

**Home learning activities**

Subject
Science
Year Group
Year 8
Unit of work / Knowledge organiser
Mixtures and Separation Techniques
Activities
<ul style="list-style-type: none"><li>• Read through Sections 1-7 of the 'Knowledge Organiser' on 'Mixtures and Separation Techniques'. Make careful and detailed notes on sections 1-3 as well as writing a list of the separation techniques which are described in the remaining sections.</li><li>• Without looking at your notes, describe, in your own words, what a mixture is (compare your answer with Section 1 afterwards).</li><li>• Learn the meanings of the key words from the 'Mixtures and Separation Techniques Keywords' sheet and complete the key words from memory on the 'Keywords Test' sheet. Find your score using the 'Key Words' sheet.</li><li>• Read the 'Key Revision Facts' sheet carefully.</li><li>• Describe, in your own words, the difference between 'filtration', 'distillation' and 'chromatography' without looking at the 'Key Revision Facts' sheet.</li><li>• Complete the 'Match and Draw', 'Filtration' and 'Dissolving' activities on the 'Test Yourself' pages; the answers are provided at the end, but do not look at these until you have tried to complete the work yourself (<b>be strict with yourself here</b>).</li><li>• Complete the exam question on 'Mixtures and Separation Techniques'. Use the mark scheme (<b>once you have tried the question</b>) to mark your answers carefully.</li></ul>
Where do you complete the work?
In Study Books.
What to do if you finish the work? (Extension activity)
<ul style="list-style-type: none"><li>• Make sure you have completed the previous set work on 'Pressure and Moments' and then complete the 'Mini Project' on 'Separating Mixtures'.</li></ul>

These websites might help:

- BBC Bitesize -> Secondary -> KS3 -> Science -> Chemistry -> Separating Mixtures

If you are struggling with your work or if you have finished.

**Please email your classroom teacher directly using the email list found in the Home Learning section of the website.**

# Year 8 – Mixtures and Separation Techniques

## 1. What is a mixture?

A **mixture** consists of two or more different substances, not chemically joined together.

The substances in a mixture can be elements, or compounds, or both. Being part of a mixture does not change the chemical properties of the substances that are in it.

Examples of mixtures are: Sea water, air, soil and bleach.

## 2. Pure or Impure?

A **pure substance** consists only of one **element** or one **compound**.

An **impure substance** is made of two or more **elements** or **compounds** that are not bonded together chemically.

## 3. Solutions

Mixture formed from a **solvent** and a **solute**.

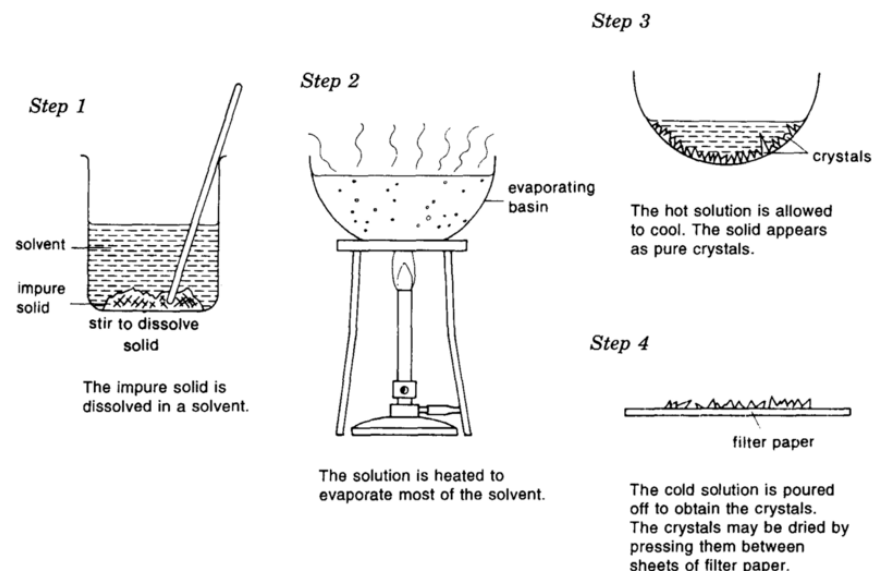
Examples of solutions are:

