Recovering dissolved substances

When water is allowed to EVAPORATE, or if it is boiled off, the solid substances that were dissolved in it are left behind.

As you have seen, a solution contains a mixture of substances dissolved in a liquid. You can't get the dissolved substances out of the liquid by filtering, so how do you separate them? The answer is by taking away the liquid.

There are two ways that a liquid, such as water, can be separated from the substances dissolved in it. These are called evaporating and **BOILING**. They both work by changing the water to steam (which is a gas). In each case, anything dissolved in the water will be left behind after all the water has changed to gas.

Evaporating

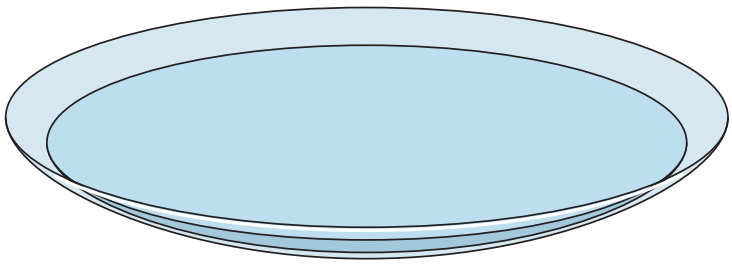
If you leave a salt water solution for several hours or days, the water will slowly evaporate, but the salt that was dissolved in it will not. Instead, the salt will be left behind (Picture 1).

Evaporation will speed up if the air above the water is dry. One way to keep dry air above the water is to blow air over it, or put the dish of water in a breeze.

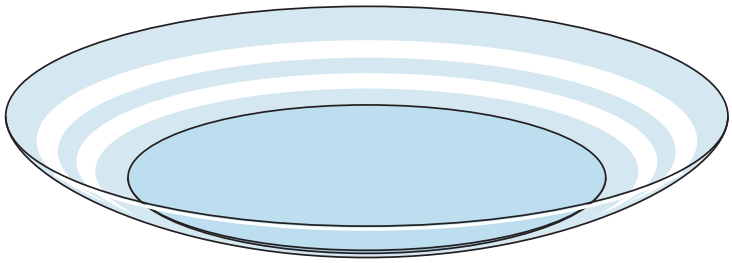
Another way of speeding up evaporation is to warm the air. Yet another way is to warm the water. The more warmth there is, the more **ENERGY** there is to make the water change from a liquid to a gas.

(Picture 1) The stages of evaporation.

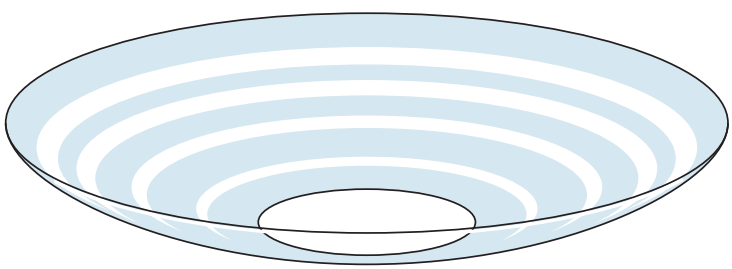
1. A glass bowl containing water. Salt is added and the solution is stirred until no more salt will dissolve.



2. Over time, evaporation removes water, and the water level goes down. A thin film of salt appears on the edge of the bowl.



2. Evaporation is complete. Only the dissolved solids remain.



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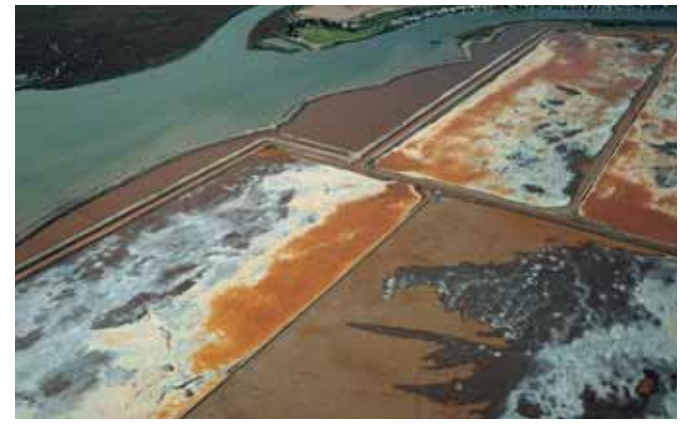
Much of the sea salt we use is made by letting sea water evaporate in lagoons that are heated by the Sun (Pictures 2 and 3).

