



## 7.2.6 Filtration, Chromatography and Distillation

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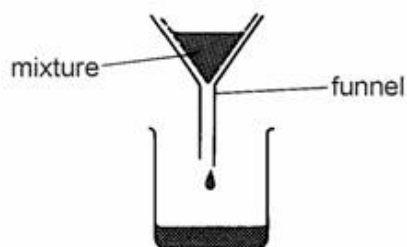
121 minutes



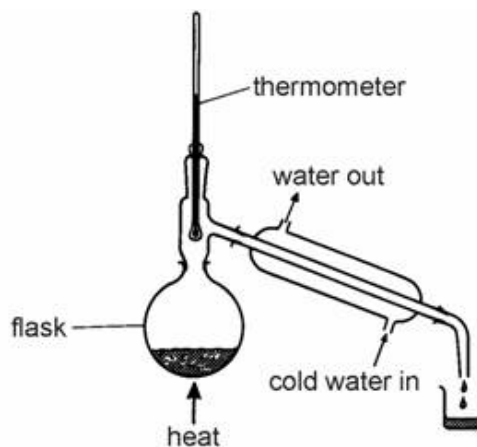
179 marks

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**Q1.** The following diagrams show two methods of separating substances.



method 1



method 2

(a) What is the name of each method?

Method 1 is .....

1 mark

Method 2 is .....

1 mark

(b) (i) Tick one box to show which of the mixtures can be separated by method 1.

sugar and salt

☐

sand and water

☐

dissolved salt and water

☐

sand and iron filings

☐

sugar and salt, both dissolved in water

☐

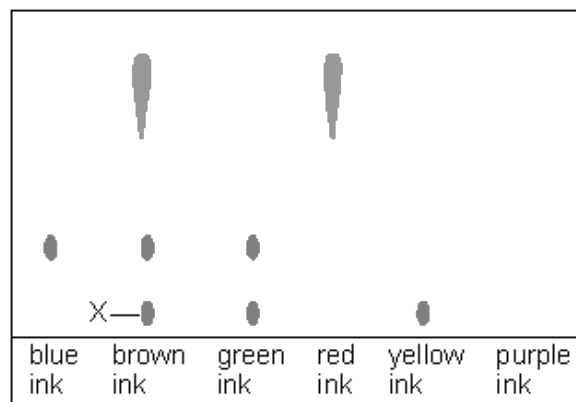
1 mark

(ii) From the list give a mixture which can be separated by method 2 but not by method 1.

.....

1 mark

- (c) Chromatography was used to analyse some soluble inks. The results are shown below.



- (i) A purple ink is a dissolved mixture of the red dye and the blue dye. On the right of the diagram draw the pattern you would expect to see for purple ink.

1 mark

- (ii) Which **three** inks contain only one dye?

.....

1 mark

- (iii) What colour is spot **X**?

.....

1 mark

Maximum 7 marks

##

John ground some coffee beans into little pieces. He put them into a coffee filter and poured 800 cm<sup>3</sup> of boiling water over them to make a jug of coffee.



- (a) Complete the sentences below. For each sentence, choose **one** of the following words.

**insoluble    soluble    solution    solvent**

- (i) The liquid in the jug is brown because parts of the coffee beans are ..... in water.

1 mark

(ii) Some bits of coffee beans are left on the filter because they are ..... in water.

1 mark

(iii) The brown liquid which drips through the filter is a ..... of coffee.

1 mark

(b) How could John get dry, solid coffee from the brown liquid in the jug of coffee?

.....  
.....

1 mark

(c) John tried making coffee in the same way using cold water. He used  $800\text{ cm}^3$  of cold water and the same amount of ground up coffee beans.

(i) The liquid in the jug was a lighter colour. Why was this?

.....  
.....

1 mark

(ii) How much solid coffee could John get back from this liquid?

Tick the correct box.

more than before

☐

the same as before

☐

less than before

☐

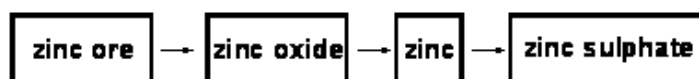
none

☐

1 mark

Maximum 6 marks

**Q3.** The flow chart shows how zinc sulphate can be obtained.



- (a) In the reaction **zinc oxide** → **zinc** an element is removed from zinc oxide to leave zinc. Give the name of the element.

.....

1 mark

- (b) (i) Zinc sulphate can be made in a reaction between zinc and an acid. Give the name of the acid.

.....

1 mark

- (ii) In the reaction between zinc and the acid, hydrogen is formed. Describe the test for hydrogen and the result if hydrogen is present.

.....

.....

1 mark

- (iii) How can crystals of zinc sulphate be formed from a dilute solution of zinc sulphate?

.....

1 mark

Maximum 4 marks

- Q4.** A scientist investigates the paints used in oil paintings. She takes tiny pieces of yellow, blue and green paint and tries to dissolve them in different solvents. Her results are shown in the table.

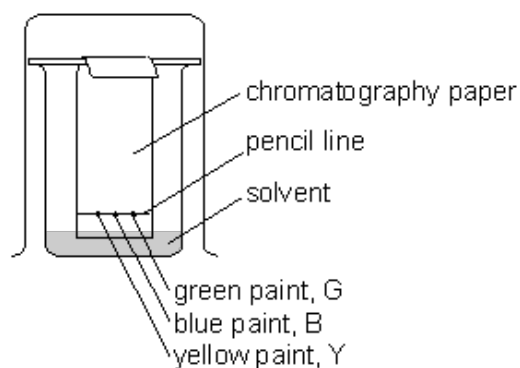
<b>solvent</b>	<b>yellow paint</b>	<b>blue paint</b>	<b>green paint</b>
water	yellow pieces are left	blue pieces are left	green pieces are left
ethanol	yellow pieces are left	clear blue liquid	clear blue liquid but yellow pieces are left
propanone	clear yellow liquid	clear blue liquid	clear green liquid

- (a) Which solvent does **not** dissolve the blue paint?

.....

1 mark

She then uses chromatography to investigate the paints.



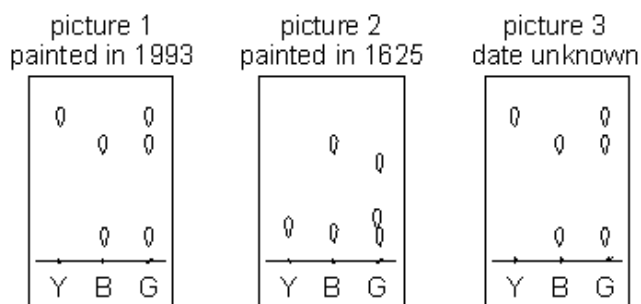
- (b) Only **one** of the solvents in the table will make all three paints move up the chromatography paper. Which solvent is this?

.....

1 mark

- (c) The scientist then investigates the paint used in three different oil paintings. She takes tiny pieces of yellow, blue and green paint from each picture and uses chromatography to compare them.

Her results are shown below:



Which of the paints in the 1993 picture contains only **one** substance?  
Tick the correct box.

yellow, Y ☐ blue, B ☐ green, G ☐

1 mark

The scientist decides that picture 3 is probably recent and not from around 1625.

- (d) Look at the chromatography results for the three pictures. Explain how the scientist was able to decide this.

.....

.....

.....

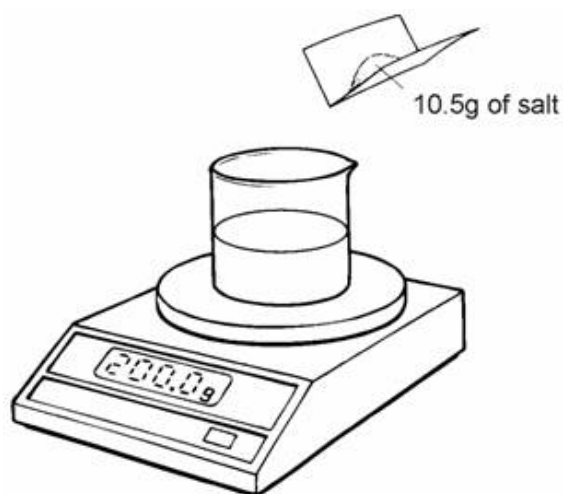
.....

2 marks  
Maximum 5 marks

- Q5.** (a) Complete the following sentence.

When a solid dissolves in a solvent, a ..... is formed.

1 mark



1 mark

A beaker contains water. It is on a balance.  
The balance reads 200.0 g.  
Patti adds 10.5 g of salt to the water. The salt dissolves.

- (b) When all the salt has dissolved, what is the reading on the balance?

..... g

- (c) Patti wants to get **all the solid salt** back from the water.

Describe how she could do this.

.....

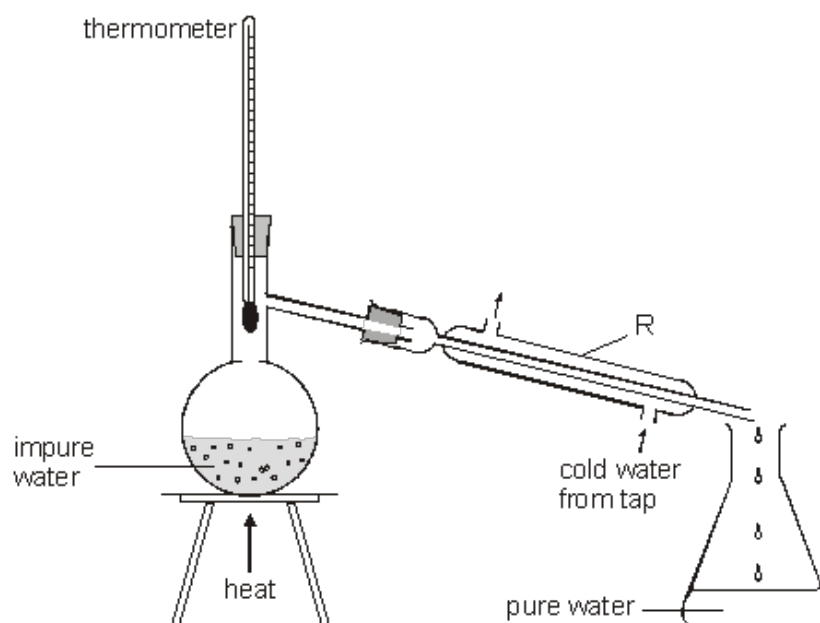
.....

.....

.....

2 marks  
Maximum 4 marks

- Q6.** (a) The apparatus in the diagram below is used to obtain pure water from impure water.



- (i) What temperature would the thermometer show?

..... °C

1 mark

- (ii) What is the function of the piece of apparatus labelled R?

.....

.....

1 mark

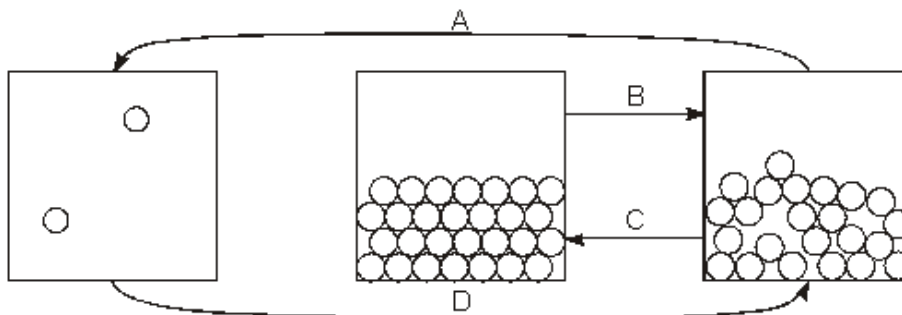
- (iii) Give the name of the process which purifies water in this way.

