



- Describe the difference between potable and pure water
- Describe the steps used to produce potable water from fresh water and from salty water



### Key Facts:

Water of appropriate quality is essential for life. For humans, drinking water should have sufficiently low levels of dissolved salts and microbes. Water that is safe to drink is called potable water. Potable water is not pure water in the chemical sense because it contains dissolved substances.

The methods used to produce potable water depend on available supplies of water and local conditions.

In the UK, rain provides water with low levels of dissolved substances (fresh water) that collects in the ground, in lakes, and rivers, and most potable water is produced by:

- choosing an appropriate source of fresh water
- passing the water through filter beds
- sterilising

Sterilising agents used for potable water include chlorine, ozone or ultra-violet light.

If supplies of fresh water are limited, desalination of salty water or sea water may be required.

Desalination can be done by distillation or by processes that use membranes such as reverse osmosis.

These processes require large amounts of energy.

Potable water is water that has been processed and is safe for human consumption and daily use.

The difference between pure water and potable water is that pure water is solely made up of **H<sub>2</sub>O molecules**, whereas potable water may contain different substances, usually dissolved minerals and salts.

Potable water should have the following characteristics:

Have a pH between 6.5 and 8.5.

The dissolved substances (e.g. salt) will be within a normal range i.e. not saturated.

Be free of bacteria or potentially harmful microbes.

Water is considered fresh when it is relatively free from dissolved substances e.g. rainwater.

Water can collect in reservoirs, lakes and rivers and is known as **surface water**.

In addition, it can collect in **aquifers** which are rocks that collect water underground.

This water is called **groundwater**.

The difference between distillation and desalination is distillation is the action of separating a solution by heating or cooling and desalination is the removal of salt from salt water. That is the difference between distillation and desalination.

### Did you know...

We're one of the UK's largest water and wastewater services company. Every day we supply **around 2.6 billion litres of drinking water to nine million customers**. We also remove and treat 4.4 billion litres of sewage every day for 15 million customers.



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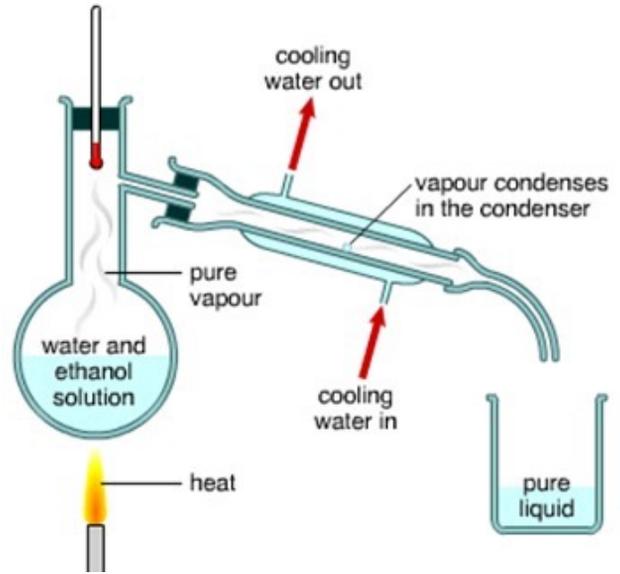
### Desalination

Desalination is the removal of salt from seawater. This produces clean drinking water and is particularly useful in countries that have coastlines but no readily available fresh water sources, such as rivers and streams.

Desalination uses one of two main methods. The first is **reverse osmosis**, where seawater is forced through a membrane at high pressure. The membrane allows water molecules to pass through but prevents any other chemicals dissolved in the water from passing through.

The second is **thermal desalination**. Older (thermal) desalination plants may work using a principle similar to **distillation**:

- the salt water is heated or the water is allowed to evaporate
- the water vapour is collected rather than being lost
- the water vapour is condensed to form pure water/fresh water
- the salt is left behind and can be used for other purposes



### Distillation

**Simple distillation** is used to separate a **solvent** from a **solution**. It is useful for producing **pure water from seawater**.

Simple distillation works because the **dissolved solute** has a much higher **boiling point** than the solvent. When the solution is heated, solvent **vapour** leaves the solution. It moves away and is cooled and **condensed**. The remaining solution becomes more concentrated as the amount of solvent in it decreases.

### Define the terms:

Potable water:

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Pure water:

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Explain the differences between the two terms.

Extended writing: describe the process of desalination.

Extended writing: describe the process of distillation

Extended writing: explain why distillation separates substances.

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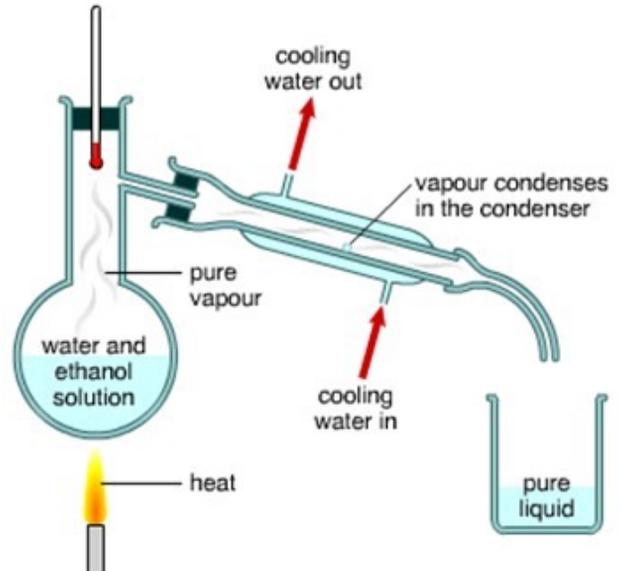
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