

Practice Questions

GCSE Chemistry

Booklet 2

Name



1. (a) The table below shows information about four ionic compounds. Complete the table.

[3]


Compound	Formula	Elements present
aluminium oxide	Al_2O_3	aluminium and oxygen
calcium chloride	CaCl_2 and
.....	CuO	copper and oxygen
magnesium bromide	magnesium and bromine

- (b) The following diagram represents carbon dioxide, CO_2 .




- (i) Use the diagram to complete the key.

[1]

hydrogen 

carbon

chlorine 

oxygen

- (ii) Using the key, draw a diagram that represents a molecule of

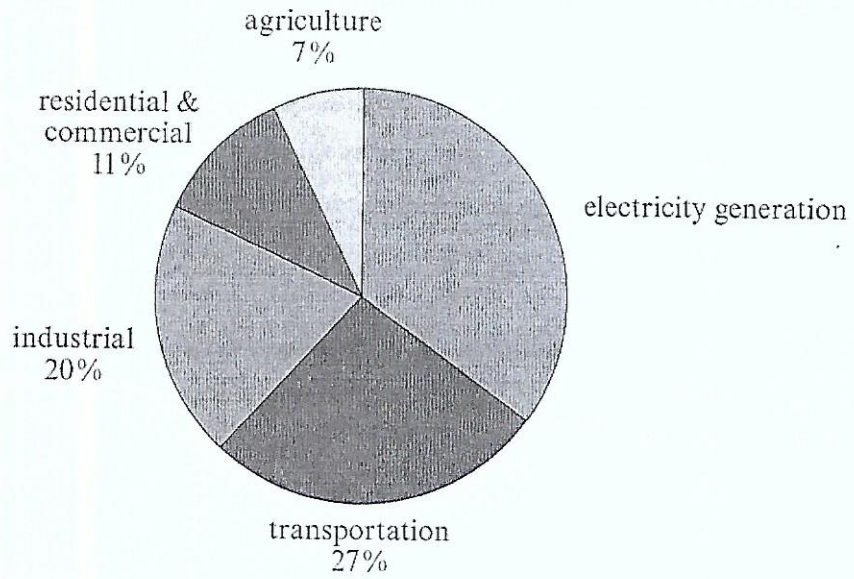
I. water, H_2O

[1]

II. tetrachloromethane, CCl_4

[1]

2. The following pie chart shows the sources of greenhouse gas emissions in the United States.



(a) Calculate the percentage of emissions from electricity generation. [2]

Percentage of emissions from electricity generation = %

(b) Explain why scientists are concerned about the release of greenhouse gases such as carbon dioxide into the atmosphere. [2]

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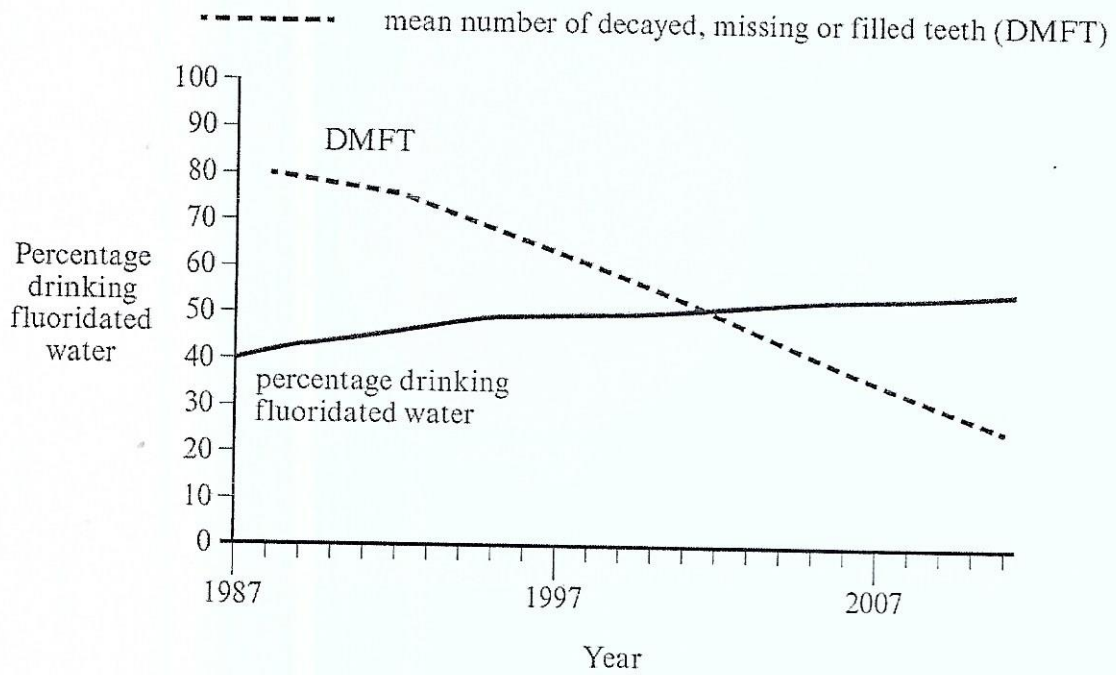
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(c) Suggest **one** way to reduce the amount of greenhouse gases released into the atmosphere due to electricity generation. [1]