.....

1 mark



- (b) The diagram below shows particles in a gas, a solid and a liquid. Each arrow, A, B, C and D, represents a change of state.



- (i) Choose from the following words to complete the sentences below.

**boiling**                      **condensing**                      **distilling**                      **evaporating**  
**filtering**                      **freezing**                      **melting**

Change of state A is called .....

Change of state B is called .....

Change of state C is called .....

Change of state D is called .....

4 marks

- (ii) Look back to the apparatus in part (a).  
 Give the letter, A, B, C or D, from the diagram above, for the change of state which occurs:

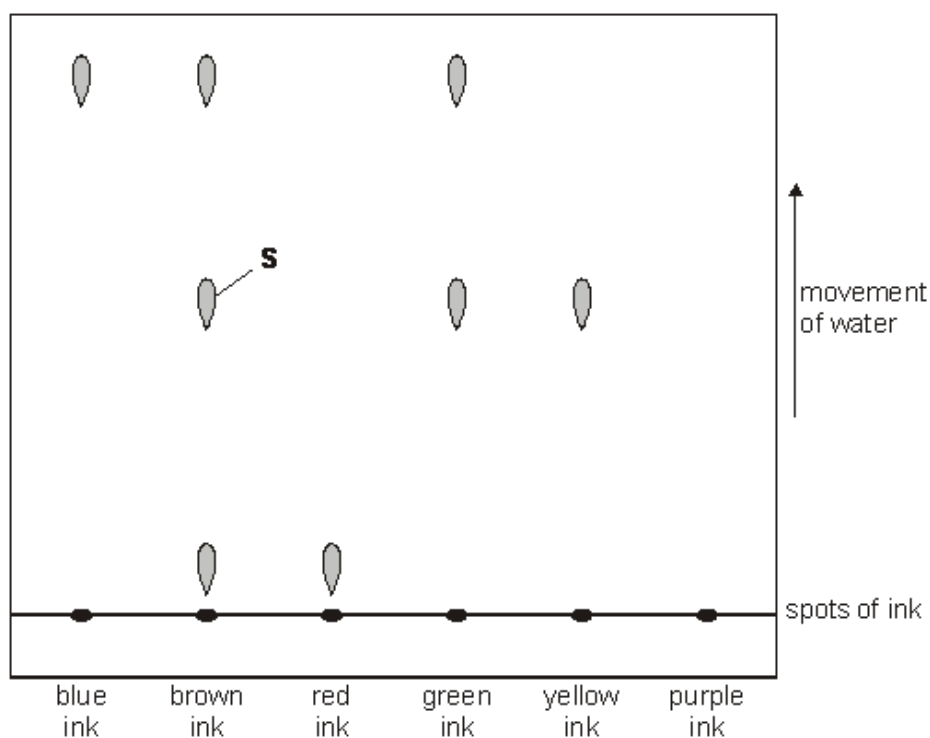
in the round-bottomed flask .....

in the piece of apparatus labelled R. ....

2 marks

Maximum 9 marks

- Q7.** A pupil used chromatography to show which dyes are present in different coloured inks. The diagram shows some of her results. The results for purple ink are missing.



- (a) (i) Give the colour of an ink which contains only **one** dye.

.....

1 mark

- (ii) Give the colour of an ink which contains **three** dyes.

.....

1 mark

- (iii) The purple ink is a mixture of the red and blue inks.  
On the diagram, draw the results you would expect from purple ink.

1 mark

- (b) What would be the colour of the spot labelled S?

.....

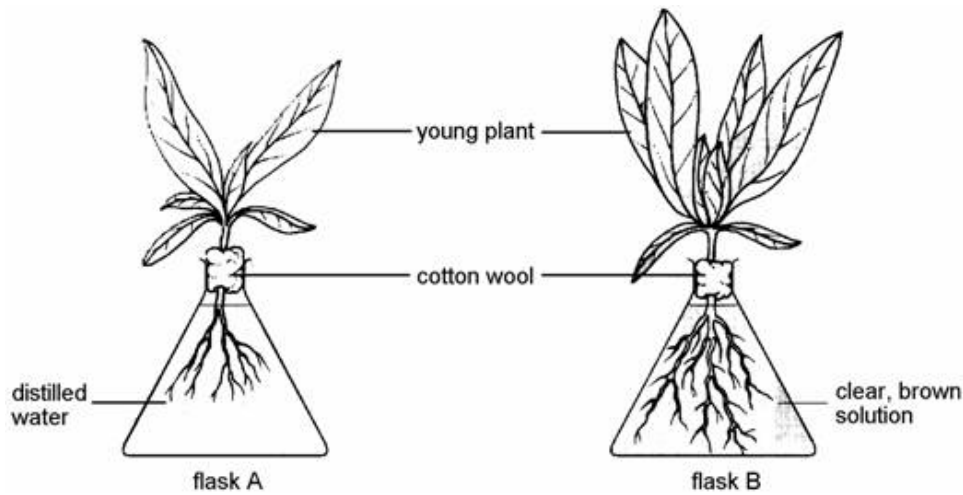
1 mark

Maximum 4 marks

##

Plants take in water from the soil. Lisa did an experiment to find out if there is anything else in soil that plants need for growth.

The diagrams below show the results of Lisa's experiment.



Lisa made the clear, brown solution in flask B by shaking a mixture of soil and water and then separating the solution from the soil particles.

- (a) How could Lisa separate the brown solution from the soil particles?

.....

1 mark

- (b) Explain why Lisa grew one plant in distilled water.

.....

.....

1 mark

- (c) (i) What type of substance, dissolved in the water in flask B, is used by the plant for growth?

.....

1 mark

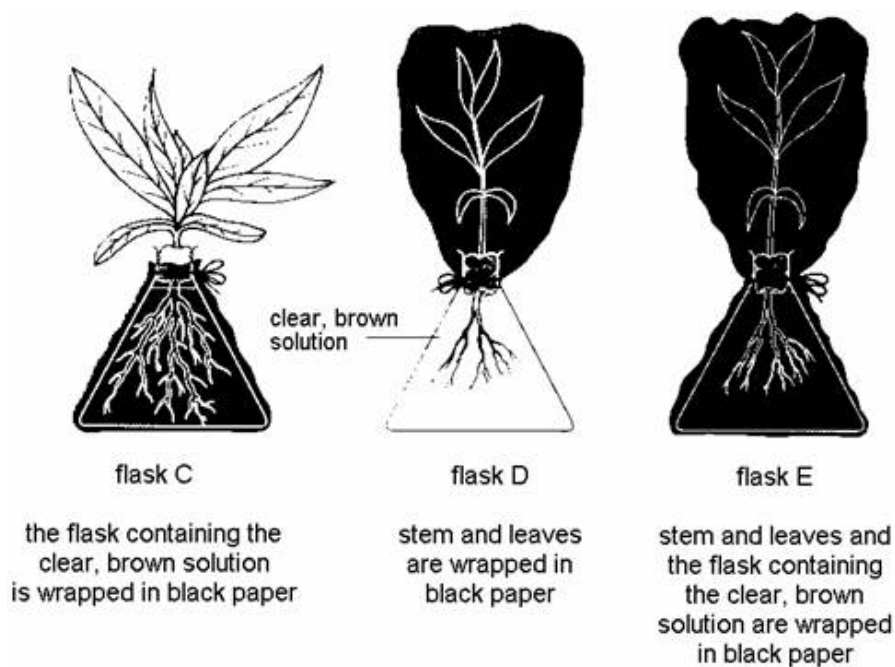
- (ii) How are roots adapted for taking in water?

.....

.....

1 mark

- (d) Lisa set up a second experiment using three similar plants. The solution in flasks C, D and E was the same. She put all three flasks in a sunny position. The diagrams below show the results of Lisa's second experiment.



The plant in flask C was the only one which grew well in this experiment. Explain why.

.....

.....

1 mark  
Maximum 5 marks

##

John dropped a glass bottle of blue copper sulphate crystals. The bottle broke and glass was mixed with the crystals.

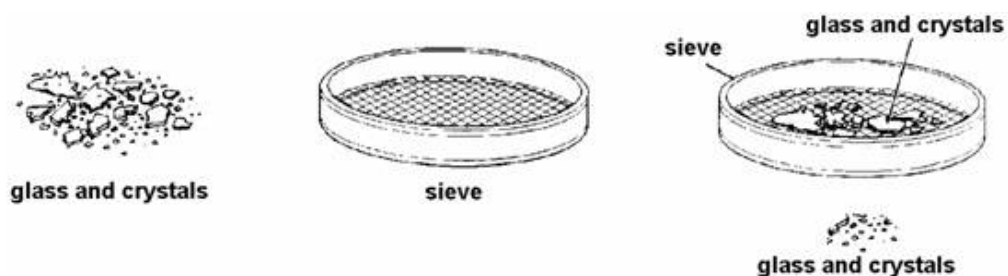
- (a) Suggest how John or a teacher could clear up the mixture safely, without cutting themselves.

.....

.....

1 mark

- (b) Mari said, "You can separate the glass from the copper sulphate crystals using a sieve".



Most of the crystals went through the sieve. Some of the glass went through as well.

Why did some of the crystals and pieces of glass stay in the sieve?

.....

1 mark

- (c) John tried another way to separate the glass from the blue copper sulphate crystals. He put the mixture into water and stirred it. The water turned blue. Why did the water turn blue?

.....

1 mark

- (d) Very carefully, he poured some of the blue liquid into a dish and gently heated it. The volume of the liquid decreased. Why did the volume decrease?

.....

1 mark

- (e) John put the dish by a window. The next day there was no liquid left. What would be left in the dish?

.....

1 mark

Maximum 5 marks

**Q10.** Kerry made some copper sulphate crystals. She wrote a description of what she did.

**I heated some dilute sulphuric acid in a beaker and added some copper oxide to it. I stirred the mixture until it became a clear blue colour. I added more copper oxide until no more would react and then filtered the mixture into a dish. A black solid was left on the filter paper. I left the solution in the dish for a week and saw that the liquid had gone and blue crystals were left.**

Use the information in Kerry's description to answer the questions below.

(a) What colour is:

(i) copper sulphate solution?

.....

1 mark

(ii) copper oxide?

.....

1 mark

(b) Write down a word equation for the reaction which took place in the beaker.

..... + ..... → ..... + water

1 mark

(c) Why did Kerry have to filter the mixture?

.....

.....

1 mark

Maximum 4 marks

**Q11.** (a) When people speak, sounds are made by their vocal cords.

How do the vocal cords make a sound?

.....

1 mark

(b) The astronauts who landed on the Moon had to wear spacesuits.

The spacesuits were filled with air because there is a vacuum on the Moon.



- (i) The astronauts had radios in their helmets.  
Without the radios, they could not hear each other speaking.  
Why does sound not travel on the Moon?

.....  
.....

1 mark

- (ii) If the radios broke, the astronauts could put their helmets together so that they touched. Then they could hear each other's voices.