Dishwater (soap dissolved in water)

Fizzy drinks (carbon dioxide dissolved in water)

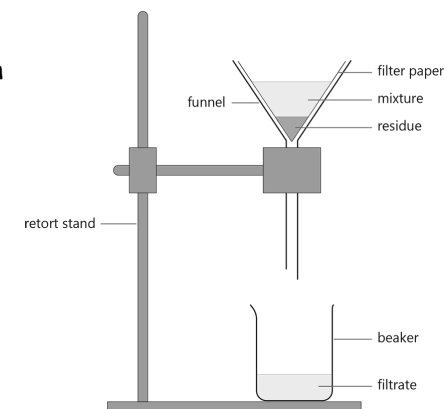
Sweet tea (sugar dissolved in solution)

## 4. Crystallisation



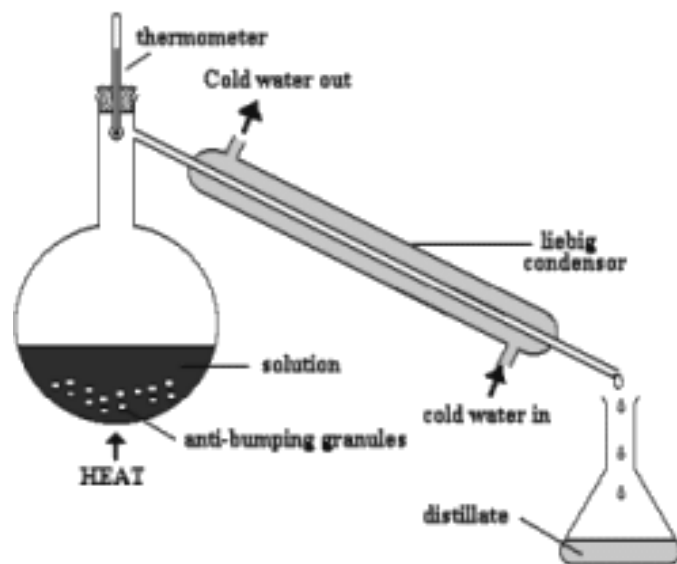
## 5. Filtration

Filtration is a method for separating an insoluble solid from a liquid. When a mixture of sand and water is filtered, the sand stays behind in the filter paper (residue) and the water passes through the filter paper (filtrate)



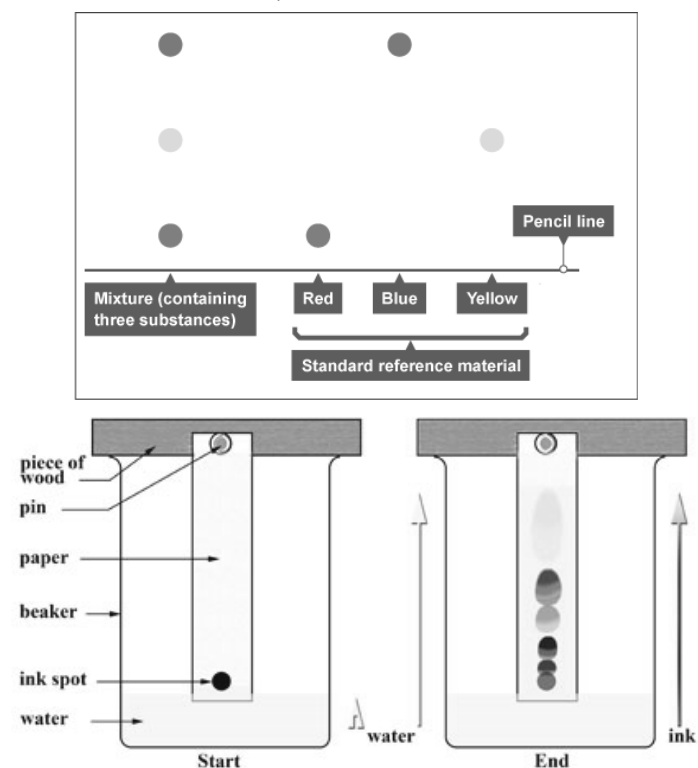
### 6. Distillation

**Distillation** is a method for separating the solvent from a solution. For example, water can be separated from salt solution by simple distillation. This method works because water has a much lower boiling point than salt. When the solution is heated, the water evaporates. It is then cooled and condensed into a separate container. The salt does not evaporate and so it stays behind.



