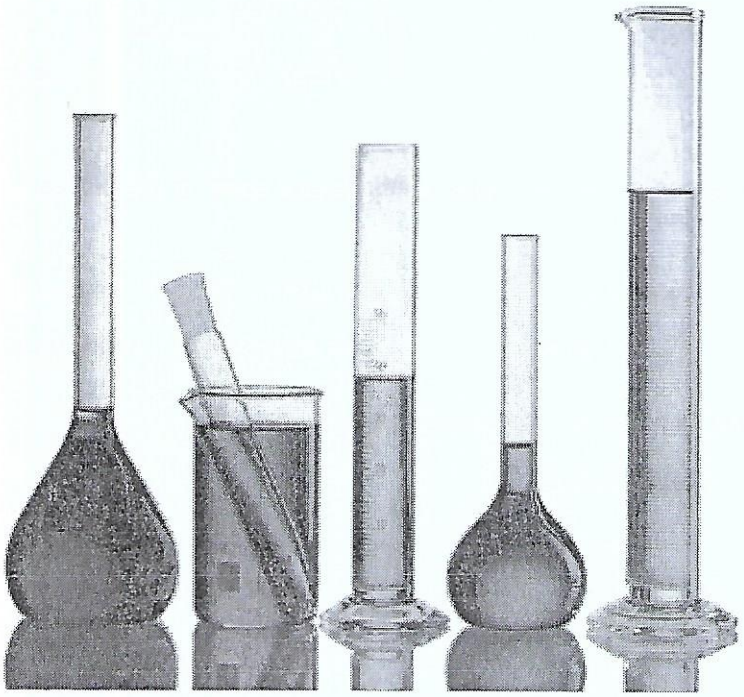
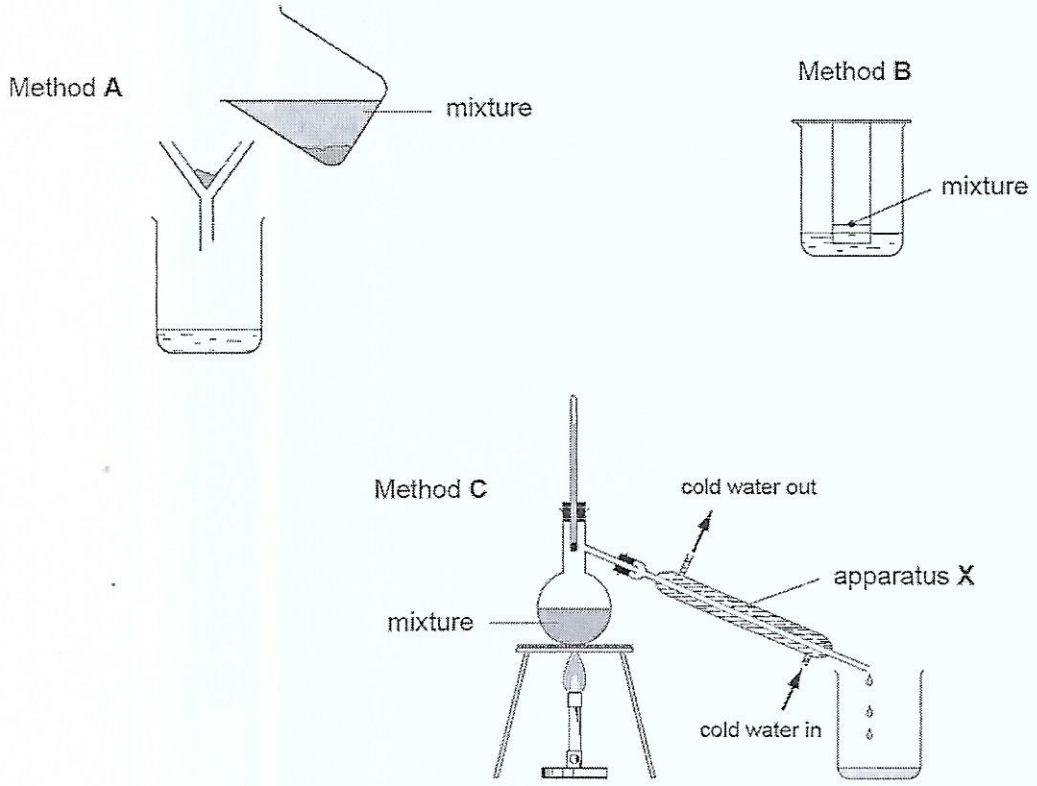
Practice Questions