Why could they hear each other's voices when their helmets were touching?

.....  
.....

1 mark

The National Aeronautics and Space Administration (NASA) says that there is ice on some parts of the Moon.

- (c) What does this tell you about temperatures on these parts of the Moon?

.....

1 mark

- (d) The ice is mixed with rocks and dust. Astronauts who visit the Moon in the future may want to get water from this mixture.

- (i) What **two** things must they do to get clear water from this mixture of ice, rocks and dust?

1. ....  
.....  
2. ....  
.....

2 marks

- (ii) After the astronauts have collected the mixture, they will need a supply of energy to get liquid water from it. Explain why.

.....  
.....

1 mark

- (iii) Suggest **one** energy resource which is naturally available on the Moon.

.....

1 mark

Maximum 8 marks

**Q12.** (a) Sunil picked yellow, red and purple primula flowers from his garden.

He dipped the different flower petals into water and into two different solutions.  
The pH of one solution was 1 and the pH of the other was 10.  
The table shows the results.

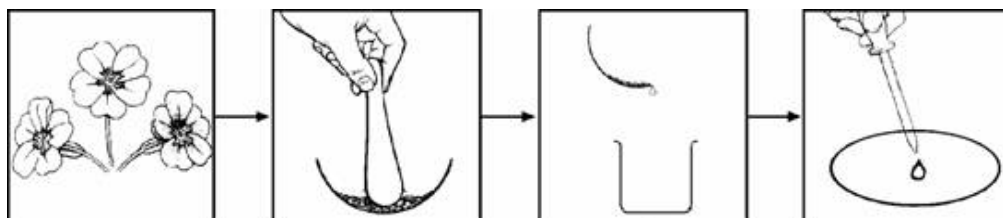
colour of flower petals	in solutions of pH 1	in water pH 7	in solution of pH 10
yellow	stayed yellow	stayed yellow	stayed yellow
red	stayed red	stayed red	turned green
purple	turned pink	stayed purple	turned blue

Which colour of flower petal would be most useful to make an indicator for **both acids and alkalis**? Explain your answer.

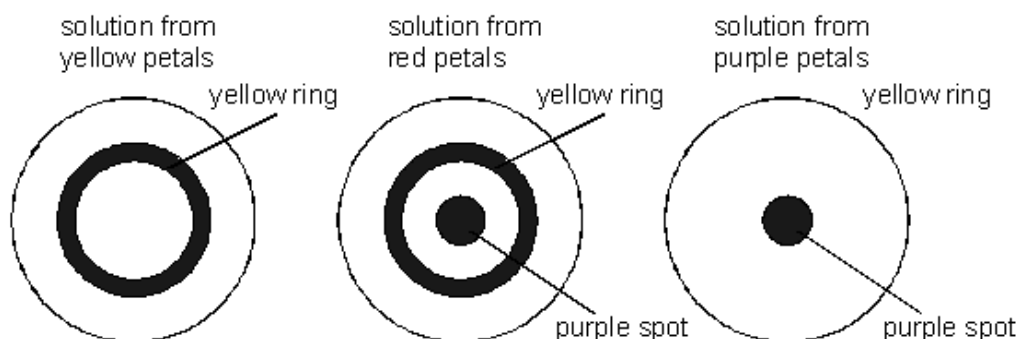
.....  
 .....  
 .....

2 marks

Sunil crushed petals from each flower separately in some liquid and poured off the coloured solutions. Then he put drops of each coloured solution into the middle of different pieces of filter paper.



The solutions spread out on the filter paper. The diagrams show his results.



(b) What is the name of this method of investigating coloured substances?

.....

1 mark



- (c) Sunil made notes on his experiment. Some words are missing. Complete the sentences.

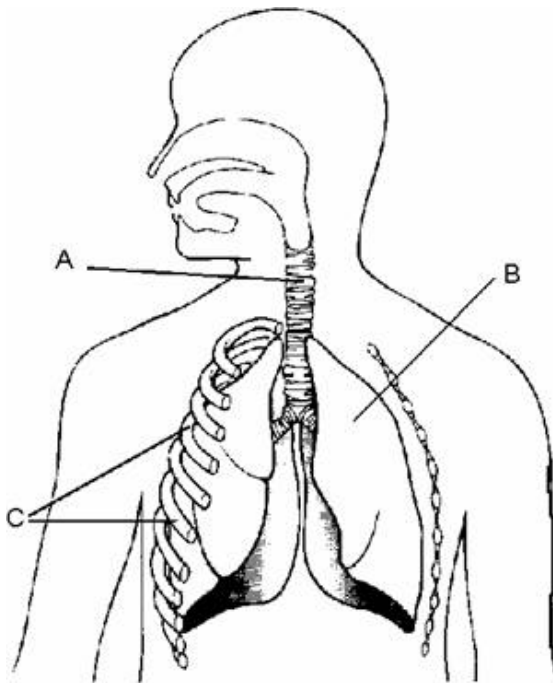
When I crushed a flower in a liquid it produced a coloured solution.

This is because a coloured substance had ..... in the liquid. This shows that the liquid is a ..... for these coloured substances.

My experiment shows that one of the flowers probably contained two coloured substances. This was the ..... flower.

3 marks  
Maximum 6 marks

- Q13.** The diagram below shows an organ system in the human body.



- (a) What is the name of the organ system shown in the diagram?  
Tick the correct box.

circulatory system

☐

digestive system

☐

reproductive system

☐

respiratory system

☐

1 mark

- (b) What are the names of parts A and B?

part A .....

part B .....

2 marks

- (c) Parts C are bones which support the chest. Give the name of these bones.

1 mark

- (d) The photograph shows a man using a sanding machine on a piece of wood.  
He is wearing a mask to stop him from breathing in the sawdust.



The mask has tiny holes in it.

- (i) When the man breathes in, the mask separates particles of sawdust from the air.  
What is this method of separation called?

.....

1 mark

(ii) If the man breathed in the particles of sawdust, what might happen to him?

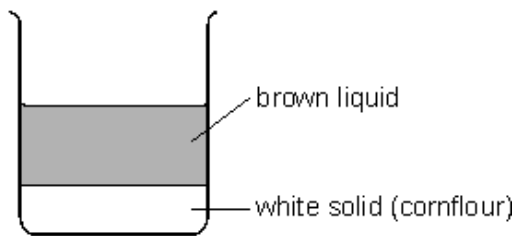
.....  
.....

1 mark  
Maximum 6 marks

**Q14.** 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

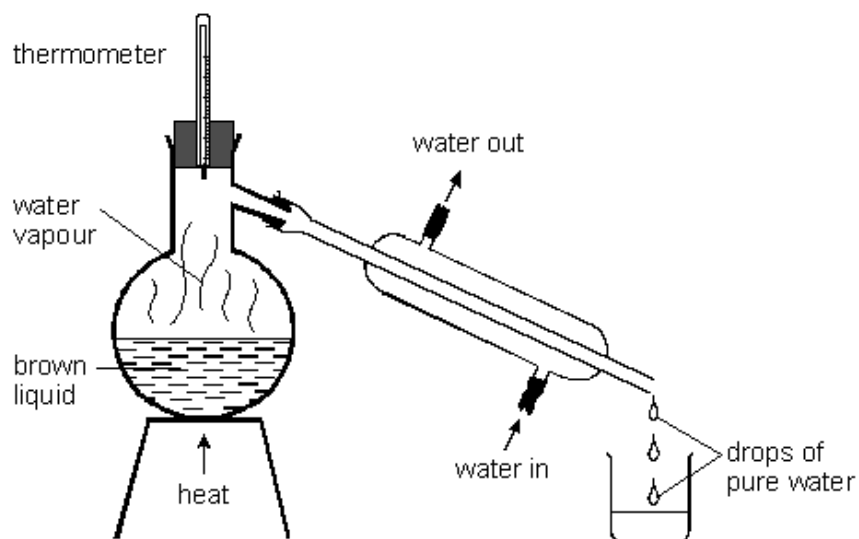
(c) Dan put a little of the brown liquid in a dish. The next day there was only a brown solid  
left in the dish. What had happened to the water?

.....

.....

1 mark

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

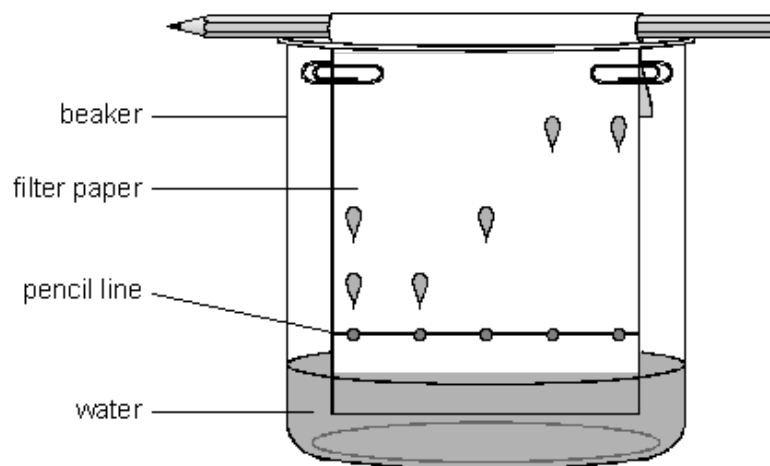


Water vapour from the brown liquid changed into drops of pure water which were collected in the beaker. What process caused the drops of water to form from the vapour? Tick the correct box.

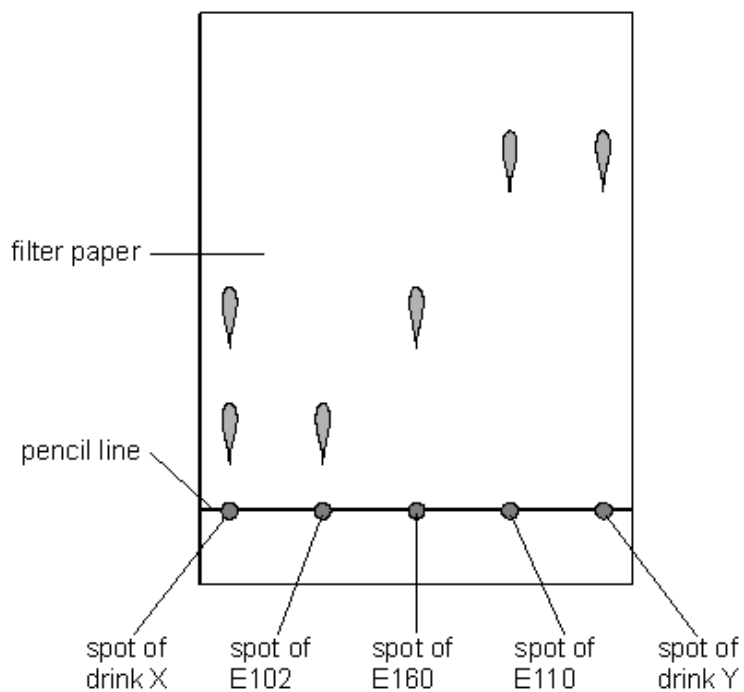
boiling	<input type="checkbox"/>	condensing	<input type="checkbox"/>
dissolving	<input type="checkbox"/>	melting	<input type="checkbox"/>

1 mark  
Maximum 6 marks

- Q15.** Cathy has two orange drinks, X and Y. She uses chromatography to identify the coloured substances in the drinks. Her experiment is shown below.