Boiling

Boiling is a fast form of evaporation. By boiling the water, you are putting a large amount of heat energy into the water and making the water change from liquid to gas as fast as possible.

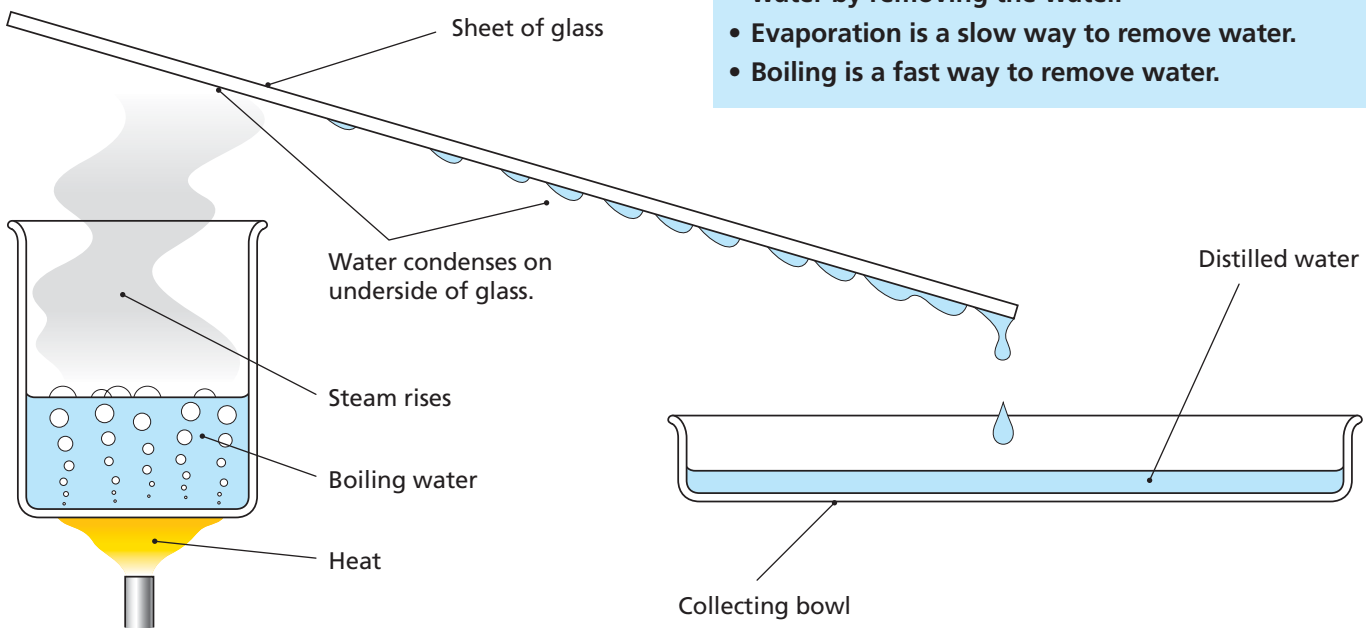
Boiling is sometimes used for getting the salt out of sea water so that it is fit to drink and free from impurities. In this case, the boiling produces steam, and the steam is cooled before it can mix with the rest of the air. When the steam is cooled, the water changes back into a liquid. This is called **CONDENSATION**. Once the condensed water has been collected and cooled it is ready for drinking (Picture 4).



(Pictures 2 and 3) The sea contains huge amounts of salt. People collect this sea salt by allowing the sea water to evaporate in lagoons. These are called salt pans. Because water evaporates faster when the water and the air are warm, most salt pans are found in places with warm climates, not cold ones.

Summary

- **Dissolved substances can be separated from water by removing the water.**
- **Evaporation is a slow way to remove water.**
- **Boiling is a fast way to remove water.**



(Picture 4) The principle of how condensation is used to make pure water by boiling. Pure water made from boiling is called distilled water.

SAFETY Never go near boiling water. Always get an adult to help.

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