### 7. Chromatography

Paper chromatography is a method for separating dissolved substances from one another. It is often used when the dissolved substances are coloured, such as inks, food colourings and plant dyes. It works because some of the coloured substances dissolve in the solvent used better than others, so they travel further up the paper. A pure substance will only produce one spot on the chromatogram during paper chromatography. Two substances will be the same if they produce the same colour of spot, and their spots travel the same distance up the paper. In the example below, red, blue and yellow are three pure substances. The sample on the left is a mixture of all three.



## Year 8 'Mixtures & Separation Techniques Keywords' Sheet

Q	Word	Meaning
1	atom	The smallest part of an element.
2	bond	Force holding atoms together.
3	compound	Substance that can be split up into simpler substances.
4	element	A substance that cannot be split up into anything simpler by chemical reactions.
5	molecule	Two or more atoms joined together.
6	precipitate	Insoluble solid produced by mixing two solutions.
7	pure	A substance that does not have anything else in it.
8	distillation	Separating a liquid from a solution by evaporating the liquid and then condensing it.
9	boiling point	When a liquid is at its boiling point it is as hot as it can get. It is evaporating as fast as it can.
10	freezing point	The temperature at which a liquid turns into a solid.
11	melting point	The temperature at which a solid turns into a liquid.
12	Mixture	Two or more different substances that are not joined together
13	Filtering	Separating a solid from a liquid when they don't dissolve. The liquid passes through filter paper to do this.
14	Residue	The solid left behind in the filter paper when filtering
15	Filtrate	The liquid that passes through the filter paper when filtering.
16	Solute	The solid that has dissolved in a liquid to make a solution
17	Solvent	The liquid that has dissolved a solid to make a solution
18	Solution	When a solid has dissolved in a liquid we end up with a _____
19	Soluble	When a solid dissolves in a liquid it is said to be s_____
20	Insoluble	When a solid cannot dissolve in a liquid it is said to be I_____
21	Dissolved	When a solid "splits up" and mixes with a liquid to make a solution we say it has Dissolved
22	Saturated solution	A solution that contains as much solid as it possibly can
23	Evaporation	When a liquid turns to a gas
24	Chromatography	Used for separating dissolved solids. Usually colours.
25	Chromatogram	The filter paper that is used for chromatography
26	Condensation	When a gas turns back to a liquid.
27	Salts	The solid usually left behind when we evaporate water from something.

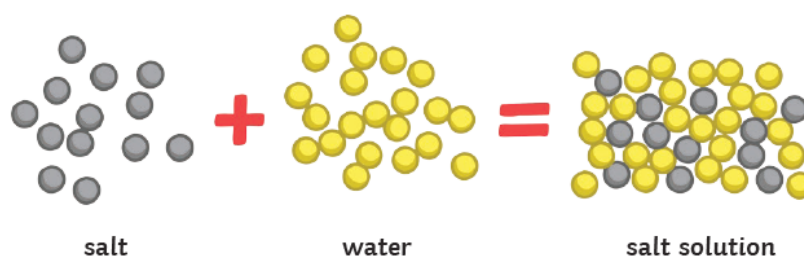
## Year 8 'Mixture & Separation Techniques Keywords' Test