Cathy made the chromatogram below using drink X, three food colourings, E102, E160, E110, and drink Y.



Cathy's chromatogram

- (a) (i) Use Cathy's chromatogram to identify the **two** coloured substances in drink X. Write their E numbers below.

1. ....

2. ....

2 marks

- (ii) Draw another spot on Cathy's chromatogram to show what it would look like if drink Y contained E102 as well.

1 mark

- (iii) Chromatography separates the coloured substances in a drink. How can you tell from a chromatogram how many coloured substances there are in a drink?

.....

.....

1 mark

- (b) (i) The spots show up well on filter paper. Give **one other** reason why filter paper is used in this experiment.

.....  
 .....

1 mark

- (ii) The line across the bottom of a chromatogram should be drawn with a pencil, **not** with ink.  
 Why should the line **not** be drawn with ink?

.....  
 .....

1 mark

Maximum 6 marks

##

The table shows the melting points and boiling points of four substances present in the air.

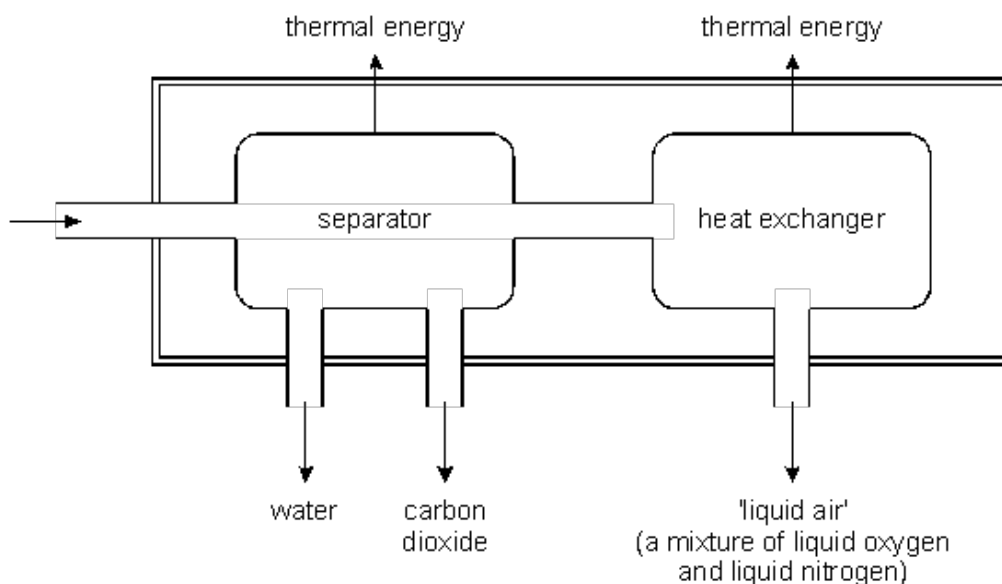
substance	melting point, in °C	boiling point, in °C
carbon dioxide	−78	−78
nitrogen	−210	−196
oxygen	−219	−183
water vapour	0	100

- (a) What happens to a piece of solid carbon dioxide if it is heated from −100°C to −78°C?

.....  
 .....

1 mark

- (b) 'Liquid air' can be formed from air in a heat exchanger. As the air passes through, thermal energy is transferred from the air to the surroundings. This is shown in the flow diagram below.



- (i) Suggest a likely temperature for the 'liquid air' that leaves the heat exchanger.

.....°C

1 mark

- (ii) Use the information in the table to explain why carbon dioxide and water vapour need to be removed from the air before it is pumped through pipes to the heat exchanger. State the consequences of **not** removing these two gases.

.....  
 .....  
 .....  
 .....

2 marks

- (c) The 'liquid air' is a mixture of liquid nitrogen and liquid oxygen. Use the information in the table to suggest how liquid oxygen could be obtained from the mixture.

.....  
 .....

1 mark

(d) A room measures 4 m x 3 m x 2.5 m.

- (i) The density of air is approximately  $1.2 \text{ kg/m}^3$ .  
What is the approximate mass of air in the room?  
Give the unit.

.....  
.....

2 marks

- (ii) If the air in the room is cooled to a low enough temperature, it will change from a gas to a liquid.  
The density of 'liquid air' is  $1125 \text{ kg/m}^3$ . What volume of 'liquid air' would the air in the room produce? Give the unit.

.....  
.....

1 mark

- (iii) How does the distance between the particles in atmospheric air compare to the size of the particles themselves?

.....  
.....

1 mark

Maximum 9 marks

**Q17.** At school Ellen heated some copper powder until it went black.

- (a) Give the name of the black substance formed when copper reacts with oxygen.

.....

1 mark

- (b) Ellen added the black substance to some dilute sulphuric acid. The black substance reacted with sulphuric acid forming a blue solution of copper sulphate.

What type of substance is copper sulphate?  
Tick the correct box.

an acid

☐

a compound

☐

an element

☐

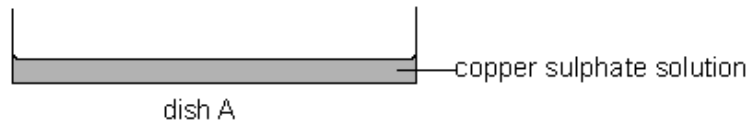
a mixture

☐

1 mark



- (c) (i) Ellen poured 20 cm<sup>3</sup> of the blue copper sulphate solution into a dish, A, as shown below.

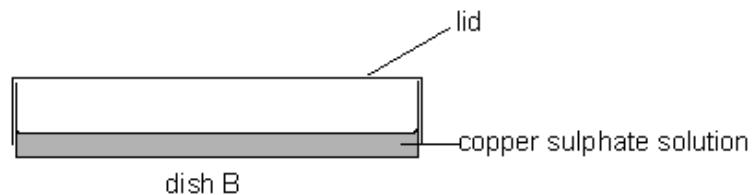


She left the dish in a room at 21°C for two days.  
What **two** changes would Ellen observe in dish A two days later?

1. ....
2. ....

2 marks

- (ii) Ellen poured 20 cm<sup>3</sup> of the same blue copper sulphate solution into another dish, B. She put a lid on dish B and left it in the room at 21°C for two days.



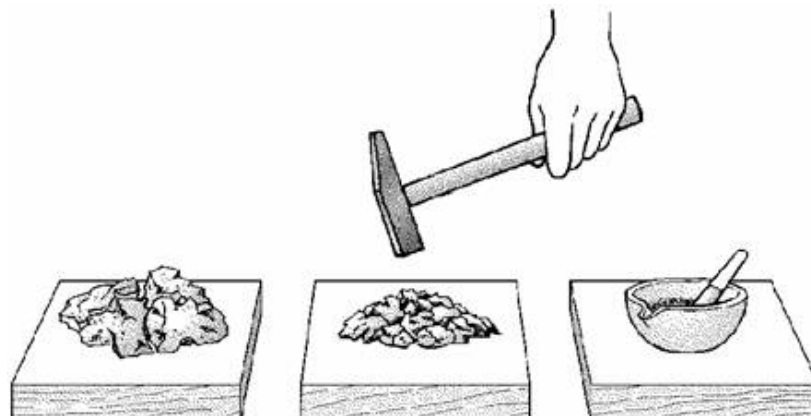
After two days the contents of dish B looked different from the contents of dish A.  
Give **one** difference Ellen would observe and explain how the lid caused this difference.

.....  
.....  
.....

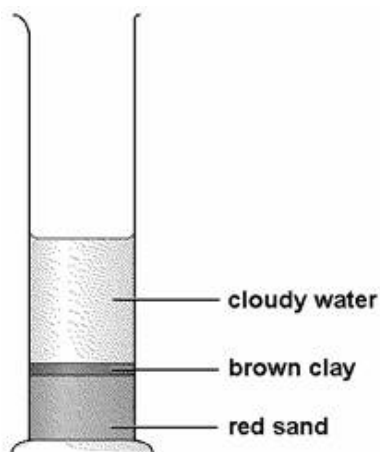
2 marks  
Maximum 6 marks

**Q18.** Linda had a piece of red sandstone.

She hammered it into pieces and then ground them into a powder using a pestle and mortar.



She put the powder into a measuring cylinder with water and shook the mixture. The contents settled.



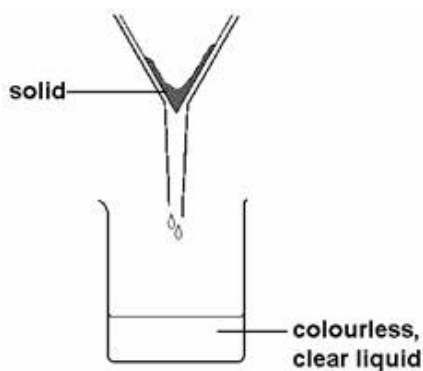
- (a) Linda said her results showed that sandstone is a mixture of two substances.
- How could she tell, from the results, that sandstone is a mixture of substances?

.....

.....

1 mark

- (b) Linda then poured the cloudy water from the measuring cylinder through filter paper in a filter funnel.



She said there might be salts dissolved in the colourless, clear liquid that came through the filter.

- (i) What could Linda do to find out if there were salts dissolved in the colourless, clear liquid?

.....

.....

1 mark

- (ii) What would she see if there had been salts dissolved in the colourless, clear liquid?

.....

.....

1 mark

- (c) Sandstone is a sedimentary rock. Four stages in the formation of sedimentary rock are listed below.  
They are **not** in the correct order.

**compacted      deposited      weathered      transported**

Put these stages in the correct order. One has been done for you.

stage 1 .....**weathered**.....

stage 2 .....

stage 3 .....

stage 4 .....

1 mark  
Maximum 4 marks

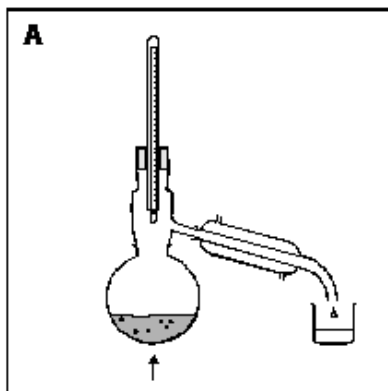
**Q19.** Diagrams A, B and C show three pieces of apparatus for separating substances.

- (a) Draw a line from each apparatus to the name of the method of separation.  
Draw only three lines.

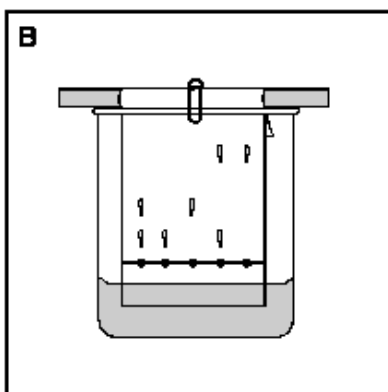
**diagram of apparatus**

**method of separation**

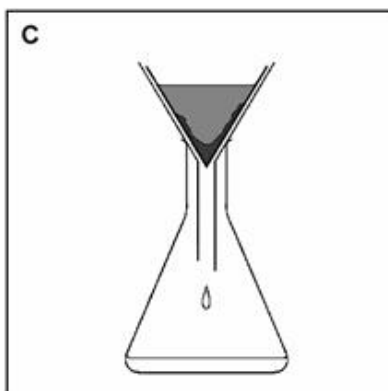
chromatography



distillation



filtration



crystallisation

- (b) Debbie has a mixture of sand and salt water.  
Look at the diagrams in part (a).