GCSE Chemistry

Booklet 3



1. The diagrams below show three methods, **A**, **B** and **C**, used to separate mixtures.



(a) The names of the separation methods and some of the pieces of apparatus used are given in the box below.

beaker	**distillation**	**chromatography**
condenser	**filter funnel**	**filtration**

Choose the answers to parts (i) and (ii) from the box.

(i) Name apparatus **X**. [1]

.....

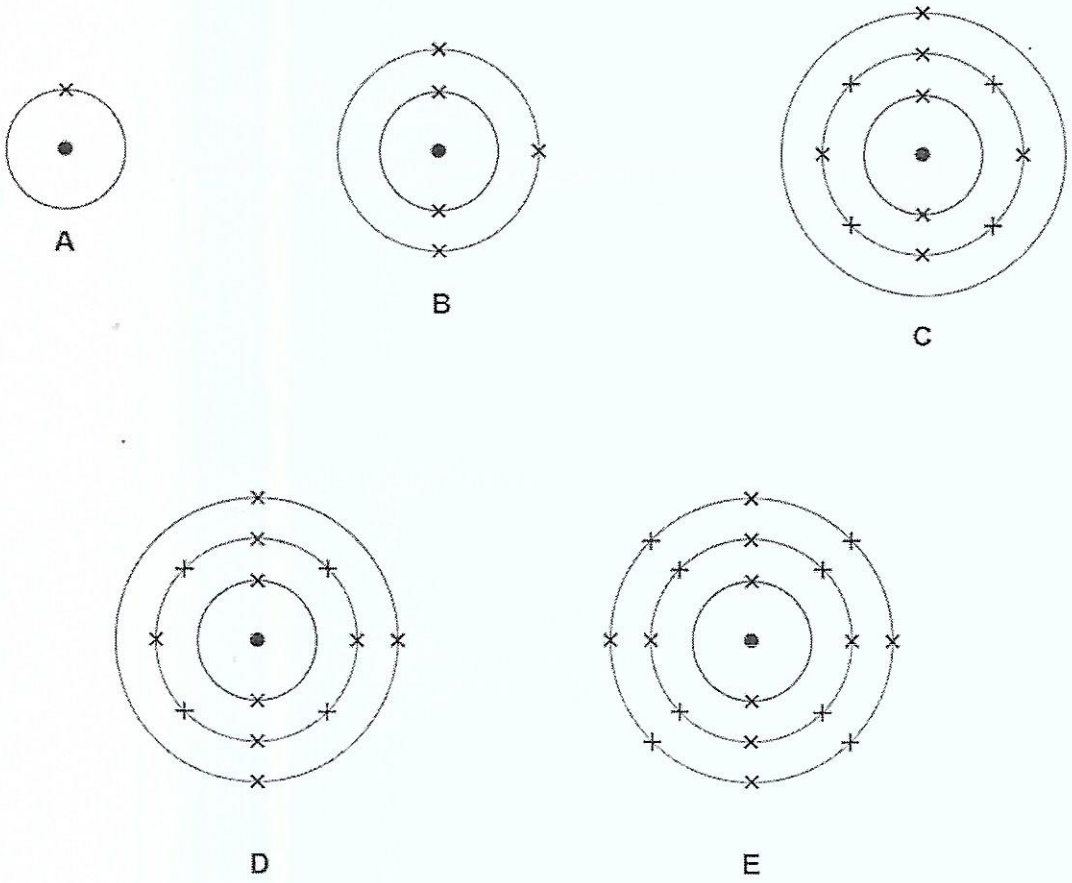
(ii) Give the name of method **B**. [1]

.....