Q	Word	Meaning
1		The smallest part of an element.
2		Force holding atoms together.
3		Substance that can be split up into simpler substances.
4		A substance that cannot be split up into anything simpler by chemical reactions.
5		Two or more atoms joined together.
6		Insoluble solid produced by mixing two solutions.
7		A substance that does not have anything else in it.
8		Separating a liquid from a solution by evaporating the liquid and then condensing it.
9		When a liquid is at its boiling point it is as hot as it can get. It is evaporating as fast as it can.
10		The temperature at which a liquid turns into a solid.
11		The temperature at which a solid turns into a liquid.
12		Two or more different substances that are not joined together
13		Separating a solid from a liquid when they don't dissolve. The liquid passes through filter paper to do this.
14		The solid left behind in the filter paper when filtering
15		The liquid that passes through the filter paper when filtering.
16		The solid that has dissolved in a liquid to make a solution
17		The liquid that has dissolved a solid to make a solution
18		When a solid has dissolved in a liquid we end up with a
19		When a solid dissolves in a liquid it is said to be s_____
20		When a solid cannot dissolve in a liquid it is said to be l_____
21		When a solid "splits up" and mixes with a liquid to make a solution we say it has Dissolved
22		A solution that contains as much solid as it possibly can
23		When a liquid turns to a gas
24		Used for separating dissolved solids. Usually colours.
25		The filter paper that is used for chromatography
26		When a gas turns back to a liquid.
27		The solid usually left behind when we evaporate water from something.

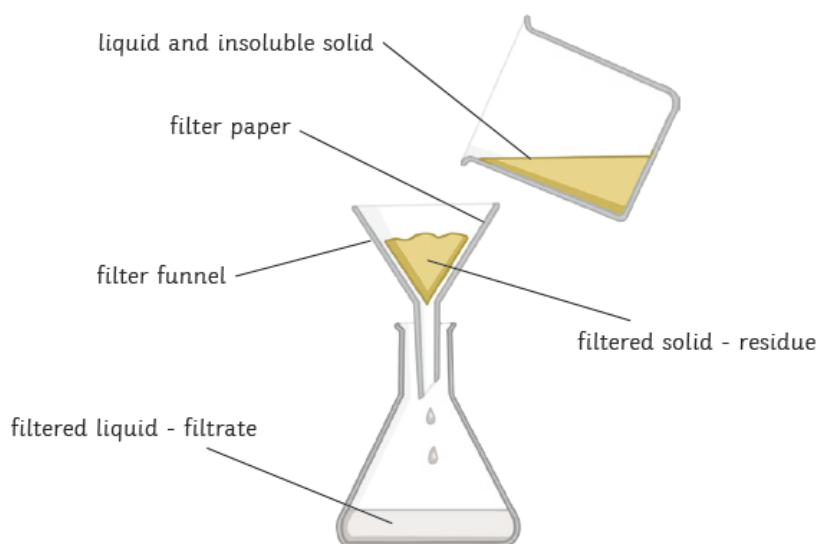
# Separation Techniques

## Key Revision Facts

- Mixtures contain several different substances, but they are not chemically combined.
- Pure substances can be identified by their boiling points.
- Solute – the solid that dissolves in a liquid.
- Solvent – the liquid the solute dissolves in.
- Solution – a mixture of the solute and solvent
- When salt is dissolved in water the particles mix with one another and do not disappear.

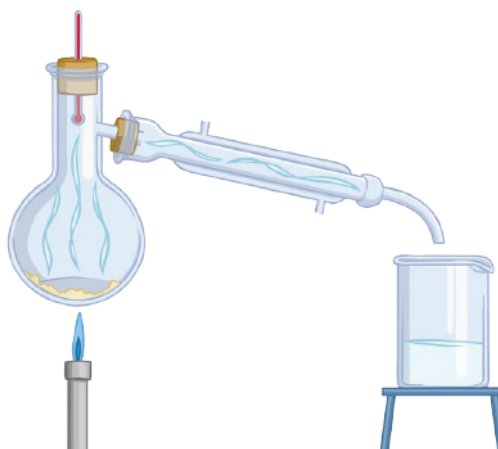


- Solubility is the mass of a solute that will dissolve in 100g of water.
- A saturated solution will not allow any more solute to dissolve.
- The apparatus for filtration is shown below.



