

Objectives

- C0.6** Evaluate the risks in a practical procedure and suggest suitable precautions for a range of practicals including those mentioned in the specification.
- C2.7** Explain the experimental techniques for separation of mixtures by:
- (a) simple distillation
 - (b) fractional distillation (links to a Maths statement).
- C2.11** *Investigate the composition of inks using simple distillation and paper chromatography.*

Maths requirements

- 1c** Use ratios, fractions and percentages.
- 4c** Plot two variables from experimental or other data.

Learning outcomes

-  **SC2.7** Describe how to carry out, and explain what happens in, simple distillation.
-  **SC2.7** Distinguish between simple distillation and fractional distillation.
-  **SC2.7** Identify when fractional distillation should be used to separate a mixture.
-  **SC2.7** Describe how to carry out fractional distillation.
-  **SC2.7** Explain how the products of fractional distillation are linked to the boiling points of the components.
-  **SC2.7** Explain what precautions are needed to reduce risk in a distillation experiment.

Exploring

1. Distillation – Core practical

This practical forms part of the core practical requirement of the specification. It is supported by the information in the Student Book *SC2d Distillation*. Students follow the instructions on Students' sheet CP1b (Investigating composition of Ink -Distillation). The first page has the experimental instructions. Ink will show an obvious visual indication that the water has been purified. Depending on the precise dimensions of the delivery tube, the beaker of ice water may need to be supported above bench height.

Support: Demonstrate the procedure first, showing how to clamp the flask and how to heat it gently.

Stretch: Give students a list of available apparatus and ask them to design their own set-up to successfully purify the water, instead of giving them the first page of the worksheet with instructions to follow.

Safety

Wear eye protection.

Warn students of the risk of scalding from hot steam. Explain the use of anti-bumping granules to help the liquid boil more smoothly and reduce the risk of boiling over.

Expected results

Students will produce a clear liquid (pure water) as the distillate. The steam should have a temperature of 100 °C.

Course resources

Chem Students' sheet CP1b

Equipment

For each group: eye protection, conical flask, 2-hole rubber bung with thermometer, delivery tube, test tube, beaker (250 or 400 cm³), crushed ice, Bunsen burner, tripod, gauze, heat-resistant mat, ink, anti-bumping granules