

Edexcel Chemistry GCSE

CP 1: Investigate the composition of inks
using simple distillation and paper
chromatography

Notes



Simple Distillation

Aim

To investigate the composition of inks using simple distillation and paper chromatography.

Equipment list

- 250 cm³ beaker
- Quickfit Apparatus (including a condenser with rubber tubing, a fractionating column and connectors)
- Round-bottomed or pear-shaped flask
- Bunsen burner
- Clamp and stand
- Cold water tap
- Thermometer

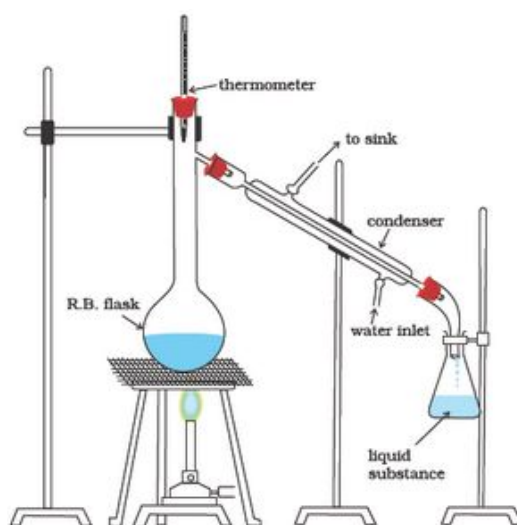
Method

1. Add a small volume of ink to a flask and connect the flask to a condenser (thermometer may also be added). Connect the condenser to a tap and place a beaker at the end of the opening.
2. Using a Bunsen burner, heat the flask slowly so that the ink simmers. Be careful not to heat the flask too strongly. Move the bunsen burner away if it starts boiling vigorously.
3. Collect a sample of the distilled solvent. Turn the Bunsen burner off when finished.

Key points

- Condenser should be horizontal with water entering at the bottom and leaving at the top.
- The flask should not be heated too strongly as this could cause the water to boil over into the beaker collecting the distillate.

Diagram



Simple distillation. The vapours of a substance formed are condensed and the liquid is collected in conical flask.

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Safety Precautions

- Turn off gas or leave Bunsen burner on orange safety flame when not in use.
- Tie back long hair.
- Keep flammable substances away from the flame.
- Be careful of the glassware. Clean up any smashed glass immediately.

Analysis of Results

The temperature recorded on the thermometer can be used to identify the solvent present in the ink by comparing it to the boiling point of possible solvents.



Paper Chromatography

Aim

Investigate the composition of inks using simple distillation and paper chromatography.

Equipment list

- 250 cm³ beaker
- Ruler and pencil
- Distilled water or suitable solvent
- Chromatography paper
- Pipette or capillary tube

Chemicals required

- Distilled water or suitable solvent
- Ink mixture to be separated

Method

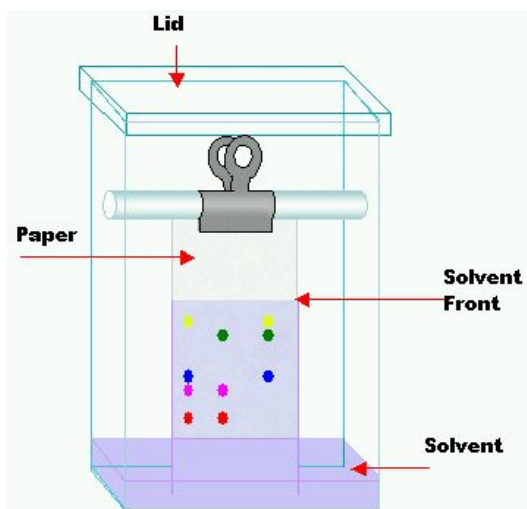
1. Use a pencil to draw a line across the chromatography paper, 2 cm from the bottom.
2. Use the pipette or capillary tube to add small dots of different inks to the line on the chromatography paper. Make sure they are not placed too close together.
3. Place the paper in a beaker containing 1 cm³ of solvent and leave the solvent until it has moved 2/3 of the way up the paper.
4. Remove the chromatogram from the solvent. Mark where the solvent reached by drawing a horizontal line across the chromatography paper at this point.
5. Leave the chromatography paper until the solvent has dried.
6. Measure the distance travelled by the solvent front and the spots from the pencil line.

Key points

- Pencil should be used to draw the line on the chromatography paper as it is insoluble in the solvent so it will not travel up the paper.
- Ink spots should be placed above the level of solvent in the beaker to prevent them dissolving in the solvent and being washed away.
- The chromatography paper should be removed from the solvent before the solvent front reaches the top to allow the R_f values to be calculated. Spots with the same R_f value for the same mobile and stationary phases are likely to be the same substance.



Diagram



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Safety Precautions

- Wear safety goggles and gloves when handling harmful solvents.
- Use a well ventilated lab or fume cupboard when using harmful solvents.
- Clear up any spillages or broken glassware immediately.

Analysis of Results

Calculate the R_f value of each ink spot using the formula:

$$R_f = \text{distance moved by substance} \div \text{distance moved by solvent.}$$

Compare R_f values and colours of each ink spot.