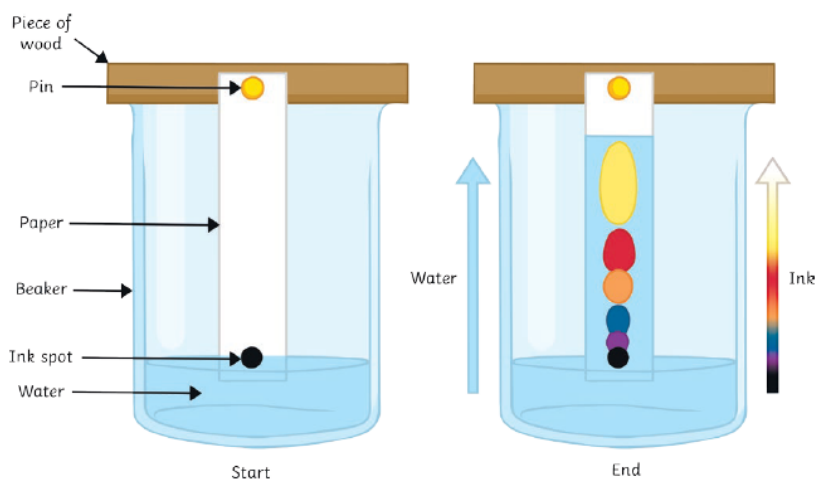
- Filtration will separate insoluble solids from liquids.
- Evaporating involves heating a solution, the water evaporates and crystals are left behind.

- Distillation can be used to obtain pure water from salt water. The equipment is shown below.



Salt water is heated up until it starts to boil, it is then cooled, condensed and collected. The salt is left behind in the flask and the pure water is collected in the flask.

- Chromatography is a separation technique used to find out which dyes are in a certain colour. The equipment is shown below.





# Separation Techniques Test Yourself

## Match and Draw

Draw a line between the key word and its definition.

Solute

A mixture of the solid and liquid

Solvent

A substance that will dissolve in a liquid

Solution

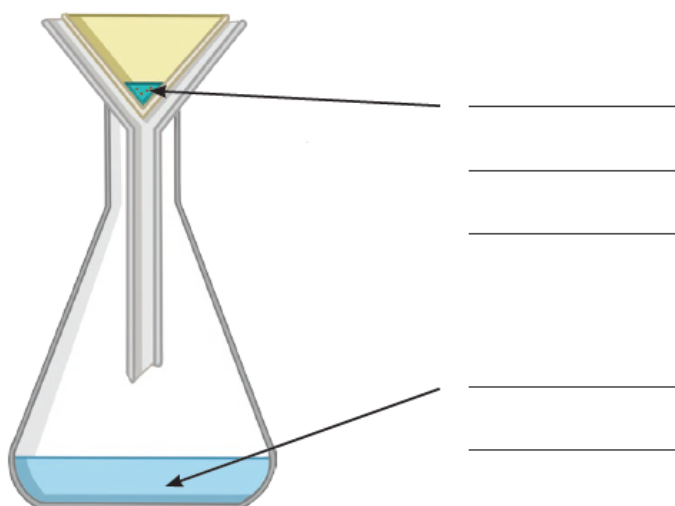
The solid that dissolves in a liquid

Soluble

The liquid in which the solid dissolves

## Filtration

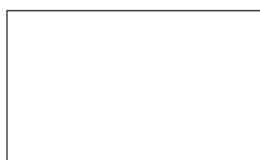
Use the following words to label the apparatus: residue, filtrate, insoluble, solid and liquid.



## Dissolving

Complete the 3 boxes below to show particles in salt, water and salt water.