- (i) Which apparatus would Debbie use to separate the sand from the salt water?  
Give the correct letter.

.....

1 mark

- (ii) Which apparatus would she use to separate pure water from the salt water?  
Give the correct letter.

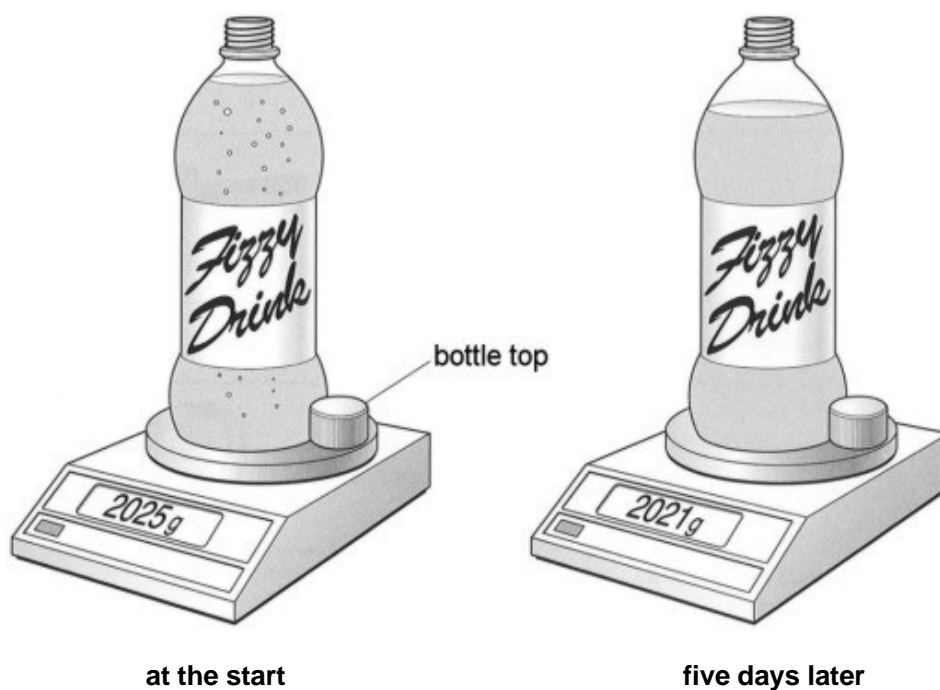
.....

1 mark

Maximum 5 marks

**Q20.**

- (a) Jenny put a bottle of fizzy drink on a balance.  
She removed the bottle-top, and the drink began to fizz.  
She left the open bottle of drink and the bottle-top on the balance for five days in a warm room.



Five days later the drink was no longer fizzy. It's mass had decreased and the level of the liquid had gone down.

- (i) Look at the drawings of the balance.  
Work out the decrease in **mass** after five days.

..... g

1 mark

- (ii) The fizzy drink contained sugar, colouring, a gas and water. The mass decreased because two of these substances were lost into the air.

Which **two** substances were lost into the air?

1. ....

1 mark

2. ....

1 mark

- (b) The sugar, colouring and the gas were all dissolved in the water.  
Which word describes the **water**?  
Tick the correct box.

alkali

☐

indicator

☐

solute

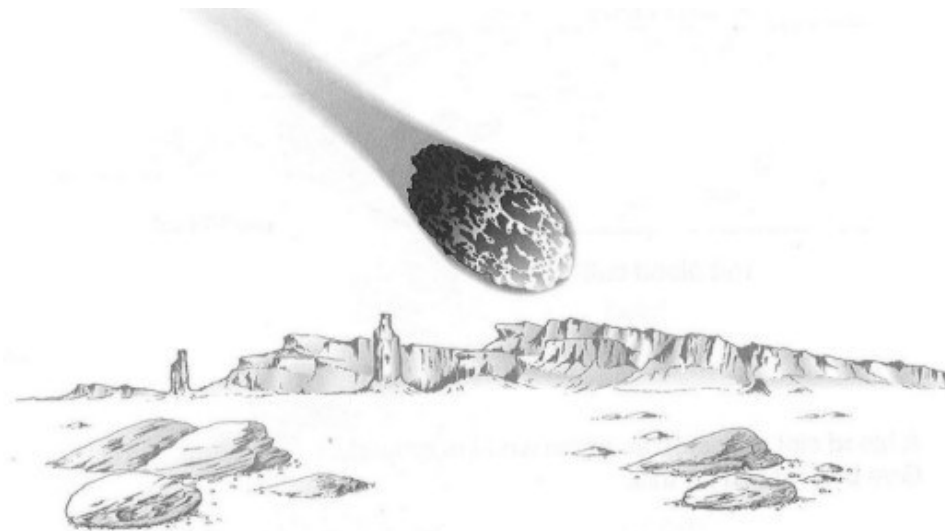
☐

solvent

☐

1 mark  
maximum 4 marks

- Q21.** A meteorite landed on Earth. It contained a new element.  
Scientists called the element jovium.



- (a) The list below shows some properties of jovium.

Which **two** properties suggest that jovium could be a metal?  
Tick **two** boxes.

It has a high melting point.

☐

It does **not** stick to a magnet.

☐

It is a blue solid.

☐

It is a good conductor of heat and electricity.

☐

It glows in the dark.

☐

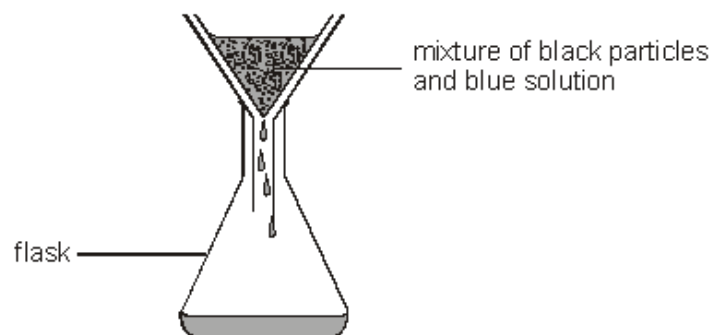
2 marks

- (b) A scientist put a piece of the meteorite in water and stirred it.  
This produced a blue solution with tiny, solid, black particles in it.

He separated the black particles from the blue solution using the apparatus below.

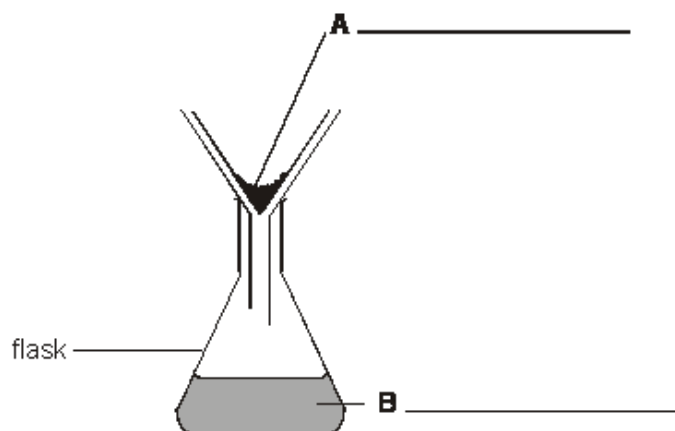
- (i) Give the name of this method of separation.

.....



1 mark

- (ii) The diagram below shows the results.  
What do the labels A and B show? Write your answers on the lines.



2 marks

- (c) The scientist poured the contents of the flask into a dish.  
Two days later there were blue crystals in the dish, but **no** liquid.

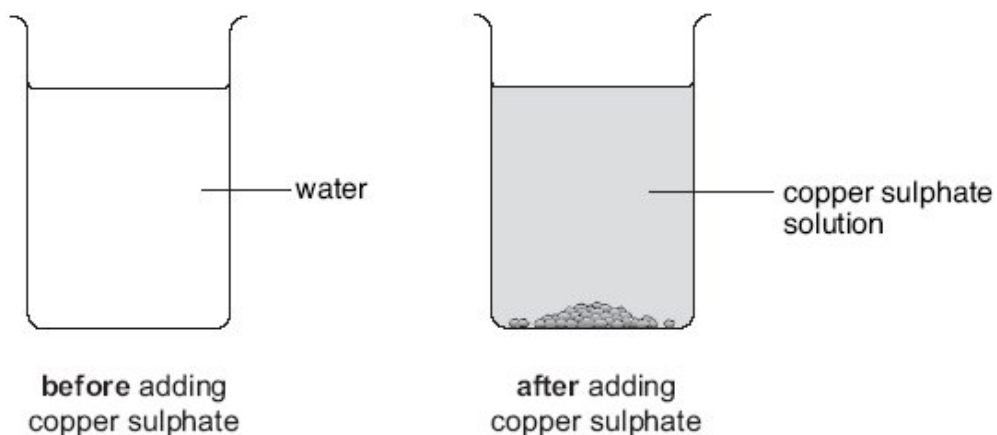


What happened to the liquid in the dish?

.....

1 mark  
maximum 6 marks

- Q22.** (a) Ruth added some blue copper sulphate crystals to a beaker of water.



- (i) How could Ruth **see** that some of the copper sulphate crystals had dissolved in the water?

.....  
.....

1 mark



(ii) How could Ruth make the copper sulphate crystals dissolve more quickly?

.....

1 mark

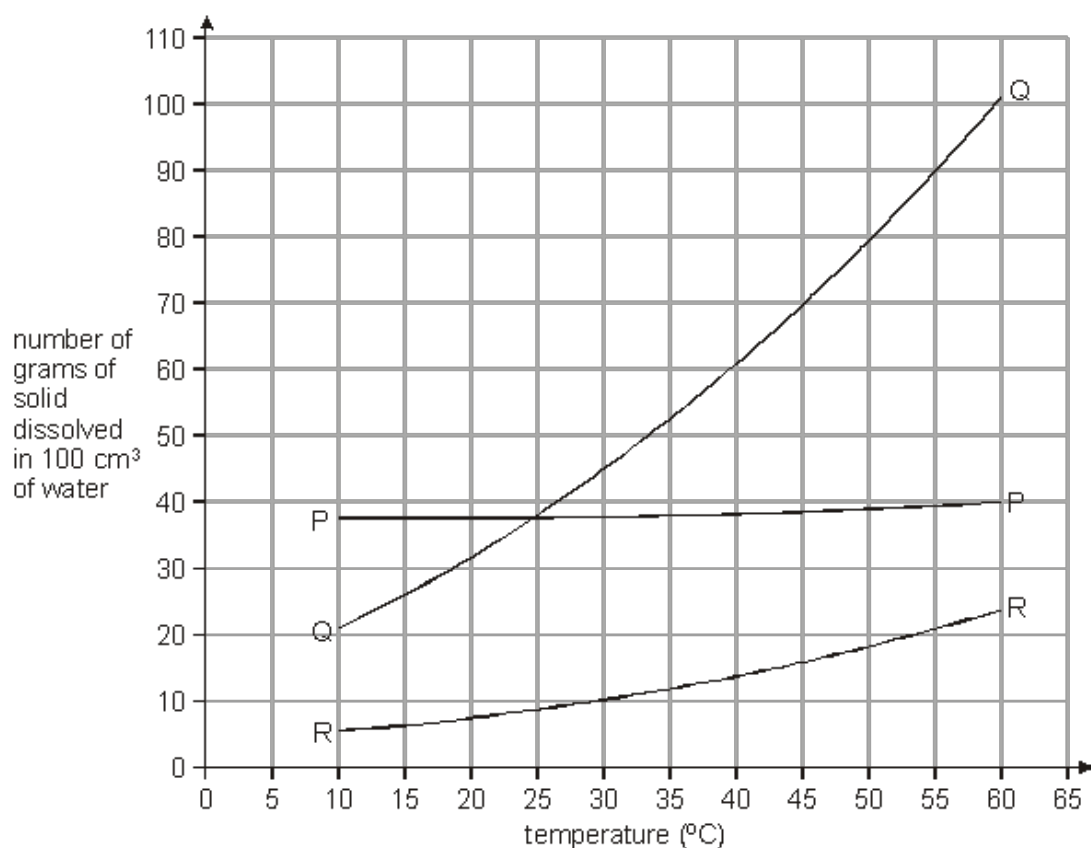
- (b) Ruth poured some of the copper sulphate solution into a dish.  
She left it in a warm room for five days.