(b) Give the **letter** of the method you would use to separate ethanol from water. [1]

2. *(a)* The following diagrams represent atoms of 5 different elements, **A**, **B**, **C**, **D** and **E**.

A, **B**, **C**, **D** and **E** are not chemical symbols.



(i) Give the electronic structure of **E**. ..... [1]

(ii) Which letter represents aluminium? ..... [1]

(iii) Give the letters of the **two** elements which are found in the same group of the Periodic Table and give a reason for your choice. [2]

.....

.....

(b) (i) Calculate the relative formula mass (M_r) of sodium hydroxide, NaOH. [1]

A_r(Na) = 23 A_r(O) = 16 A_r(H) = 1

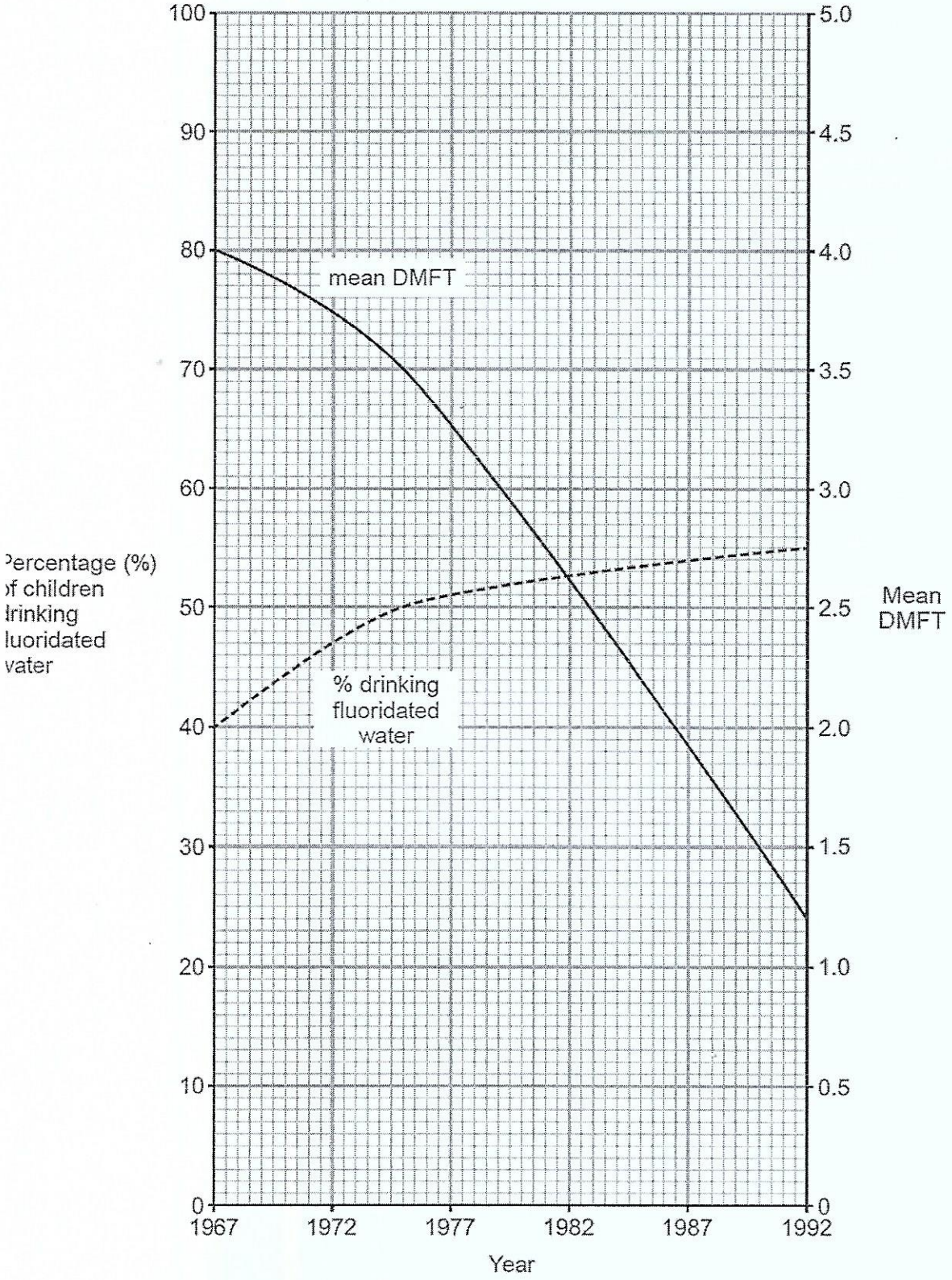
Relative formula mass = ...