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3. A water company is planning to add fluoride to drinking water. The following graph was used to support their plan. It shows how the number of decayed, missing or filled teeth is affected by the presence of fluoride in drinking water.



- (a) State how the data in the graph can be used to persuade people that adding fluoride to drinking water is a good idea. [1]

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- (b) Discuss why some people are against the fluoridation of water supplies. [2]

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4. The table below shows some information about elements A-F. The letters are not the chemical symbols of the elements.

Element	Colour	Melting point (°C)	Boiling point (°C)	Conducts electricity	Density (g/cm ³)
A	dull grey	1414	2900	yes	2.03
B	pale yellow	-219	-188	no	0.0017
C	orange brown	-7	59	no	3.10
D	shiny brown	1084	2927	yes	8.92
E	shiny grey	1538	2861	yes	7.87
F	colourless	-157	-153	no	0.0033

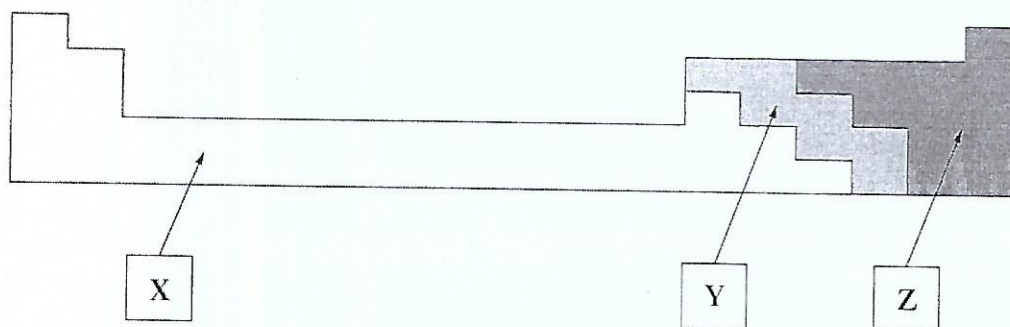
- (a) State which of the elements A-F are gases at room temperature. [1]

.....

- (b) Give the letter of the element A-F that has the biggest difference between melting point and boiling point. [1]

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- (c) The following diagram shows an outline of the Periodic Table.



- (i) Element A is found in area Y of the Periodic Table. Explain how the information in the table supports this. [2]

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- (ii) From elements B-F, identify all that would be found in area X. [1]

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5. (a) Atoms consist of particles called electrons, neutrons and protons.

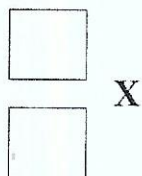
Complete the following table by giving the charge on an electron and the mass of a neutron. [2]

	Mass	Charge
electron	negligible
neutron	neutral (0)
proton	1	positive (+1)

- (b) Potassium is represented as ${}^{39}_{19}\text{K}$.

Element X has 9 electrons, 10 neutrons and 9 protons.