All the water evaporated from the solution in the dish.  
What was left in the dish?

.....

1 mark

- (c) Ruth did an experiment to see how much of three solids, P, Q and R, will dissolve in water at different temperatures.  
She plotted her results on graph paper as shown below.



Use the graph above to answer the questions below.

- (i) At 30°C how many grams of solid R dissolved in the water?

..... g

1 mark

- (ii) At 60°C which solid dissolved the most in water? Give the letter.

.....

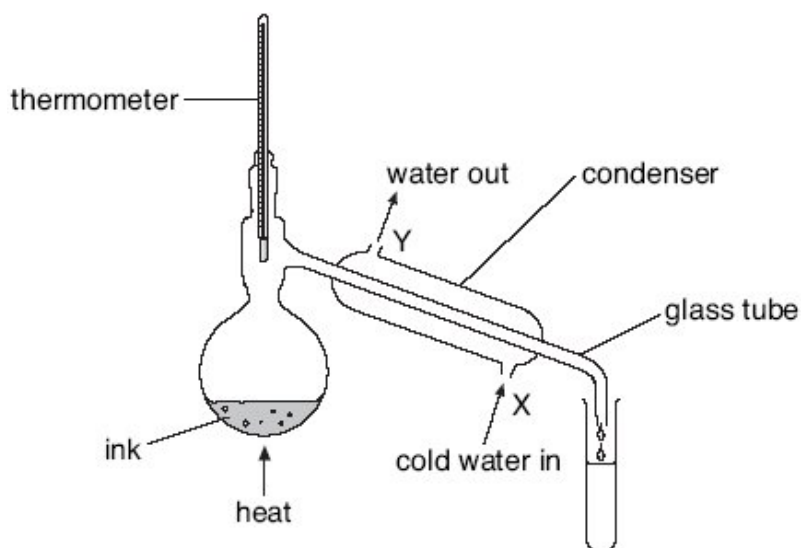
1 mark

(iii) Which **two** solids were equally soluble at 25°C? Give the letters.

..... and .....

1 mark  
maximum 6 marks

**Q23.** Rema used the apparatus below to distil 100 cm<sup>3</sup> of water-soluble ink.



**apparatus A**

*not to scale*

- (a) Which processes occur during distillation?  
Tick the correct box.

condensation then evaporation

☐

evaporation then condensation

☐

melting then boiling

☐

melting then evaporation

☐

1 mark

- (b) Give the name of the colourless liquid that collects in the test-tube.

.....

1 mark

- (c) What would the temperature reading be on the thermometer when the ink has been boiling for two minutes?

.....°C

1 mark

- (d) (i) Water at 15°C enters the condenser at X.  
Predict the temperature of the water when it leaves the condenser at Y.

.....°C

Explain this change of temperature.

.....

.....

1 mark

- (ii) Give **two** ways in which the water vapour changes as it passes down the glass tube in the condenser.

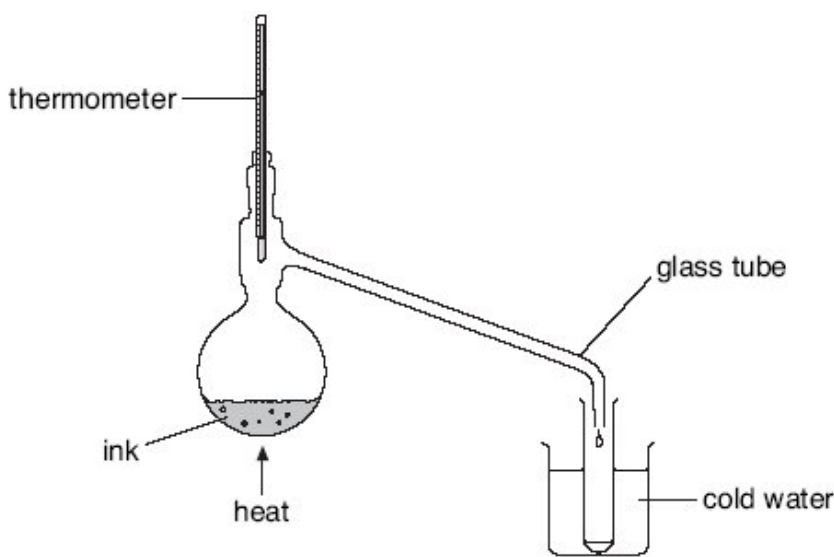
1. ....

1 mark

2. ....

1 mark

- (e) Peter used the apparatus below to distil 100 cm<sup>3</sup> of water-soluble ink.



**apparatus B**

*not to scale*

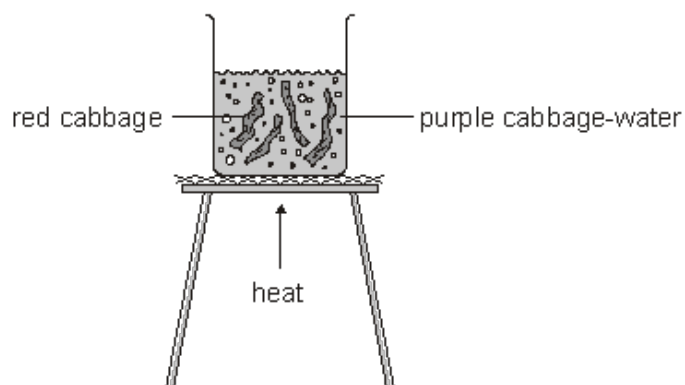
Why is the condenser in **apparatus A** better than the glass tube and beaker of water in **apparatus B**?

.....

.....

1 mark  
maximum 7 marks

**Q24.** Sharna boiled some red cabbage in water. The cabbage-water turned purple.



(a) (i) Sharna separated pieces of cabbage from the cabbage-water.

Which method did she use?

Tick the correct box.

chromatography	<input type="checkbox"/>	filtration	<input type="checkbox"/>
condensation	<input type="checkbox"/>	freezing	<input type="checkbox"/>

1 mark

(ii) Sharna wanted to find out if the purple cabbage-water contained more than one **coloured** substance.

Which method did she use?

Tick the correct box.

chromatography	<input type="checkbox"/>	filtration	<input type="checkbox"/>
condensation	<input type="checkbox"/>	freezing	<input type="checkbox"/>

1 mark

- (b) Sharna mixed the purple cabbage-water with some other liquids. She wrote the colours of the mixtures in a table as shown below.

	colour of cabbage-water mixed with liquid	Is the liquid acidic, alkaline or neutral?
liquid 1	red	acidic
liquid 2	blue	alkaline
liquid 3	purple	neutral

Use the information in the table to answer parts (i) and (ii) below.

- (i) Sharna mixed cabbage-water with colourless washing-up liquid. The mixture turned **blue**.

What does this tell you about the washing-up liquid?

.....

1 mark

- (ii) Sharna then mixed cabbage-water with lemon juice. Lemon juice is **acidic**.

What colour was the mixture?

.....

1 mark

- (c) What is the name of a chemical which changes colour when it is mixed with acids or alkalis?  
Tick the correct box.

filtrate

☐

indicator

☐

non-metal

☐

solution

☐

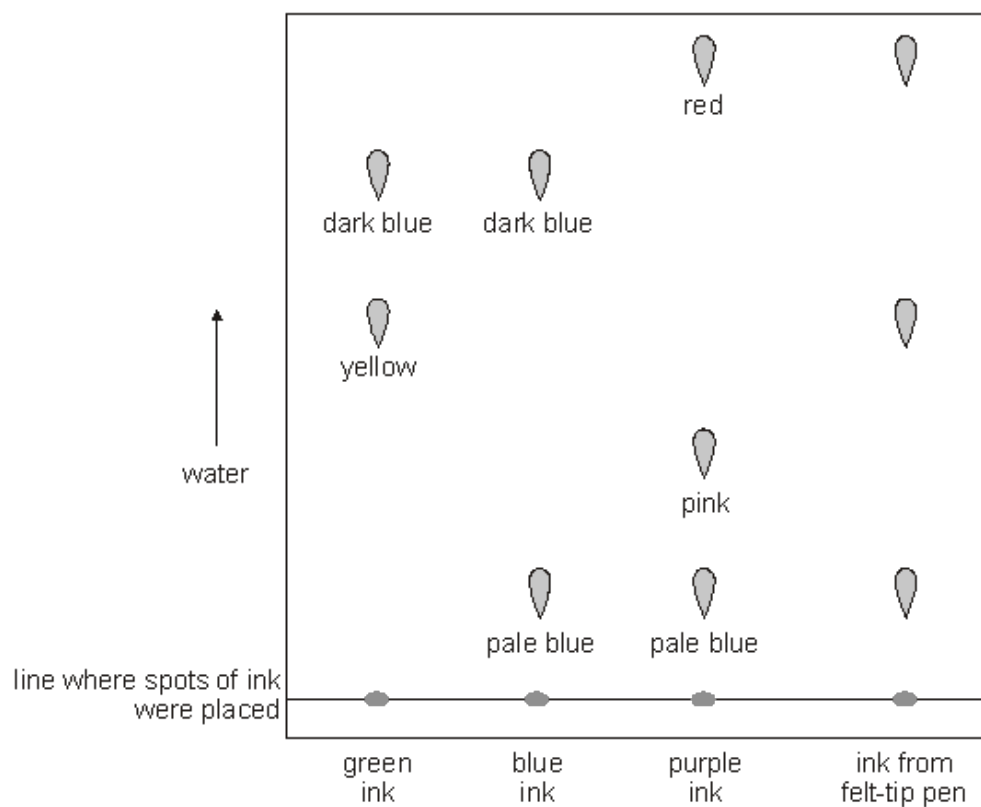
1 mark  
maximum 5 marks

**Q25.** Susie used chromatography to identify the coloured substances in the ink from a felt-tip pen.

She used:

- green ink
- blue ink
- purple ink
- ink from her felt-tip pen.

She used water as the solvent.



Look at the diagram above.