(ii) Using your answer to part (i), calculate the percentage by mass of oxygen in sodium hydroxide, NaOH. [2]

Percentage by mass of oxygen = ... %

3. The graphs below show the results of research on the effect of water fluoridation on the teeth o children aged 12 years in the United States.

(DMFT = number of decayed, missing or filled teeth)



(a) Use the graph to find the decrease in the mean DMFT between 1967 and 1992. [1]

Decrease in the mean DMFT = ...

(b) Does the evidence from the graph support the following statement? Give a reason for your answer.

"Fluoridation of drinking water is responsible for the decrease in tooth decay among 12 year-olds." [1]

.....

.....

.....

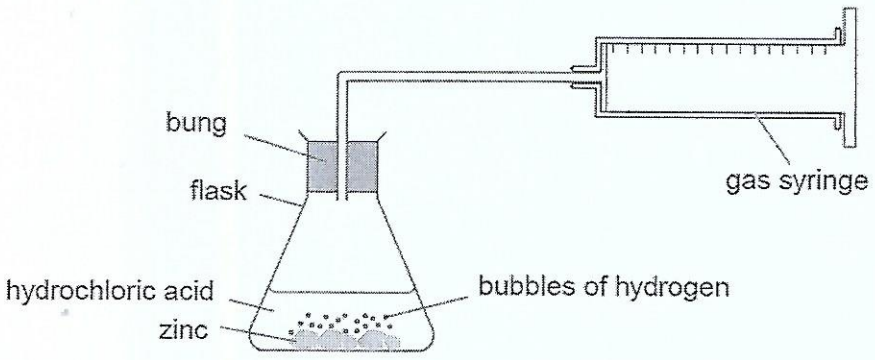
(c) Give **two** reasons why some people oppose the fluoridation of drinking water. [2]

Reason 1 .....

Reason 2 .....

4. *(a)* Zinc reacts with dilute hydrochloric acid to produce hydrogen gas.

The diagram below shows apparatus that can be used to investigate the rate of the reaction between zinc and hydrochloric acid. A small amount of copper sulfate is added because it acts as a catalyst for the reaction.



A few pieces of zinc were placed in excess dilute hydrochloric acid and the volume of hydrogen produced was recorded every 10 seconds. The experiment was carried out at room temperature. The results obtained are shown below.

