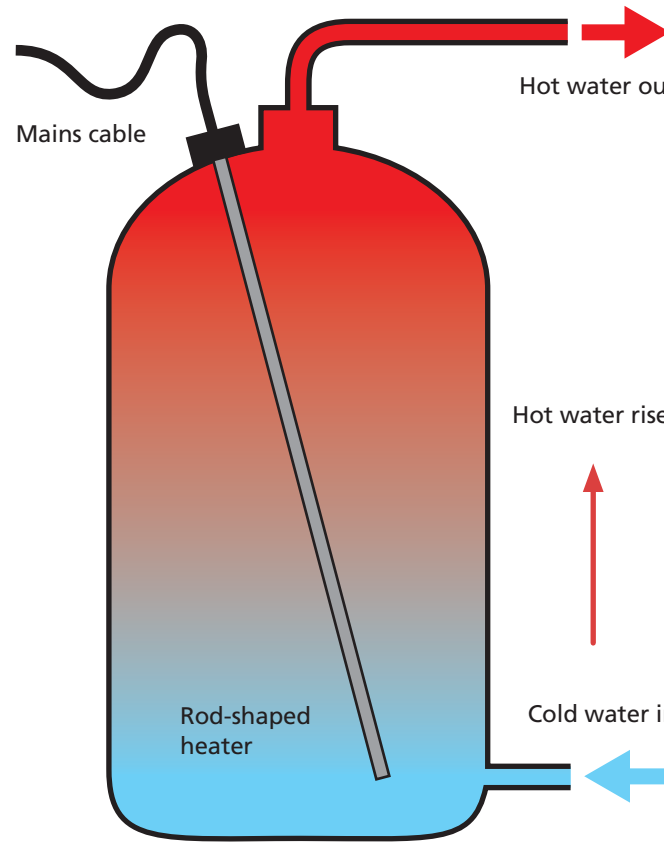
If ice is placed in a drink, it floats on the surface. The ice cools the water next to it. As the water becomes colder, it becomes more dense and sinks to the bottom of the glass, pushing warmer water back to the surface (Picture 2). This kind of stirring is much slower than heating because an ice cube is not very cold, but a stove gets very hot.

(Picture 2) The purple dye shows the way that water moves when it is cooled. The ice cube floating on the surface cools the water, which then sinks down the outside of the glass.

When water doesn't move

Warmed water naturally rises above cold water. So, if you heat water at the surface, it will stay on the surface and will not mix easily with the cold water below it. The same thing happens in lakes and oceans. The water on the surface is warmed by the Sun but the deeper water stays cold.

The fact that hot water stays above cold can be put to good use. In your hot water tank at home (Picture 3), the water is always drawn off from the top because this is the hottest part of the tank. The hot water doesn't mix with the cold water entering at the bottom.



(Picture 3) In a hot water tank, hot water is taken from the top, and more cold water flows in from below. This means that you draw off all of the hot water before you draw off any cold.

Summary

- **If liquids are warmed from below they rise.**
- **If liquids are cooled at the top they sink.**
- **If liquids are cooled at the bottom, or heated at the top, no movement takes place.**

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