

GCSE Edexcel

Separation and purification

There are different ways to separate mixtures, for example by filtration, crystallisation, distillation or chromatography. The method chosen depends upon the type of mixture.

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Core practical - investigating the composition of inks

There are a number of ways that you could investigate the composition of inks in Chemistry. This is an outline of the required steps to undertake one of these methods.

Aims

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

Simple distillation

Method

1. Add a small volume of ink to a flask. Connect the flask to the fractionating column and secure it with a stand, boss and clamp.
2. Attach a condenser to the top of the fractionating column, connect it to a cold water tap and sink, and secure it over a beaker.
3. Heat the flask using a Bunsen burner, reducing the flame as necessary to achieve gentle simmering.
4. Collect a small sample of the distilled solvent, then turn the Bunsen burner off.

Results

1. describe the appearance of the distilled solvent
2. if your apparatus included a thermometer at the top of the column, record the maximum temperature reached as the solvent was collected

Analysis

1. Explain any difference in the appearance of the solvent and ink.

2. If you measured the maximum temperature, compare this to the boiling points of possible solvents. These could include water, ethanol and propanol.

Evaluation

Discuss whether or not you are able to identify the solvent from the ink.

Paper chromatography

Method

1. draw a pencil line across the chromatography paper, 1-2 cm from the bottom
2. use a pipette or capillary tube to add small spots of each ink to the line on the paper
3. place the paper into a container with a suitable solvent in the bottom
4. allow the solvent to move through the paper, but remove the chromatogram before it reaches the top
5. allow the chromatogram to dry, then measure the distance travelled by each spot and by the solvent

Results

1. Record your results in a suitable table. For example:

Ink	Spot colour	Distance travelled by spot (mm)

Analysis

1. Calculate the R_f value of each spot.

2. Compare the R_f values and colours of each spot in the inks. Describe their similarities and differences.

Evaluation

Question

Explain why the distances travelled by each spot were measured in mm, rather than in cm.

Reveal answer ▼

Hazards, risks and precautions

It is important in this practical activity to use appropriate apparatus and methods. This includes the safe use and careful handling of substances. Eye protection must be worn.

Evaluate the hazards and the precautions needed to reduce the risk of harm. For example:

Hazard	Harm	Precaution
Hot apparatus	Skin burns	Allow apparatus to cool before touching it
Bunsen burner flame	Skin burns	Keep hair and clothes tucked in
Bunsen burner flame	Fire	Do not bring flammable solvents near to the flame
Harmful solvent	Skin irritation	Avoid skin contact, eg wear gloves
Harmful solvent	Breathing difficulties	Ensure adequate ventilation or use a fume cupboard

Glossary ▾

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