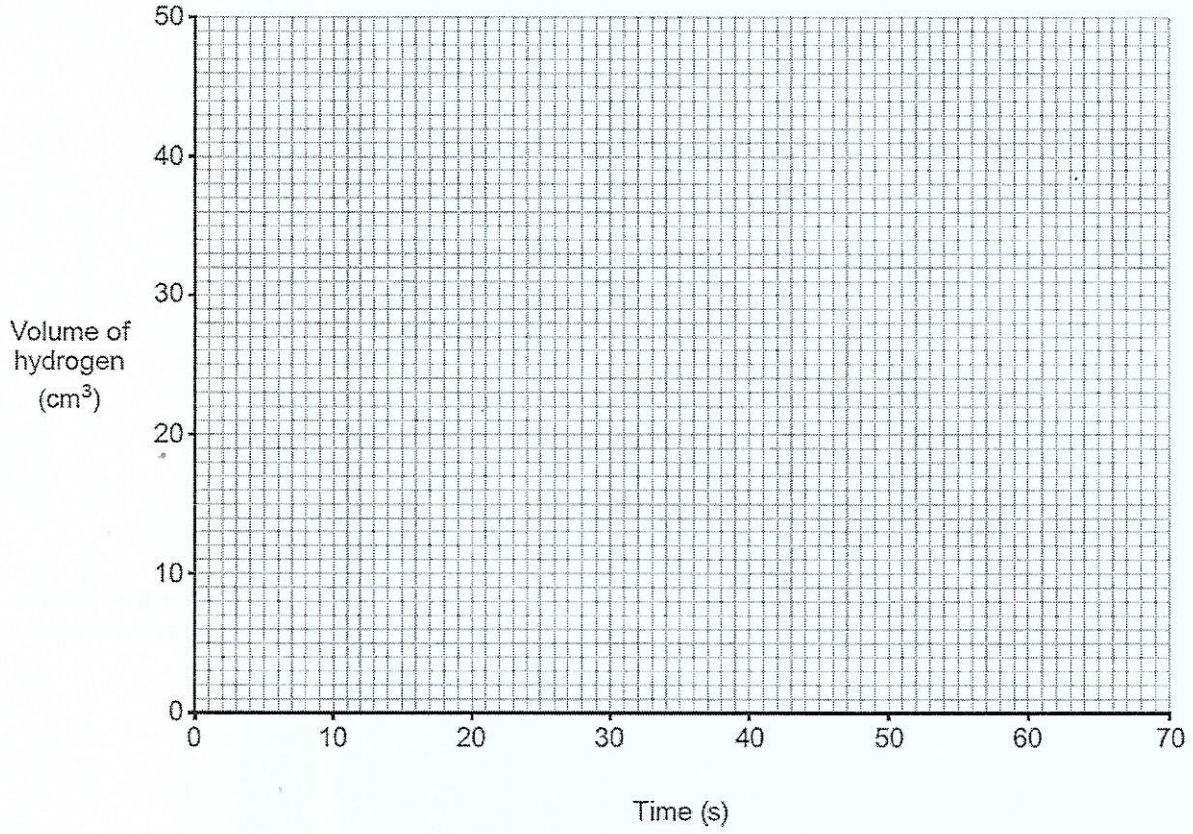
Time (s)	0	10	20	30	40	50	60	70
Volume of hydrogen (cm^3)	0	8	33	40	45	48	49	49

(i) All the results were measured accurately but the volume recorded after 10 seconds is lower than expected. Suggest a possible reason for this. [1]

.....

.....

(ii) Plot **all** the results from the table on the grid below and draw a suitable line. [3]



(iii) Use your graph to give the volume of hydrogen expected after 10 seconds. [1]

..... cm^3

(iv) State how the graph shows that the reaction has stopped. [1]

.....

.....

(v) Choose statements from the box below to complete the following sentences.

less time	more time	the same time

Each statement may be used once, more than once or not at all. [2]

Using zinc **powder** instead of the larger pieces of zinc the reaction takes

..... .

When the experiment is repeated without the copper sulfate catalyst the reaction takes ..... .

(b) A chemical reaction takes twice as long if the temperature is decreased by 10 °C.

At 30 °C, milk undergoes a chemical reaction that makes it go sour in 1 day.

Calculate how long it will take milk to go sour at 10 °C. [2]

.....

.....

5. *(a)* The following processes are used in the treatment of our water supply.

sedimentation **filtration** **chlorination**

State the purpose of each process. [3]

Sedimentation

.....

.....

Filtration

.....

.....

Chlorination

.....

.....

(b) Drinking water can be obtained by desalination.

State what is meant by *desalination* and name a process by which it can be carried out. [2]

.....

.....

6. Potassium reacts vigorously with water.

(a) (i) Describe what you would **observe** when potassium reacts with water. [3]

.....

.....

.....

.....