Write the information for element X in the same form as above. [1]



- (c) Chlorine has two isotopes: chlorine-35 and chlorine-37.

Complete the table below. [2]

	chlorine-35	chlorine-37
Atomic number	17	17
Mass number	35	37
Number of electrons	17
Number of neutrons	18
Number of protons	17	17

(d) The atomic number of sodium is 11.

Place a tick (✓) in the box next to the electronic structure of sodium.

[1]

- 11
- 2,9
- 4,7
- 2,4,5
- 2,8,1

(e) Element Z is found in Group 2 and in Period 4 of the Periodic Table.

Place a tick (✓) in the box next to the electronic structure of element Z.

[1]

- 2,4
- 4,2
- 2,8,2
- 2,8,8,2
- 2,8,8,4

7 The following box shows the names of five non-metals.

argon	chlorine	helium	iodine	neon
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Use **only** the non-metals named above to complete sentences (a)-(c).

Each non-metal can be used once, more than once or not at all.

(a) A gas used to fill weather balloons is [1]

(b) Two non-metals that can be obtained from sea water are
..... and [2]

(c) and are poisonous and
can be used to kill bacteria. [2]

8. (a) Lithium, sodium, potassium and rubidium are the first four members of Group 1 in the Periodic Table.

The following table gives the melting points and boiling points of lithium, potassium and rubidium.

Element	Melting point (°C)	Boiling point (°C)
lithium	180	1330
sodium	-	-
potassium	64	774
rubidium	39	688

Using the information in the table, choose from below the pair of values most likely to be the melting point and the boiling point of sodium. [1]

Pair A
59 910

Pair B
113 735

Pair C
98 890

Pair D
134 1498

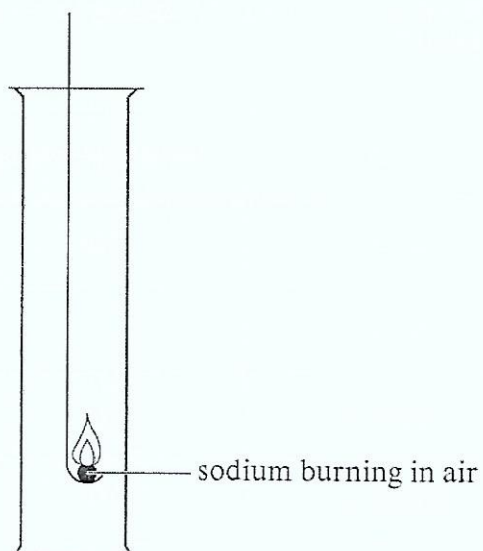
Pair

- (b) State why sodium is stored in oil. [1]

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(c) Sodium burns vigorously in air.



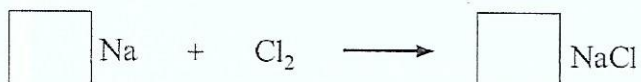
(i) Give the colour of the flame. [1]