salt



liquid



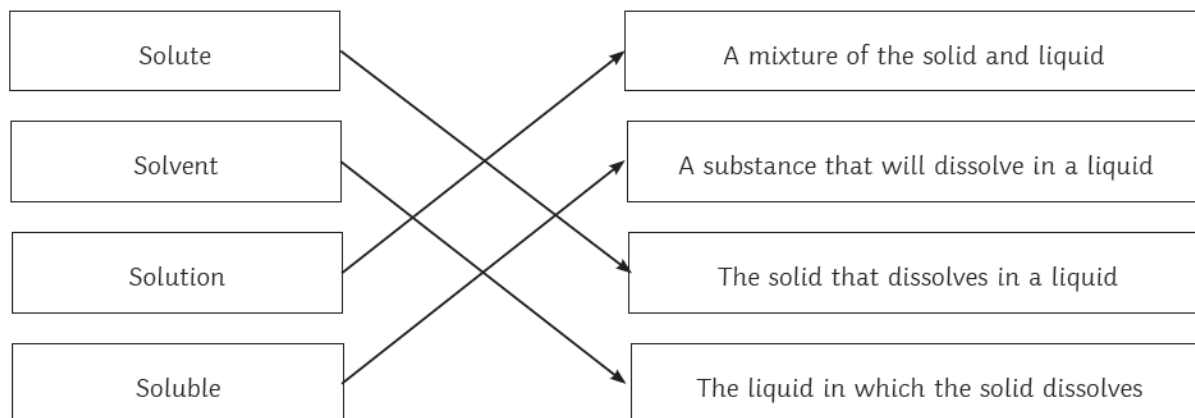
salt water



# Separation Techniques Test Yourself Answers

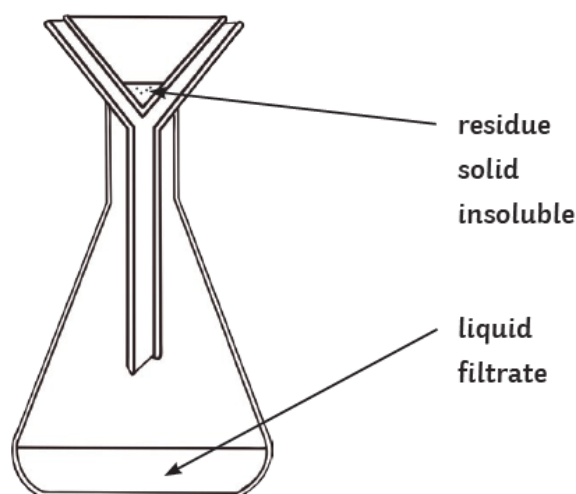
## Match and Draw

Draw a line between the key word and its definition.



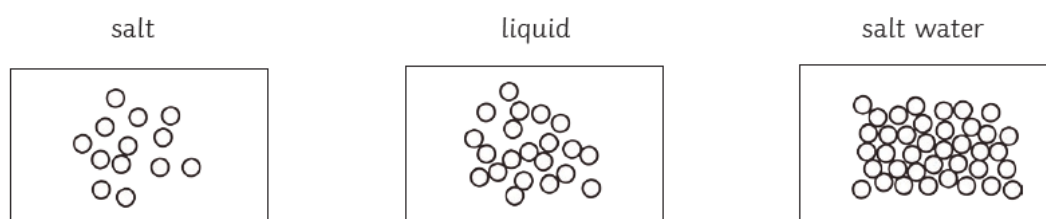
## Filtration

Use the following words to label the apparatus: residue, filtrate, insoluble, solid and liquid.



## Dissolving

Complete the 3 boxes below to show particles in salt, water and salt water.

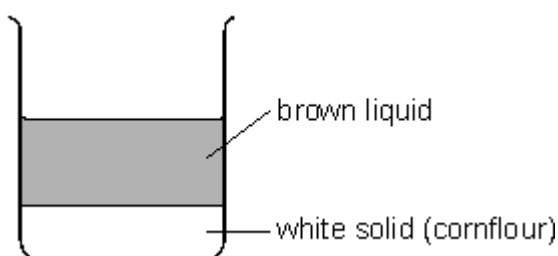


## Exam Question – Mixtures and Separating Techniques

Gravy powder contains:

- a brown substance to make the gravy brown;
- cornflour to make the gravy thick.

Dan mixed some gravy powder with cold water in a beaker. An hour later, the contents of the beaker looked like this:



(a) Use the words in the list below to fill the gaps in the following sentences.

**solvent      solution      soluble      insoluble**

The brown substance dissolves in water to form a brown .....

The cornflour settles at the bottom of the beaker because

it is ..... in water.

Water is the ..... in this experiment.

3 marks

(b) Dan wanted to separate the brown liquid from the white solid. What could he do to separate them?

