

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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Pure substances and mixtures

The meaning of pure

The word 'pure' is used in chemistry in a different way from its everyday meaning. For example, shops sell cartons labelled as 'pure' orange juice. The label means that the contents are just orange juice, with no other substances added. However, the juice is not pure in the chemical sense, because it contains different substances mixed together. In chemistry:

- a **pure** substance consists only of one **element** or one **compound**
- a **mixture** consists of two or more different substances, not chemically joined together



The components of a mixture can be separated without chemical reactions

Different types of chemical substance

- an element contains just one type of **atom**
- a compound contains two or more types of atom joined together
- a mixture contains two or more different substances that are not joined together
- the different substances in a mixture can be elements or compounds

The table shows some examples:

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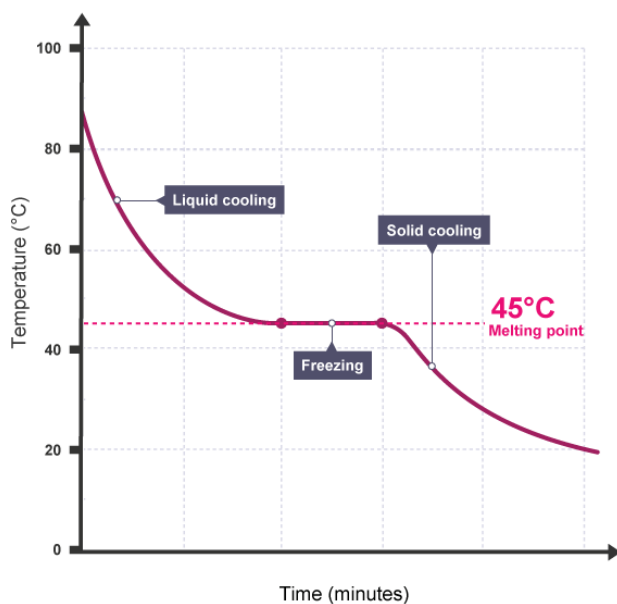


Description	Example	Diagram
Pure element	Oxygen	
Pure compound	Carbon dioxide	
Mixture of elements	Oxygen and helium	
Mixture of compounds	Alcohol and water	
Mixture of elements and compounds	Air	

Notice that the different substances in a mixture can be single atoms, molecules of elements or molecules of compounds.

Distinguishing between pure substances and mixtures

Pure substances have a sharp **melting point** but mixtures **melt** over a range of temperatures. This difference is most easily seen when the temperature of a hot liquid is measured as it cools and **freezes**. The graph shows the cooling curve for a sample of a compound called salol.



The temperature stays the same while a pure substance changes state

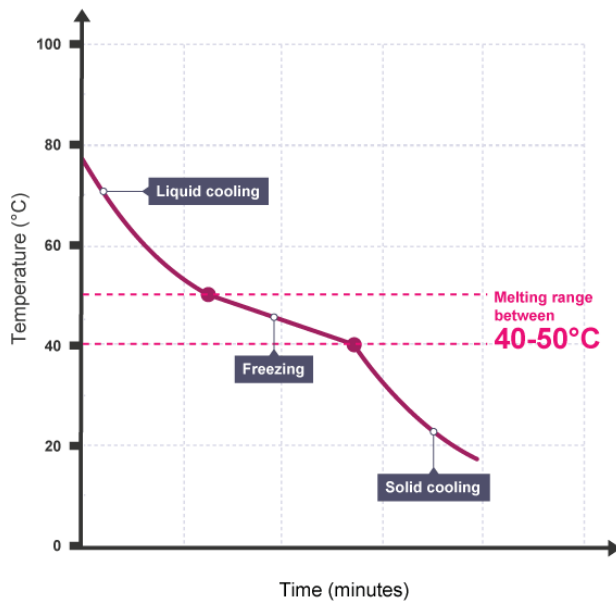
The horizontal part of the graph shows that the salol has a sharp melting point, so it is pure. Impure salol (a mixture of salol and other substances) would produce a gradual decrease over a range of temperatures as it freezes.



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The temperature changes slightly as an impure substance changes state



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