

Answer **all** the questions.

- 1 It is important to make sure that people can tell if a chemical is dangerous. Words or symbols can be used to warn people about hazardous substances.

(a) Draw a straight line to link each **hazard** with the correct **explanation**.

One has been done for you.

hazard	explanation
highly flammable	can cause death if swallowed, breathed in or absorbed through the skin
toxic	provides oxygen to allow other things to burn fiercely
oxidising	attacks and destroys living tissues
irritant	causes reddening or blistering of skin
corrosive	easily catches fire

[3]

(b) Which hazard warning, if any, would you expect to see on each of the following?

If there is no need for a warning, write "none".

(i) rat-poison

..... [1]

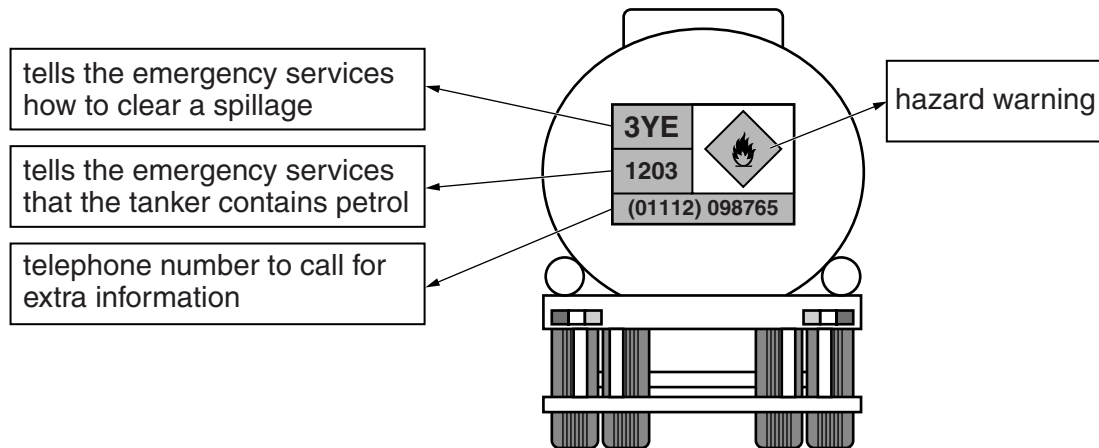
(ii) concentrated sulfuric acid

..... [1]

(iii) milk

..... [1]

- (c) Lorries that carry chemicals show warning signs to tell the emergency services how to deal with the chemicals in an accident.



- (i) What is the meaning of the hazard warning on the lorry?

..... [1]

- (ii) Some of the codes to show the emergency services how to clear a spillage are explained in the table below.

code	safety									put out fire with ...			
	P	R	S	T	W	X	Y	Z	E	1	2	3	4
use breathing apparatus and fire kit	X	X	✓	✓	X	X	✓	✓	evacuate people nearby	water jets	water spray	foam	dry powder
wear chemical suits	✓	✓	X	X	✓	✓	X	X	This tanker carries the code 3YE .				
do not wash spill into drains	X	X	X	X	✓	✓	✓	✓					

Use the information from the table to describe what the emergency services should do if this tanker is involved in an accident.

.....

 [3]

- (iii) There are regulations which protect people at work.

Give the name of the organisation in the UK which enforces these regulations.

..... [1]

[Total: 11]

Turn over

2 Noor has bought a box of 'LawnFix'.

This is a new product that helps the grass grow better in her garden.

LawnFix is a mixture of three substances, as shown in the table.

substance	formula	percentage of LawnFix
sand	SiO_2	80%
iron(II) sulfate	FeSO_4	
ammonium sulfate	$(\text{NH}_4)_2\text{SO}_4$	14%

The sand improves the soil. It is not soluble in water.

Ammonium sulfate and iron(II) sulfate help the grass to grow and kill off moss in the lawn. They are both soluble salts.

(a) (i) Complete the table to show what **percentage** of the LawnFix is iron(II) sulfate. [1]

(ii) How many **atoms** of sulfur are shown in the formula of iron(II) sulfate?

..... [1]

(iii) How many different **elements** are present in ammonium sulfate?

..... [1]

(b) Noor wants to check the percentage of sand in her box of LawnFix.

She carries out an experiment.

This is her report of the experiment.

- I measured 10g of LawnFix into a beaker
- I added 100ml of water to the beaker
- I stirred the mixture in the beaker
- I poured the mixture through a filter paper into a conical flask

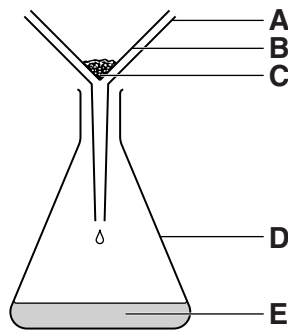
(i) Use the diagram to identify each of the following.