.....

1 mark

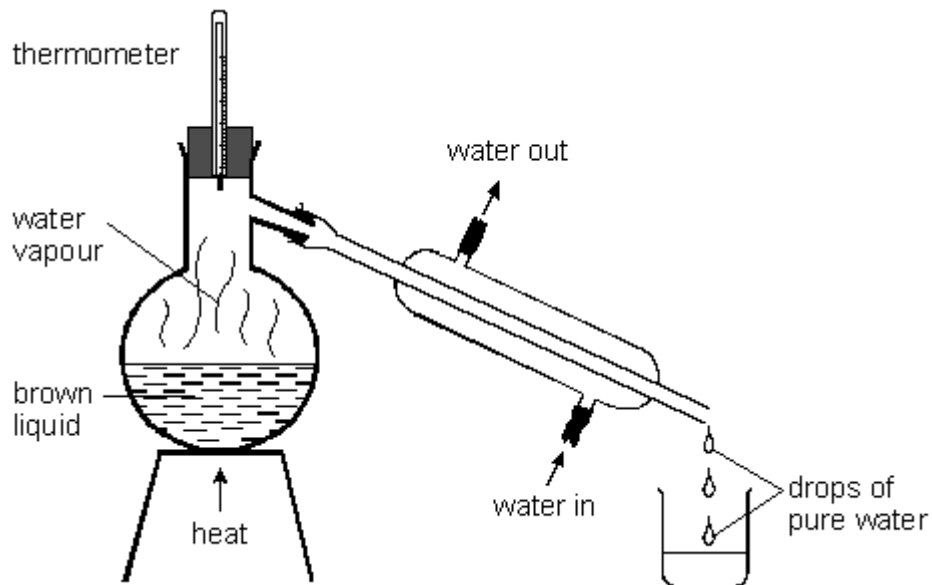
(c) Dan put a little of the brown liquid in a dish. The next day there was only a brown solid left in the dish. What had happened to the water?

.....

.....

1 mark

- (d) Dan wanted to get pure water from the rest of the brown liquid. He set up the apparatus shown below.



Water vapour from the brown liquid changed into drops of pure water which were collected in the beaker. What process caused the drops of water to form from the vapour? Tick the correct box.

boiling	<input type="checkbox"/>	condensing	<input type="checkbox"/>
dissolving	<input type="checkbox"/>	melting	<input type="checkbox"/>

1 mark  
Maximum 6 marks

## Mark Scheme – Mixtures and Separating Techniques

- (a) solution 1 (L4)  
insoluble 1 (L4)  
solvent  
*answers must be in the correct order* 1 (L4)
- (b) any **one** from  
• filter it **or** filtration  
*do not accept 'sieve it'*  
• pour off the liquid  
*accept 'centrifuge it'* 1 (L4)
- (c) it evaporated  
*accept 'it had become gas or vapour'* 1 (L4)
- (d) condensing  
*if more than one box is ticked, award no mark* 1 (L4)

**[6]**

# Separating Mixtures

Watch this video: <https://www.youtube.com/watch?v=XC1RxloV0Mo>

Task	Description
1	Create a decorative cover sheet for your project using pictures and as many keywords from the topic as possible.
2	Write a definition for an insoluble substance and soluble substance, and give two examples of each.
3	Draw or print off a diagram of a method for separating a mixture of rock and water and label each part of the apparatus. After that, write a paragraph explaining filtration.
4	Draw or print off a diagram of a method for separating a mixture of salt and water and label each part of the apparatus. After that, write a paragraph explaining evaporation.
5	Produce a leaflet detailing the process of dissolving salt in water using a diagram to show the particles of salt and water, and label the diagram.
6	Write a story to show how to use distillation to separate a mixture of ink and water. Include a diagram for the distillation and label it.
7	Write the method for separating dyes using chromatography. Research the uses of chromatography.
8	<p>*High level <b>EXTENSION</b> task:</p> <p>Draw a poster that explains what happens to the sugar that is put in a cup of tea. Make sure you use the keywords correctly. Try to describe and explain melting using particle theory.</p>