

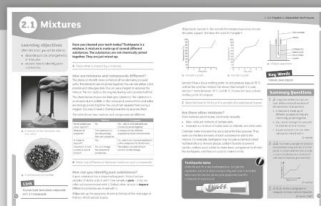
2.1 Mixtures

Chemistry NC link:

- the concept of a pure substance
- mixtures, including dissolving
- the identification of pure substances.

Working Scientifically NC link:

- use appropriate techniques, apparatus, and materials during fieldwork and laboratory work.



Band	Outcome	Checkpoint	
		Question	Activity
Developing	State that parts of mixtures are not joined together (Level 3).	A, B, 1	Plenary 1
	State that different substances in mixtures have their own melting points (Level 4).	C, 2, 3	Plenary 2
	Choose a simple separation technique with help (Level 3).		Main 2
Secure	Describe particle arrangements in mixtures (Level 5).	A, B, 1, 3	Main 2, Plenary 1
	Explain how to identify pure substances (Level 6).	C, 2	Plenary 2
	Select appropriate separation techniques for different mixtures (Level 5).		Main 2
Extending	Use particle models to represent mixtures (Level 7).		Main 2, Plenary 1
	Comment on a substance's purity by interpreting temperature change data (Level 7).	C, 2	Plenary 2
	Explain why separation techniques are suitable, in terms of the properties of constituent substances (Level 7).		Main 2

Maths

Students interpret numerical data in graphs in order to determine whether substances are pure or impure.

Literacy

Students explain the terms mixtures, pure, and impure, using these words when describing and explaining experimental observations.

APP

Students select appropriate separation techniques when separating mixtures (AF4) and interpret melting and boiling point data to draw conclusions on the purity of substances (AF5).

Key Words

mixture, impure, pure

Answers from the student book

In-text questions	<p>A Several different substances not chemically joined together.</p> <p>B Credit two of the following: Substances in mixtures are not chemically joined together whereas in compounds they are. Properties of mixtures are the same as the constituent elements, whereas in compounds they are different. Mixtures of substances are easy to separate, whereas a chemical reaction is required to separate compounds to their elements. Relative amounts of elements can change in a mixture, whereas in compounds they cannot.</p> <p>C Substances with clearly-defined melting (or boiling) points are pure. If the melting or boiling of a substance occurs over a temperature range then it is impure.</p>
Activity	<p>Toothpaste tales Ingredients list and uses should include hydrated silica (removes plaque), sodium fluoride (prevents cavities), sodium lauryl sulfate (makes foam), carrageenan (thickens toothpaste), and titanium oxide (whitener).</p>

78

Summary Questions

- 1a** A mixture is made up of different substances that are **not** chemically joined together.

b You **can** change the amounts of substances in a mixture. (**c** is correct.) (3 marks)
- 2** Substance is pure because the phase change (melting or boiling) takes place at a clearly-defined temperature. (2 marks)
- 3** 6 mark question. Example answers:
In a mixture substances are not joined together. In a compound the atoms of the substances are strongly joined together. Substances in mixtures keep their properties whereas compounds have different properties to the elements they are made of. Substances in mixtures can be easily separated. Substances in compounds have to be separated by chemical reactions. The amount of each substance in a mixture can change, but in a compound the relative amount cannot change.



Starter	Support/Extension	Resources
<p>An alternative question-led lesson is also available.</p> <p>What is a mixture? (5 min) Students describe what they think a mixture is and give examples of any everyday mixtures they can think of. A common misconception is that mixtures cannot contain substances that appear to remain together, and students will often assume if a substance looks the same throughout (such as white toothpaste) then it cannot be a mixture, so this can cause confusion.</p> <p>Spot the mixtures (10 min) Students sort a list of common substances according to whether they are mixtures or not using the interactive resource. Students should justify their suggestions. Check their answers and ask students if there are any substances that they have found surprising in its category.</p>	<p>Support: Remind students of the definitions of atom, element, and compound before they proceed.</p> <p>Extension: Students recall and use the words pure and impure.</p> <p>Extension: Students should suggest how mixtures are related to elements and compounds.</p>	<p>Question-led lesson: Mixtures</p> <p>Interactive: Spot the mixtures</p>
Main	Support/Extension	Resources
<p>Identifying mixtures (15 min) Discuss the definition of a mixture, explaining that they contain parts which can easily be separated, and that they would be classified as impure. Explain that pure substances will have sharp melting points, whereas impure substances melt over a range of temperatures. Discuss the differences between elements, compounds, and mixtures.</p> <p>Separating mixtures (25 min) Students carry out simple experiments to separate different mixtures, choosing appropriate techniques using the apparatus provided, justifying their choice of techniques, and answer the questions that follow.</p>	<p>Support: The accompanying support sheet lists possible separation techniques and how they work.</p>	<p>Practical: Separating mixtures</p> <p>Skill sheet: Scientific apparatus</p>
Plenary	Support/Extension	Resources
<p>Defining mixtures (10 min) Draw particle diagrams of elements, compounds, and mixtures on the board. Students use their knowledge to decide on the category and use mini-whiteboards to display their answer. This activity will ensure full-class participation.</p> <p>Pure or impure? (10 min) Draw sketch graphs for phase changes of hypothetical substances. Students use mini-whiteboards to say whether the graph shows a pure or impure substance. Select students to justify their answer.</p>	<p>Extension: Students may draw other examples of their own, particularly if double-sided whiteboards are available.</p> <p>Extension: Students should be able to suggest, using the direction of the line graph, whether the graph is showing the melting/boiling or freezing/condensing of a substance.</p>	
Homework	Support/Extension	
<p>Students write a list of five mixtures from around the home and local environment. Students explain how they decided the substances were mixtures.</p>	<p>Extension: Encourage students to offer suggestions on how to separate mixtures into individual substances.</p>	

79