Choose from **A, B, C, D** and **E**.

the filter paper

the filtrate

the residue



[2]

As soon as she had filtered the mixture, Noor expected to find 8g of sand in the filter paper and 100ml of solution in the flask.

(ii) Explain why the sand has a mass of **more** than 8g.

.....

.....

..... [1]

(iii) Suggest what Noor should do to find out exactly what mass of sand she has collected.

.....

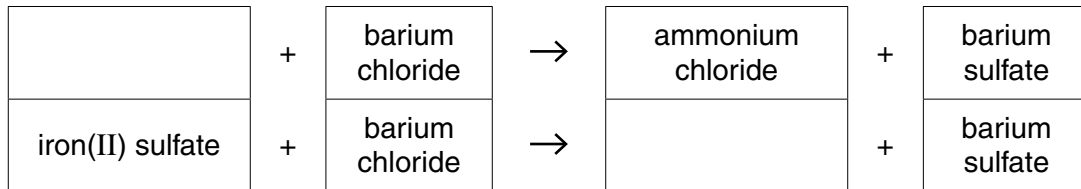
.....

..... [1]

(c) The solution contains the two different salts from the LawnFix.

They both react in the same way with barium chloride solution, making a precipitate of barium sulfate.

Complete the word equations for the reactions.



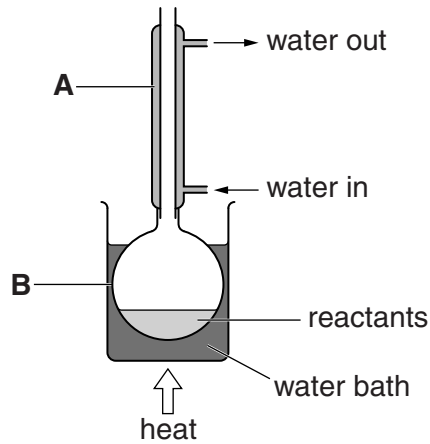
[2]

[Total: 9]

3 Fruit flavourings often contain esters.

The reaction used to make an ester is very slow.

The apparatus shown in the diagram can be used to make an ester.



(a) (i) Name the apparatus labelled **A** in the diagram.

..... [1]

(ii) Why is it necessary to heat the reaction in flask **B**?

..... [1]

(iii) Suggest why the reactants are heated by a water bath rather than a Bunsen burner.

.....
 [1]

(b) Choose words from this list to complete the sentences below.

crystallising

distilling

filtering

pressure

reflux

The process shown in the diagram is called heating under

The ester which has been made can be separated by [2]

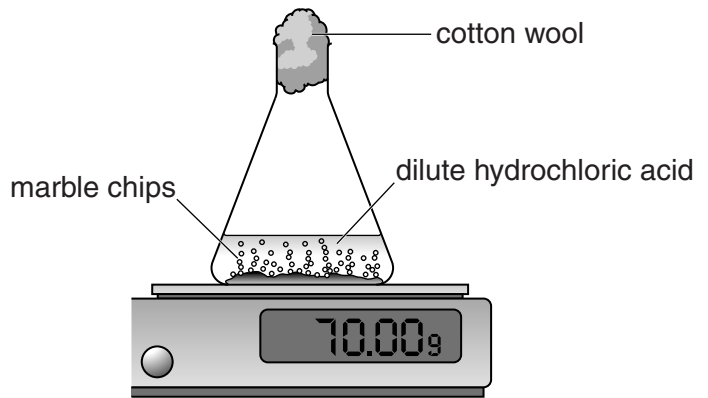
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- 4 Andy is investigating the reaction between dilute hydrochloric acid and calcium carbonate (marble chips).

He uses 50 ml of the dilute acid and 5.00 g of marble chips.

When the reaction starts, fizzing can be seen as a gas is given off.

When the reaction stops, some marble chips can still be seen in the flask.



Andy measures the mass of the flask and its contents during the reaction.

