

Aim

The aim of the revision activity is to provide support for students who need to progress from *developing* to *secure* for the core National Curriculum statements.

The aim of the extension activity is to provide extension for students who have already achieved *secure*. The activity is also suitable for higher ability or older students in need of further extension work.

Revision activity overview

The revision activity asks students to work through a number of tasks to help them move towards demonstrating a secure grasp of key concepts from this chapter. Suggestions are given in the Teacher Handbook of how you can support students in making progress for each outcome.

Additional notes:

- The revision sheet should be appropriate for students achieving less than 62 % in the Checkpoint assessment.
- You can review students' answers to questions in the Checkpoint assessment in Kerboodle. You may decide not to cover all tasks in the revision sheet, based on students' performance on specific questions.
- An index of which task covers which outcome is given in the Teacher Handbook.
- Students should be confident when using terminology such as solute, solvent, and solution before beginning this activity. You may wish to revisit the meaning of these three words before allow students to begin.
- It is important that students are reminded of chromatography as a separation technique. Students often focus on the analytical uses of chromatography, overlooking the fact that the analytical approach only works due to the separation of mixtures.
- This sheet could also be used as a revision sheet for all students.

Revision activity answers

Task 1

- 1 Element – diagram of one type of atom only. These can be monatomic, diatomic, and so on.
Compound – diagram of more than one type of atom joined together into a molecule. All molecules must be identical in diagram
Mixture – diagram of more than one type of atom or molecule, not chemically joined together.
- 2 **a** Graph of water contains only straight lines.
Graph of chocolate contains curves.
b Water is pure. This is because changes of state are shown as horizontal lines/occur at one temperature.
c Heating curve for water should be labelled solid, melting, liquid, and boiling.
Heating curve for chocolate should be labelled solid, melting, and liquid.
d The substance for testing should be placed in a beaker with a thermometer. Heat the beaker and its contents using standard heating apparatus (Bunsen burner, tripod, and gauze). Record the temperature from the thermometer at regular time intervals, for example, every minute.

Task 2

- 1 **a** A solution is made when a solute is dissolved in a solvent.
b A solute dissolves when its particles separate, and solvent particles surround each solute particle. Like the solvent particles, the solute particles are now arranged randomly and can move freely.
- 2 **a** The solubility of a substance is the mass of that substance that dissolves in 100 g of water. For example, 202 g of sugar can dissolve in 100 g of water at 20 °C.
b A solution is said to be saturated when no more solute will dissolve.

Task 3

- 1 diagram of filter funnel – filtration
diagram of evaporating basin - evaporation
diagram of round-bottomed flask and condenser – distillation
diagram of chromatography paper – chromatography
- 2 2, 5, 1, 4, 3
- 3 solvent, salt, solvent, solution, evaporating basin, evaporates
ink, distillation, lower, condenser, liquid
- 4 Place a sample of each ink you would like testing on the pencil line of the chromatography paper. Place the chromatography paper in a beaker of solvent, for example, water. The level of solvent in the beaker must not be above the pencil line. The solvent moves up the chromatography paper. The ink samples dissolve in the solvent. The solvent carries the samples up the chromatography paper. Some dyes move faster than others, and some dissolve better than others, so the mixture separates.
- 5 **a** green
b Probably not, since felt-tip pens from different companies contain different combinations of dyes for the same colour. This will be shown as the same coloured dots at different heights of the chromatogram, or with additional coloured dots/colours missing.

Extension activity notes

Students prepare an instruction booklet for a trainee scientist on four separation techniques (filtration, evaporation, distillation, and chromatography).

Additional notes:

- It is recommended that this activity is only given to students achieving 62% or more in the Checkpoint assessment.
- Students will use their literacy skills to explain scientific key words such as solubility, and organise information in an extended piece of writing.
- This is also an excellent opportunity for students to revise hazards and risks in a scientific environment.
- This activity could also be used as extension material for older students, as a recap on solutions, mixtures, and separation techniques.

Extension activity marking guidance

The extending outcomes shown in the teacher-handbook spreads in C2 Chapter 2 can be used for marking guidance.

Content in the booklet should cover:

- explanation of a mixture
- the difference between solution and solubility
- all key words used correctly and consistently
- description and explanation of each separation technique
- labelled diagrams for each technique
- examples of substances separated by each technique
- annotated particle diagrams to explain how substances are separated
- risks, hazards, and safety precautions associated with each technique.