(ii) During a class demonstration the potassium exploded. Suggest what might have caused this to happen. [1]

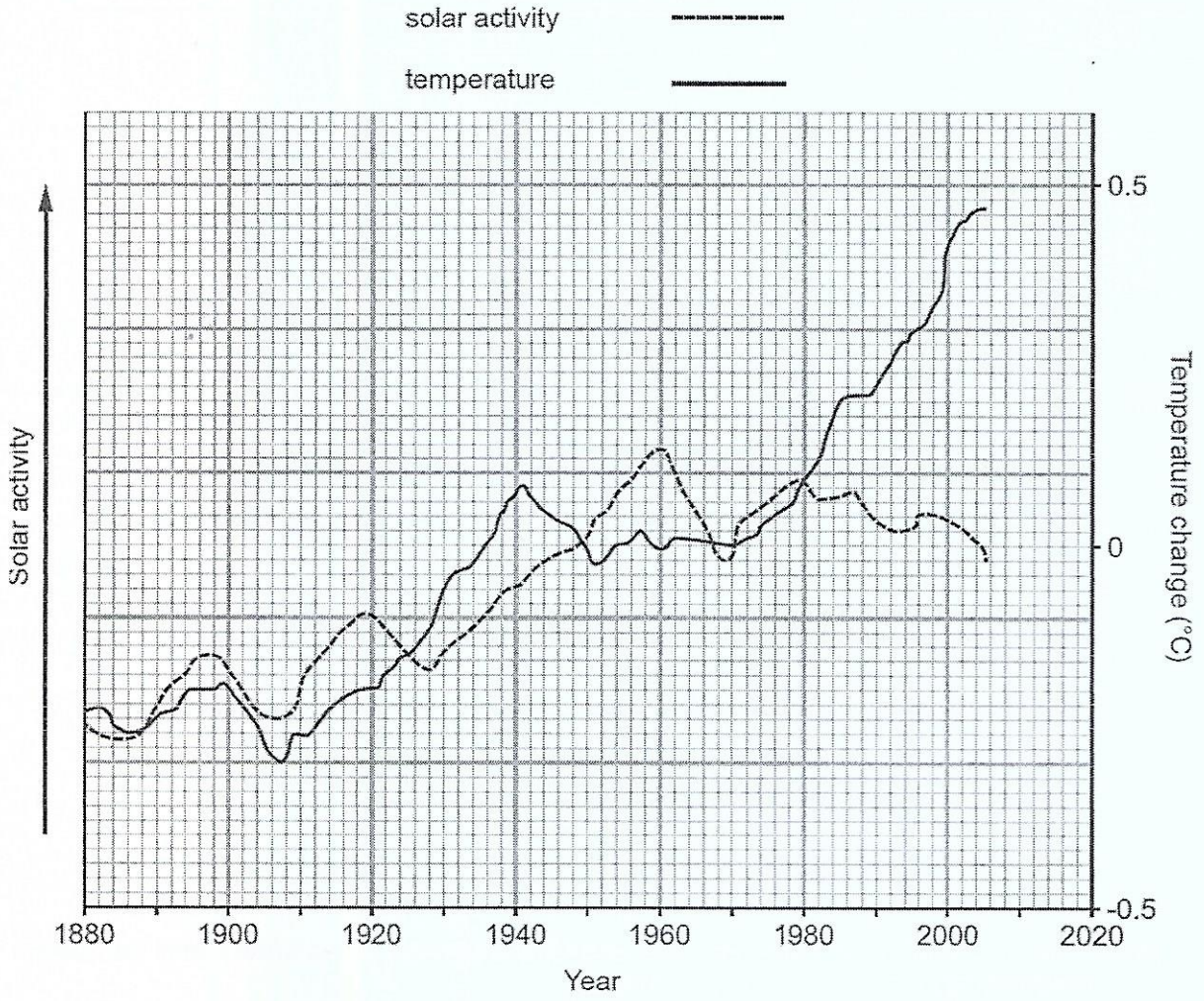
.....

.....

(b) Complete and balance the symbol equation for the reaction between potassium and water. [2]

$2K + 2H_2O \longrightarrow$ ..... + ...

7. *(a)* A small minority of scientists believe that it is changes in solar activity (i.e. changes in the brightness and warmth of the sun) that causes global warming. The graphs below show the changes in solar activity and atmospheric temperature since 1880.



