# Distillation

## ➢ Simple Distillation

**Simple distillation** is a technique for separating a liquid from a solution containing dissolved solids, or for separating one pure liquid from a mixture of liquids.

- For example, to separate water from a saltwater solution, we can use simple distillation. The saltwater is heated, the water vapour is collected, and then it's cooled to form pure distilled water.

### Procedure

Below are the steps for performing simple distillation.

**1. Set up the distillation apparatus:**

- Fill the distillation flask with the solution to be distilled

**2. Heat the solution using a Bunsen burner.**

- The neck of the flask is connected to a glass tube, which is surrounded by a component known as a condenser

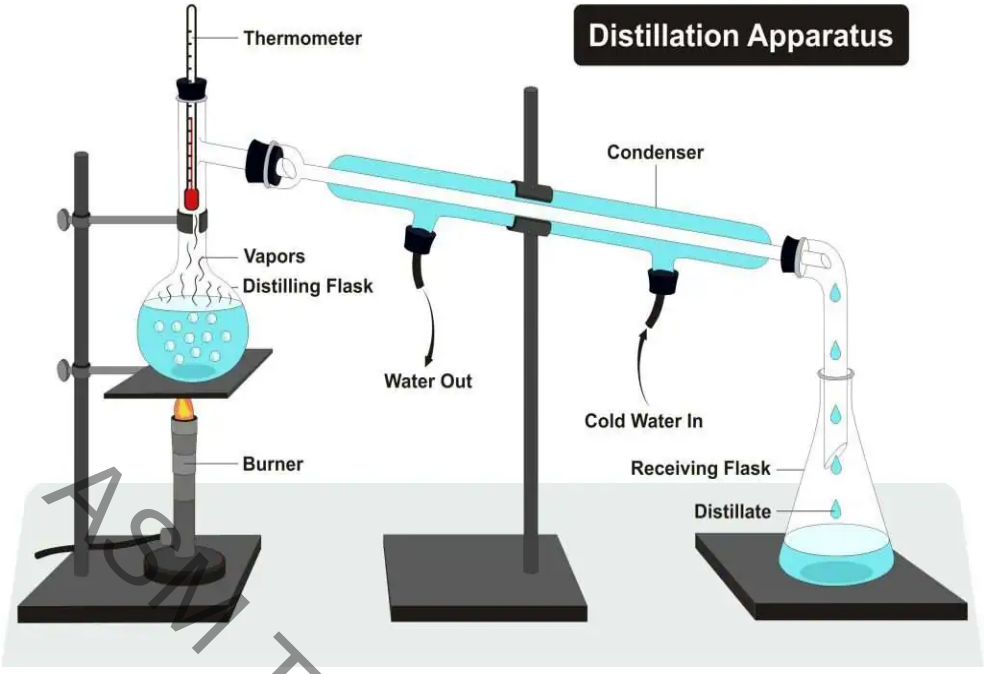
**3. The liquid will begin to evaporate, producing a vapour.**

- The liquid will evaporate at a specific temperature, which can be monitored using the thermometer

**4. The vapour will pass through the glass tube** and cool as it travels through the condenser, turning back into a pure liquid.

- The condenser remains cold due to the continuous flow of water through it

5. **The pure distilled liquid will collect in the receiving flask,** while the solids and liquids with a higher boiling point will remain in the distillation flask.






# Fractional distillation

- Fractional distillation is used to separate different liquids from a mixture of liquids. It is useful for separating ethanol from a mixture of ethanol and water, and for separating different fractions from **crude oil**.

## Principal of fraction distillation:

Fractional distillation works because the different liquids in the mixture have different boiling points.

## Procedure

To carry out fractional distillation with two liquids:

**1.** Heat the mixture to the temperature of the substance with the lowest boiling point (B.P).

- Use a thermometer to track the temperature
- The flask containing the mixture is connected to a glass column, which is called a **fractionating column**.

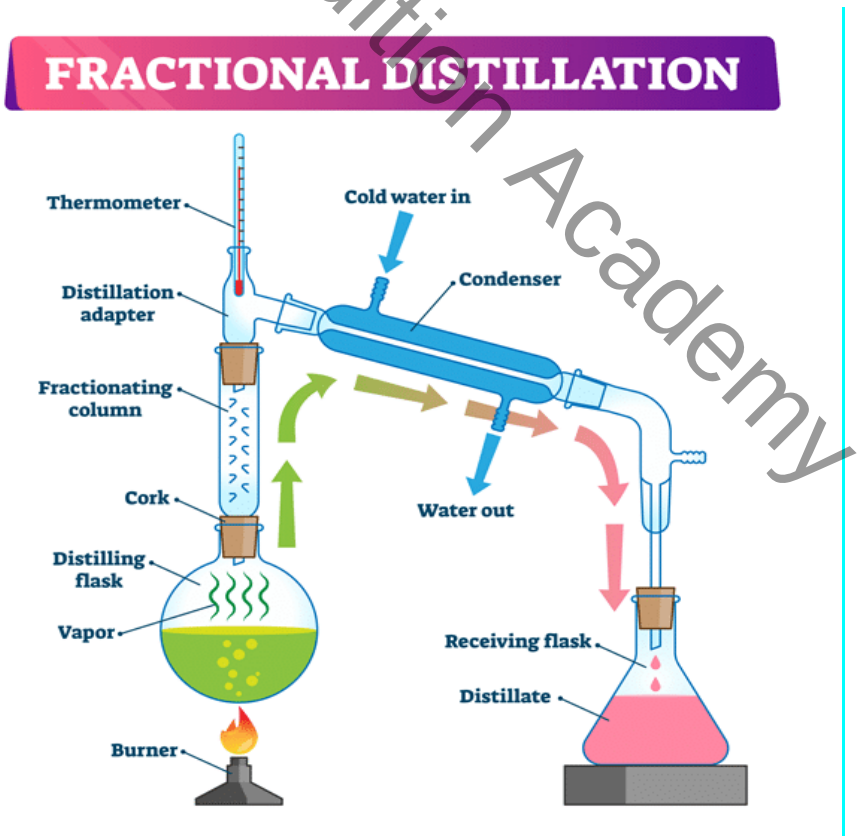
2. As you heat the mixture, the substance with the lowest B.P will evaporate more easily

**3.** So, the mixture of the two different vapours rises into the fractionating column

- The fractionating column is cold at the top and hot at the bottom. So, when the vapours of both substances reach the cooler part of the fractionating column, the substance with the higher B.P will tend to remain in liquid form. This means that it will drip back into the distilling flask.

**4.** The substance with the lower B.P will remain as a vapour, even at cooler temperatures. It will rise through the column, then cool and condense in the condenser, turning into a liquid.

**5.** Collect the liquid in the receiving flask.



## Difference between Simple distillation and Fractional distillation