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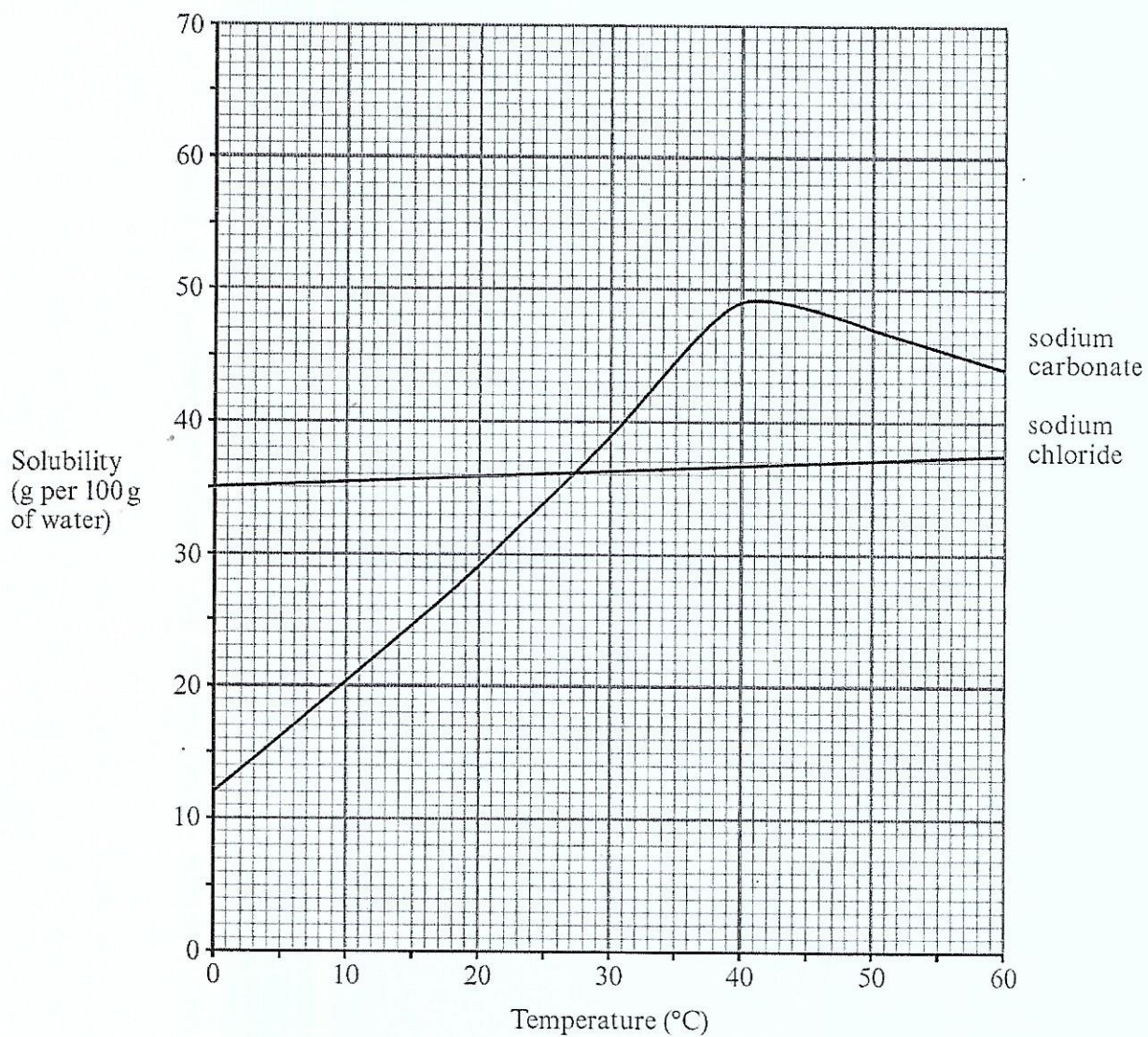
(ii) Give the **word** equation for the reaction that takes place when sodium burns in air. [2]

..... + →

(iii) Sodium also reacts vigorously with chlorine. Balance the symbol equation for the reaction between sodium and chlorine. [1]



9. The graphs below show the solubilities of sodium chloride and sodium carbonate in water at different temperatures.



(a) Describe the trend in the solubility of sodium carbonate.

[1]

.....

.....

(b) The table below shows the solubility of sodium bromate in water at different temperatures.

Temperature (°C)	0	10	20	30	40	50	60
Solubility (g per 100g of water)	25	29	35	41	48	55	64

Plot the results from the table on the grid opposite and draw a suitable line. [3]

(c) List the three sodium compounds in order of solubility at 40°C. [1]

Most soluble

.....

Least soluble

(d) The solubility of silver chloride is 0.0002 g in 100 g of water at room temperature, 20°C.