Using the information from the graphs, state how well the evidence supports the argument that solar activity is the cause of global warming. [2]

.....

.....

(b) Most scientists believe the main cause of global warming is the increase in carbon dioxide levels in the atmosphere.

(i) State the **main** cause of this increase in carbon dioxide levels. [1]

.....

(ii) Describe **one** method of reducing current atmospheric carbon dioxide levels. [1]

.....

8. The table below shows the amount of soap solution required by different samples of water to form a permanent lather. In each case 25 cm^3 of the water samples were used and the soap solution was added 1 cm^3 at a time.

	Volume of soap solution added (cm^3)				
Sample	Test 1	Test 2	Test 3	Test 4	Mean
distilled water	2	2	2	2	2
A	8	8	9	7	8
B	11	18	12	13	
C	15	14	14	13	14
A after boiling	8	7	9	8	8
B after boiling	6	5	6	7	6
C after boiling	2	2	2	2	2

(a) Two pupils, David and Haf, calculated the mean value for sample **B**. David calculated a value of 13.5 and Haf calculated a value of 12. Show how both values were obtained. State which is the better value to use and give a reason for your choice. [3]

.....

.....

.....

.....

(b) State which of water samples **A**, **B** and **C** is the **least** hard. [1]

Water sample .....

(c) State which of water samples **A**, **B** and **C** contains **both** temporary and permanent hardness. Give the reason for you answer. [2]

Water sample .....

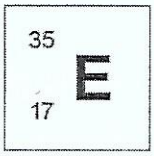
Reason .....

.....

(d) Name an ion which causes hardness in water. [1]

.....

9. An atom of element **E** is represented as follows.



State and explain what information this gives you about element **E**.

You may wish to refer to the key on the Periodic Table to help you answer this question. [6 QWC]

10. *(a)* When bromine is passed over heated iron wool it glows and forms iron(III) bromide.

Write a balanced **symbol** equation for the reaction. [3]

..... + ... ⟶ .....

(b) Name the substance used to test for the presence of bromide ions in iron(III) bromide solution and give the expected result. [2]

.....

.....

.....

11. Many metal ores contain sulfides. Chalcocite is an important copper ore which contains copper(I) sulfide, Cu_2S.

Copper can be obtained from the ore by heating in air.

The equation for the reaction that takes place is as follows.

$$Cu_2S + O_2 \longrightarrow 2Cu + SO_2$$

(a) Use the above equation to calculate the mass of copper produced on reacting 20.5 tonnes of copper(I) sulfide with an excess of oxygen. [3]

A_r(Cu) = 64 A_r(S) = 32

Mass of copper = ... tonnes

(b) When the extraction was carried out with 20.5 tonnes of chalcocite only 12.3 tonnes of copper was formed.

Calculate the percentage of **impurity** present in the ore. [2]

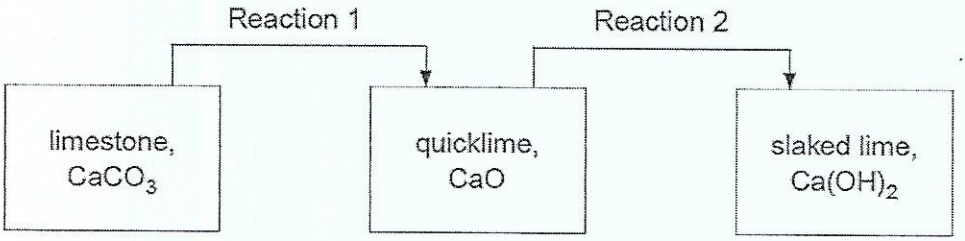
Percentage of impurity = ... %

12. Describe how reactions involving chlorine, bromine and iodine can be used to show the trend in reactivity in Group 7 elements. [6 *QWC*]

You should include equations in your answer.

Triple extension question

13. Limestone, $CaCO_3$, is an important raw material. It can be converted into other useful materials as shown in the diagram below.



Describe how these reactions can be carried out in a laboratory.
Your answer should include:

- the conditions required for each reaction;
- observations at each stage;
- equations for the reactions taking place. [6 QWC]