(a) (i) Which colours were present in the ink from the felt-tip pen?

.....

1 mark

(ii) How many coloured substances were there in green ink?

.....

How can you tell?

.....

.....

1 mark

- (iii) Susie placed the spots of ink on a line on the chromatography paper as shown in the diagram.

To draw the line, Susie had to choose a felt-tip pen or a pencil.

Which **one** should she use?

.....

Give the reason for your answer.

.....

.....

1 mark

- (b) Susie used water as the solvent in this experiment.  
When she repeated the experiment with a different set of pens, it did **not** work.  
She then used ethanol instead of water.

Suggest why the experiment worked with ethanol but **not** with water.

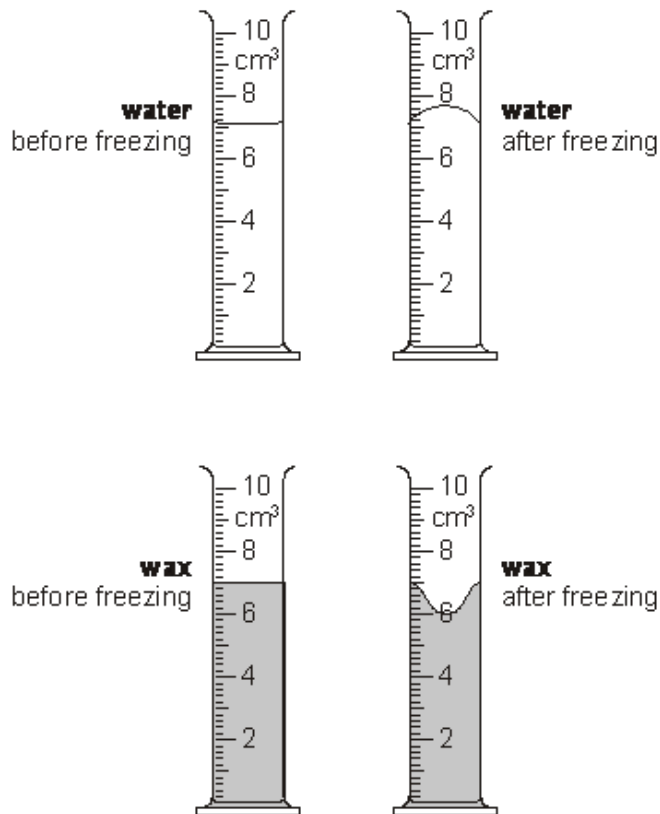
.....

.....

1 mark  
maximum 4 marks

**Q26.** Meera poured  $7\text{ cm}^3$  of water into a measuring cylinder.

She poured  $7\text{ cm}^3$  of melted wax into another measuring cylinder. She put both measuring cylinders into a freezer for 24 hours.



- (a) Look at the measuring cylinders.  
What happened to the volume of the water and the wax after freezing?

the volume of water .....

the volume of wax .....

1 mark

- (b) The measuring cylinders were taken out of the freezer and left in a room at  $20^\circ\text{C}$ .

- Frozen water melts at  $0^\circ\text{C}$ .
- Wax melts at  $53^\circ\text{C}$ .

What would the physical state of each substance be at  $20^\circ\text{C}$ ?

Choose from **gas** or **liquid** or **solid**.

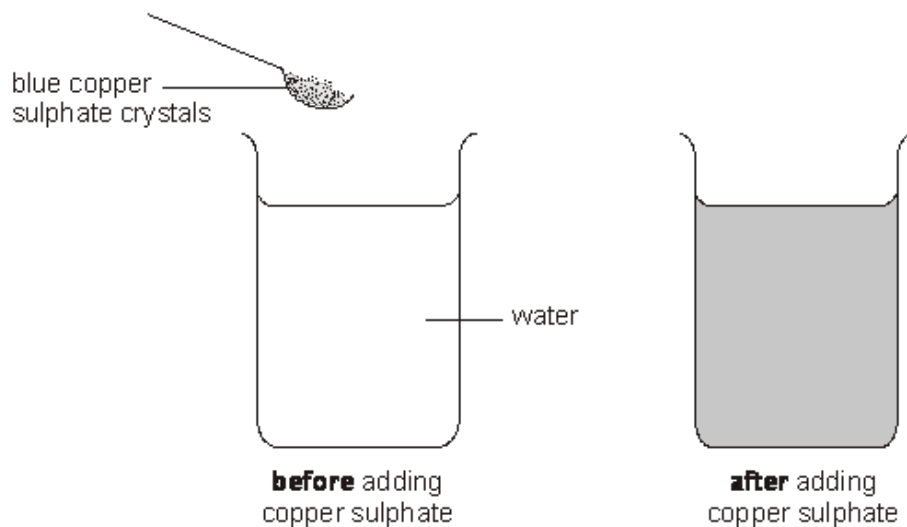
water .....

wax .....

2 marks



- (c) Meera added blue copper sulphate crystals to some water in a beaker. The copper sulphate dissolved in the water.



- (i) Give **one** way Meera could see that the copper sulphate had dissolved in the water.

.....

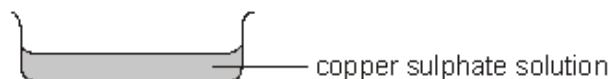
1 mark

- (ii) Give **one** way that she could get the copper sulphate to dissolve more quickly.

.....

1 mark

- (d) Meera poured some of the copper sulphate solution into a dish. She left it in a warm room for a week.



A week later there was a blue solid but **no** liquid in the dish.

- (i) What happened to the water in the copper sulphate solution?

.....

1 mark

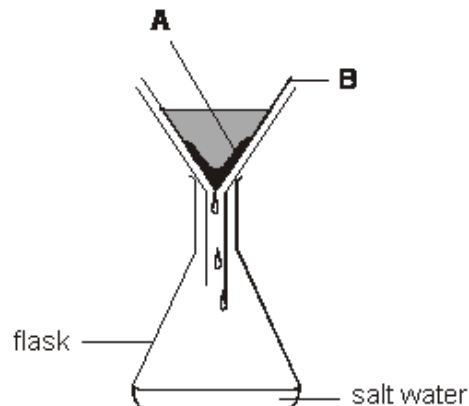
- (ii) What was the blue solid left in the dish?

.....

1 mark  
maximum 7 marks

**Q27.** Chris collected some sea water near a beach.  
The sea water had salt dissolved in it. It had sand mixed in it.

(a) Chris separated the sand from the salt water as shown below.



(i) What is this method of separation called?  
Tick the correct box.

chromatography

☐

distillation

☐

filtration

☐

magnetism

☐

(ii) What is substance A?

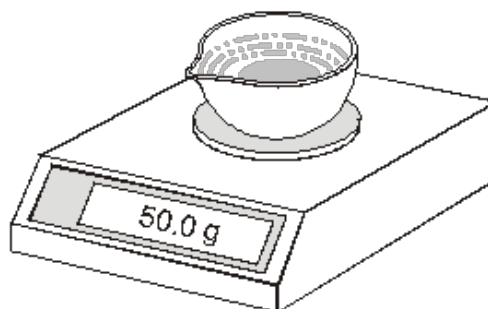
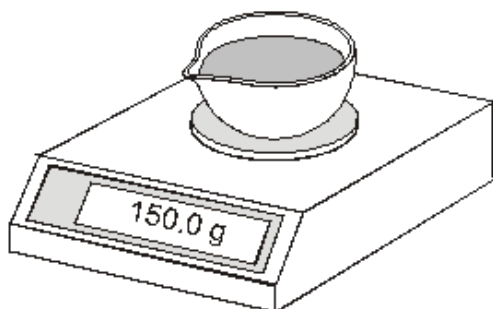
.....

(iii) What is the part labelled B?

.....

3 marks

(b) Chris poured some of the salt water from the flask into a dish.  
He put the dish on a balance and left it in a warm room for a week.



- (i) Look at the two readings on the balance.

Work out the decrease in mass.

..... g

- (ii) After one week there was a white solid but **no** liquid in the dish.  
What had happened to the water in the dish?

.....

- (iii) What was the white solid left in the dish?

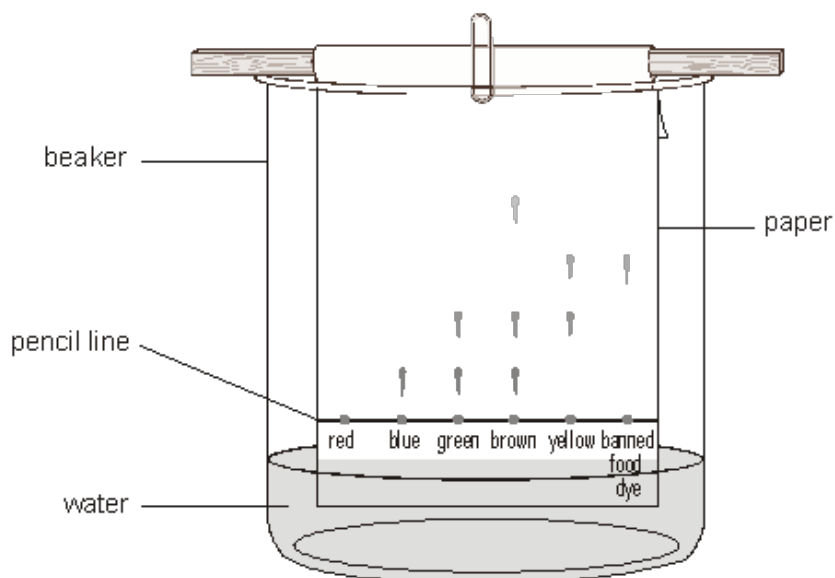
.....

3 marks  
maximum 6 marks

**Q28.** Gary wanted to find out if some food colourings contained a banned food dye.

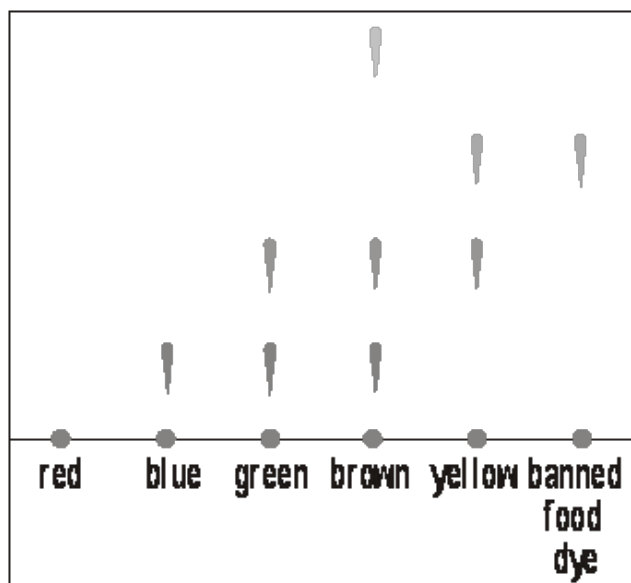
He put a drop of each food colouring and the banned food dye onto some special paper.

He hung the paper in a beaker of water.



After 10 minutes, the banned food dye and some of the dyes from the food colourings had moved up the paper.

Gary's results are shown below.



- (a) Gary wrote the labels on the paper in pencil.  
Why should he **not** write them in ink?

.....  
.....