You are given a mixture of sodium chloride and silver chloride powder. Describe how you would obtain a sample of silver chloride from the mixture. [3]

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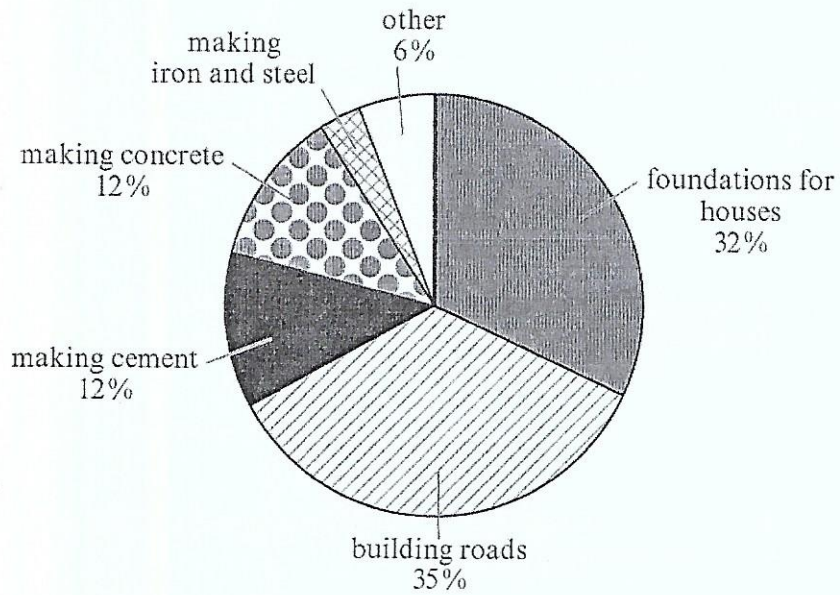
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10. Limestone is an important raw material.

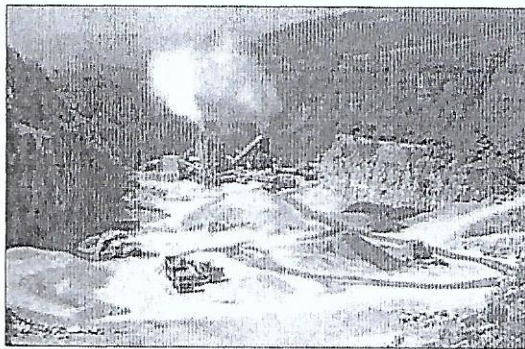
(a) The pie chart below shows some uses of limestone in the construction industry.



Calculate the percentage of limestone used for making iron and steel. [2]

Percentage used for making iron and steel =%

(b) The photograph below shows a limestone quarry.

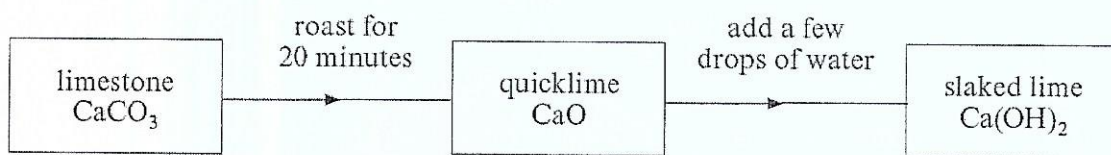


Give **two** environmental problems relating to limestone quarrying. [2]

Problem 1

Problem 2

- (c) Limestone, CaCO_3 , is the raw material for the production of slaked lime, Ca(OH)_2 . The flow diagram below shows the steps involved.



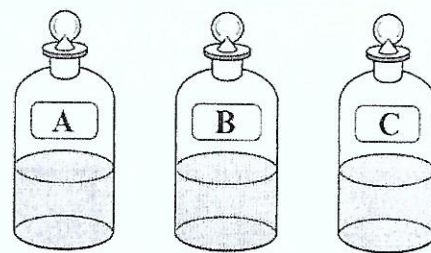
- (i) Using the **chemical names** write a word equation for the production of slaked lime from quicklime. [1]

..... + →

- (ii) The addition of water to quicklime is a very exothermic reaction. Describe what you **observe** during this reaction. [2]

.....
.....

ii. (a) A water company has provided your class with three samples of water from different parts of Wales. The water company is asking for the hardness of the water samples to be investigated.



Water samples

Describe an experiment you would carry out to show which sample is the hardest.

You are provided with soap solution and basic laboratory equipment.

Include in your answer

- the ways in which you will make the experiment a fair test,
- how you will know which sample is the hardest.

