Liquids in a liquid mixture can be separated from one another through heating if they have different boiling temperatures. Liquids can also be separated from the substances that have dissolved in them in the same way. These types of separation processes are called distillation.

Material

1	Demo physics board with stand	02150.00
1	Clamping holder, *d* = 28 ... 36 mm, fixing magnet	02151.06
1	Clamping holder, *d* = 0 ... 13 mm, fixing magnet	02151.07
1	Support plate on fixing magnet	02155.00
1	Burner-holder on fixing magnet	02162.00
1	Wire gauze holder on fix. magnet.	02163.00
1	Wire gauze 160 mm x 160 mm, ceramic cen.	33287.01
1	Microspoon, steel	33393.00
1	Beaker, 100 ml, low plastic	36011.01
1	Glass beaker DURAN, short, 250 ml	36013.00
1	Erlenmeyer flask 250 ml, narrow neck	36424.00
(1)	Glass tubes, right angled, 155+85, 1 item	36701.57
(1)	Glass tubes, l = 375 mm, 1 item made of	36701.67
1	Rubber stopper 26/32, 1 hole 7 mm	39258.01
1	Silicon tubing, d_i = 7 mm	39296.00
1	Glass rod, l=200mm, d=6mm	40485.04
1	Butane burner, Labogaz 206 type	32178.00
1	Butane cartridge without valve, 190 g	47535.00
1	Glycerol, 250 ml	30084.25
1	Boiling chips, 200 g	36937.20
1	Patent blue V, 25 g	48376.04

Fig. 1

Setup

- Place the holder for the burner on the left side on the board (Fig. 1)
- If using the butane burner place the holder for the wire gauze upon the board at the marked height of 240 and place the wire gauze on top of it
- Prepare colored water in the 250 ml glass beaker and fill 100 ml of it into the Erlenmeyer flask; add two boiling chips
- Slide the short sides of the right-angled glass tube into the rubber stopper with the aid of a bit of glycerol and seal the Erlenmeyer flask with the stopper.
- Affix the Erlenmeyer flask in the clamping holder (d = 28 ... 36 mm and lower it onto the wire gauze
- Place the straight glass tube onto the board with the aid of the other clamp holder according to Fig. 1 and connect it above with the rectangular glass tube with the aid of a approx. 15 cm piece of hose (twist the rectangular tube a somewhat towards the back to do this).
- Place the 100 ml beaker on the support plate beneath the straight glass tube

Implementation

- Bring water to a boil and allow it to continue boiling on a small flame
- Monitor the Erlenmeyer flask, glass tubes and beakers
- End the experiment after approx. 10 to 15 minutes

Observation and measurement results

Droplets form on the sides of the Erlenmeyer flask even before the water boils.
If the water boils these droplets formed are transferred to the glass tubes and quickly spread. Drops of water flow down in the slanted tube.
Droplet mist can also be seen in the glass tubes, it then escapes from the lower end of the straight glass tube.
Clear water is collected in the beaker.
The water quantity results from the size of the flame and the experiment duration. For example: If the water has been boiling for 10 minutes at a low heat the beaker will contain slightly more than 10 ml of water while the water level in the Erlenmeyer flask has been reduced by approx. 20 ml.

Evaluation

The hot steam condenses on the tube walls as the glass tubes are cooled by the surrounding air. The water that is produced (distilled water) is captured in the beaker.
When boiling colored water the water only evaporates, the dissolved dye (solid material) remains in the Erlenmeyer flask.

Remarks

The experiment demonstrates that not only water but also steam escapes from the glass tube. The tube would have to be cooled more effectively to increase the quantity of distilled water in the beaker. The coolers used for distilling in chemistry and technology are therefore more elaborate, they offer additional water cooling to reduce the temperature of the steam until it has been completely condensed.