1 mark

- (b) Look at Gary's results.  
The different dyes in some of the food colourings had moved up the paper.

- (i) Which food colouring contained the banned food dye?

.....

1 mark

- (ii) Which food colouring contained the most dyes?

.....

1 mark

- (c) Which food colouring did **not** dissolve in the water?

.....

1 mark

- (d) Which method did Gary use to separate the dyes?  
Tick the correct box.

chromatography

☐

distillation

☐

evaporation

☐

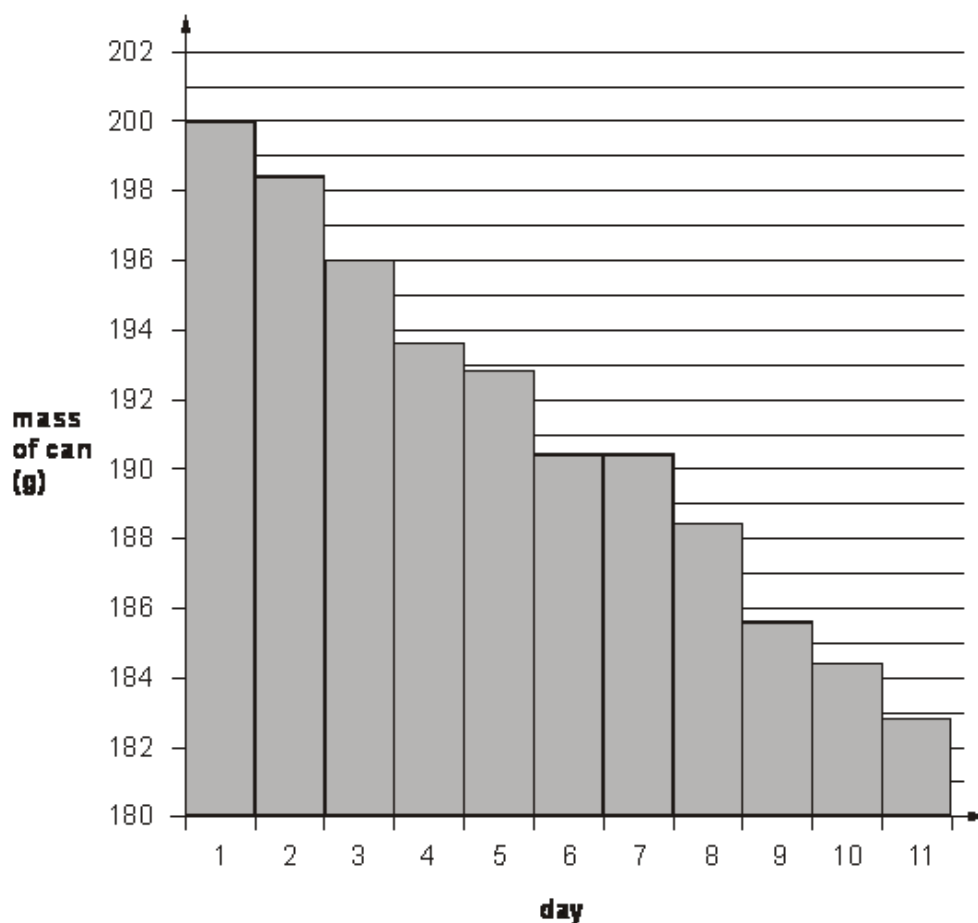
filtration

☐

1 mark  
maximum 5 marks

- Q29.** Anna has a can of deodorant that she uses once each day.  
Before she uses the deodorant she measures the mass of the can.

- (a) Her results are shown in the graph below.



- (i) What was the mass of the can of deodorant on day 1?

..... g

1 mark

- (ii) How did the mass change as Anna used the deodorant?

.....

1 mark

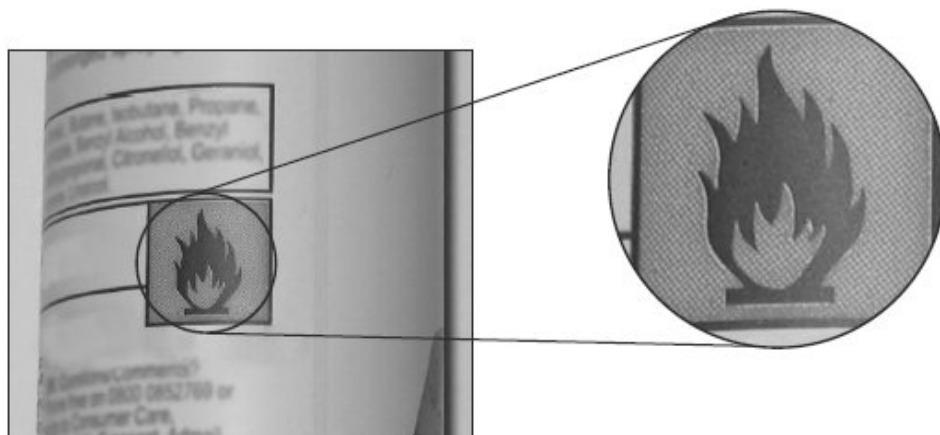
- (iii) Anna did **not** use the deodorant on day 6.  
How can you tell this from the graph?

.....

.....

1 mark

- (b) The deodorant can has a warning sign on it.



What does this warning sign mean?

.....

1 mark

- (c) A deodorant contains a solution of perfume and alcohol.

What happens to the perfume when it is mixed with the alcohol?  
Tick the correct box.

It boils.

☐

It dissolves.

☐

It freezes.

☐

It melts.

☐

1 mark

- (d) Anna sprayed the liquid deodorant under her arms.  
After a few minutes, her skin had dried.

What happened to the liquid?  
Tick the correct box.

It evaporated.	<input type="checkbox"/>	It dissolved.	<input type="checkbox"/>
It boiled.	<input type="checkbox"/>	It condensed.	<input type="checkbox"/>

1 mark  
maximum 6 marks

- Q30.** (a) Amy's family are at the beach during the summer.  
Amy and her sister have a bucket containing seawater and sand.



Read the following statements.  
Which are **true** and which are **false**?

Tick **one** box for each statement.

	true	false
Water is a solvent for salt.	<input type="checkbox"/>	<input type="checkbox"/>
Sand sinks in water because water is more dense than sand.	<input type="checkbox"/>	<input type="checkbox"/>
When a solid dissolves in water, the solid is called a solute.	<input type="checkbox"/>	<input type="checkbox"/>

2 marks

- (b) Seawater contains dissolved salt.  
Describe what Amy can do to separate **and** collect pure water from seawater.

.....

.....

2 marks

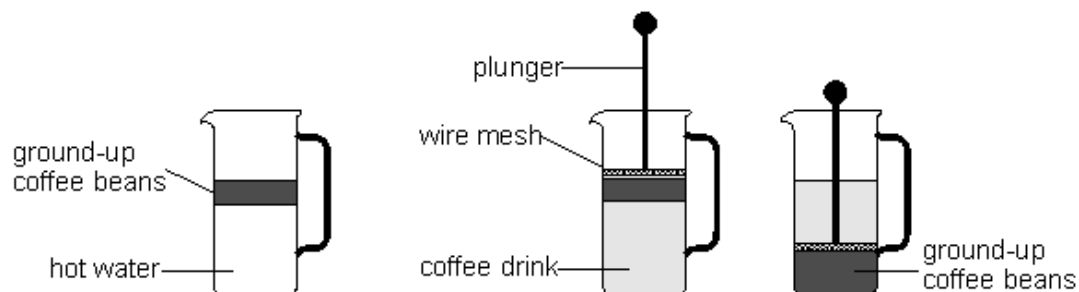
- (c) Draw a line from each of the **substances** below to the **group** that it belongs to.  
Draw only **three** lines.

Draw a line from each **group** to the correct **description**.  
Draw only **three** lines.

substance	group	description
seawater	compound	It contains two or more types of atoms or molecules which can be physically separated.
salt	mixture	It contains only one type of atom.
oxygen	element	Two or more types of atoms are chemically joined together.

2 marks  
maximum 6 marks

- Q31.** Russell put ground-up coffee beans in a coffee maker and added hot water.



He pushed the plunger down.  
This separated the coffee drink from the ground-up coffee beans.

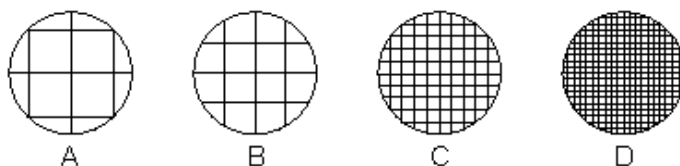


- (a) How could Russell see that some coffee had dissolved in the water?

.....

1 mark

- (b) The end of the plunger is a circle of wire mesh.

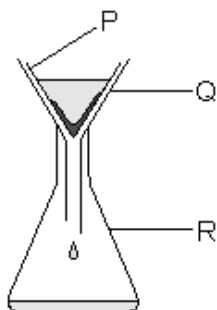


- (i) Which mesh would be best to separate the coffee drink from all the ground-up coffee beans? Write the letter.

.....

1 mark

- (ii) This method of making coffee uses a type of filter.  
The apparatus used for filtration in a school laboratory is drawn below.

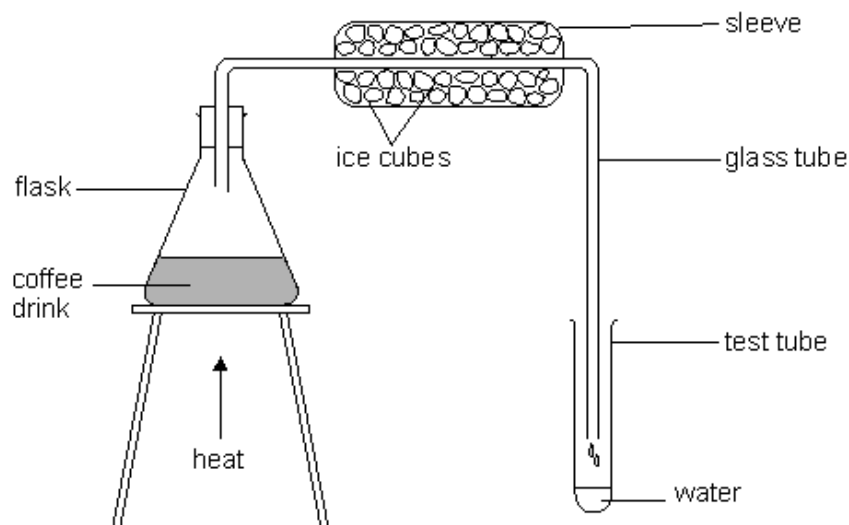


Which part of the apparatus above works in the same way as the wire mesh? Write the letter.

.....

1 mark

- (c) Russell wanted to separate the water from the coffee drink.  
He set up the apparatus shown below.



- (i) Why did Russell put ice cubes around the glass tube?

.....

1 mark

- (ii) Choose words from the box below to fill the gaps in the following sentences.

<b>an acid</b>	<b>a gas</b>	<b>a liquid</b>	<b>a solid</b>
<b>condensation</b>	<b>crystallisation</b>	<b>evaporation</b>	<b>filtration</b>

Russell heats the water. Water in the drink changes from

..... into .....

This change of state is called .....

Water vapour changes into liquid. This change of state is called

.....

4 marks  
maximum 8 marks