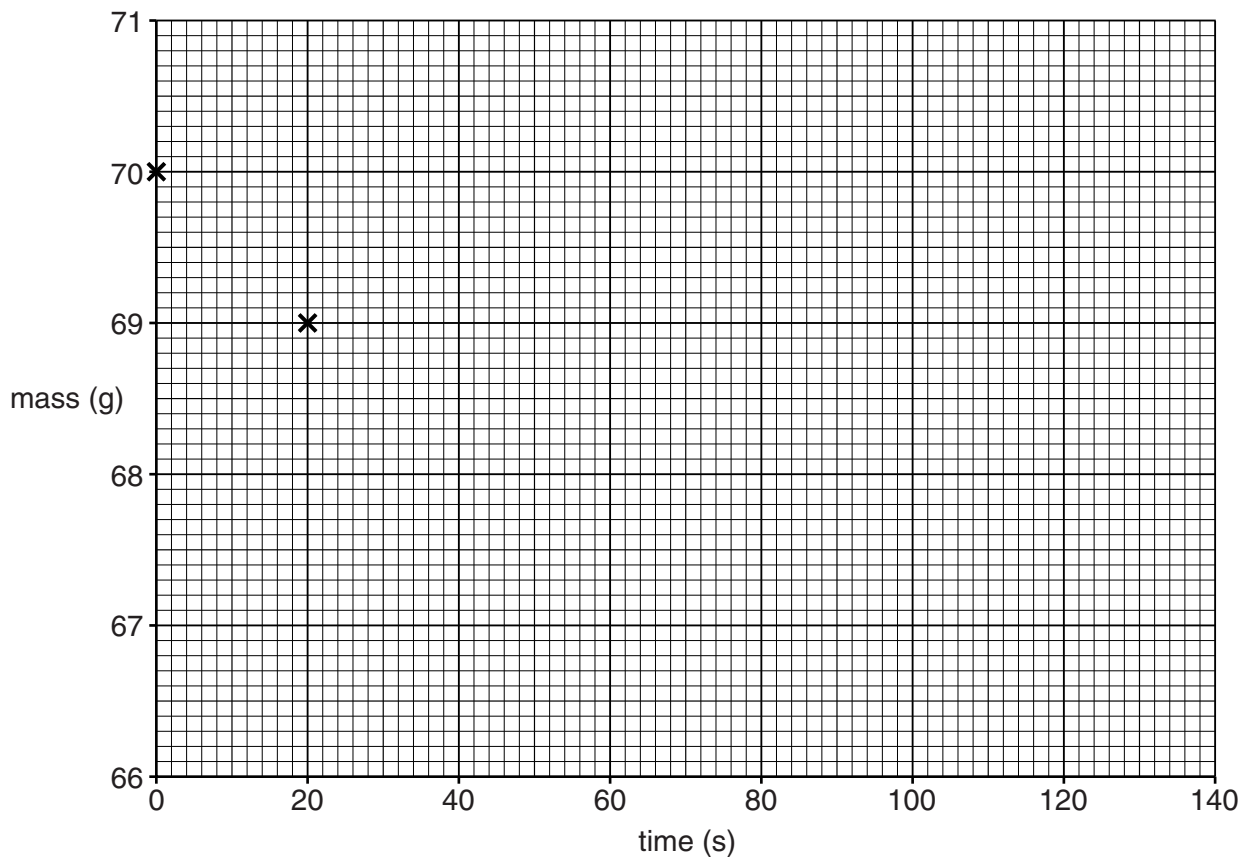
His results are shown in the table below.

time (s)	0	20	40	60	80	100	120
mass (g)	70.00	69.00	68.40	68.00	67.80	67.80	67.80

- (a) (i) Plot these results on this grid.

The first two points have been plotted for you.

[2]



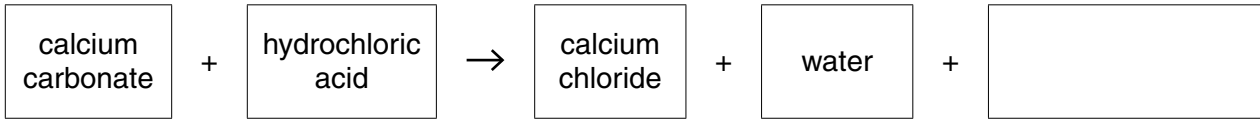
- (ii) Draw the line of best fit.

[1]

(b) How much mass has been lost during the experiment?

mass lost g [1]

(c) Complete the word equation to show which gas was given off during the reaction.



[1]

(d) The following statements are about the end of the reaction.

Put a tick (✓) in the boxes next to the **two** correct statements.

The reaction stopped ...

... after 80 seconds.

... when all the marble chips had dissolved.

... when all the acid had been used up.

... when the flask was full of gas.

... when the gas could not get through the cotton wool.

[2]

(e) Andy wants to investigate the effect of using powdered marble chips.

He repeats the experiment with another 50ml of the same dilute acid but using 5.00g of **powdered** marble chips.

He notices that the mass lost is exactly the same but it happens in a much shorter time.

(i) Why is it important to use the same volume of the same acid?

.....
 [1]

(ii) Why does the reaction take place more quickly than in the first experiment?

.....
 [1]

- (f) Andy repeats the experiment again with another 50 ml of the same dilute acid and 10.0 g of powdered chips.

Explain why the mass lost is still exactly the same as in the first two experiments.

.....

.....

..... [2]

[Total: 11]

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