[5]

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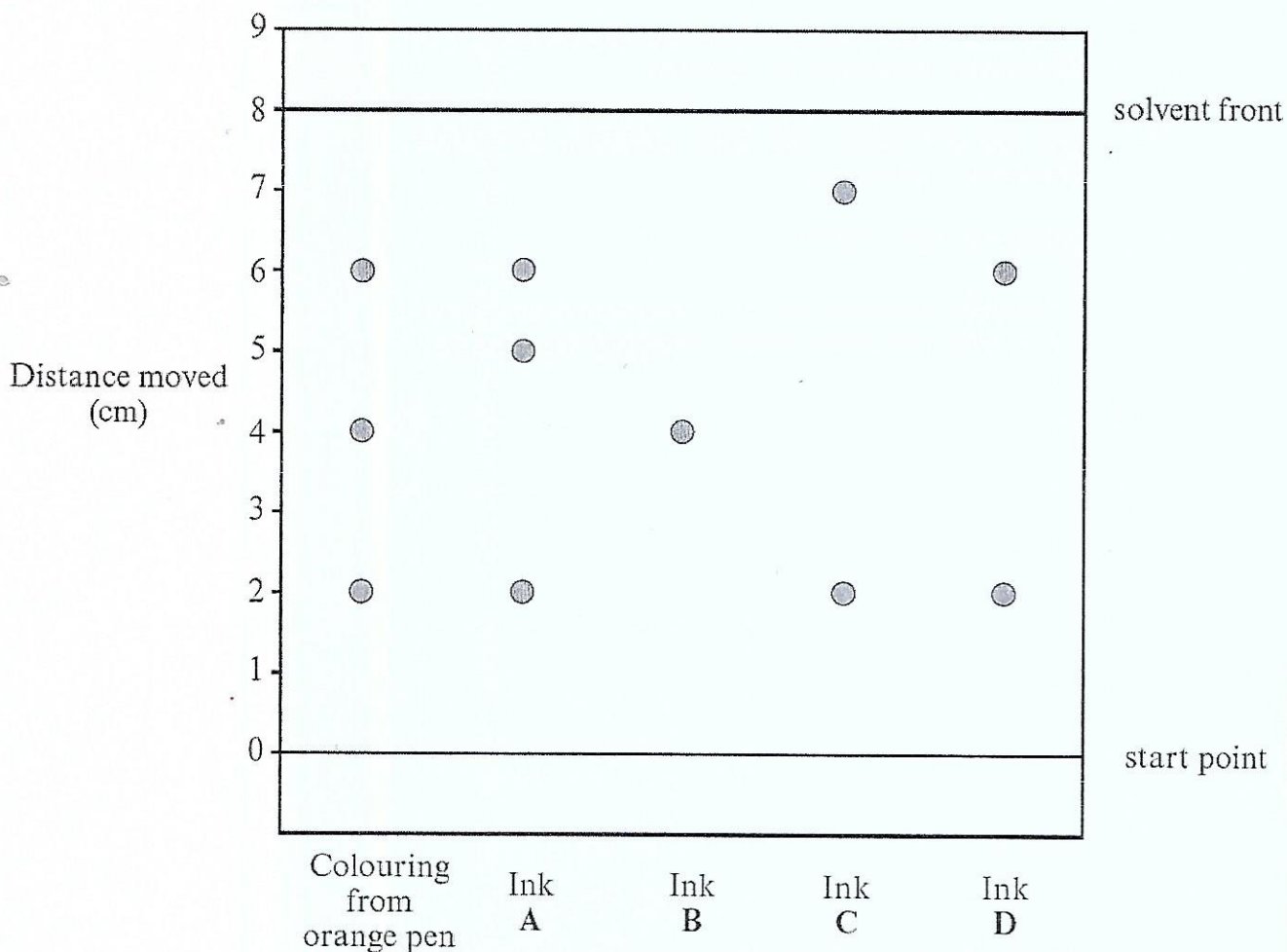
(b) The box below contains some statements about hard water.

forms limescale when heated	reduces heart disease
strengthens bones and teeth	forms a scum with soap
wastes soap	tastes better

Choose one statement which

- (i) gives a health benefit, [1]
- (ii) describes why hard water causes problems in boilers and water pipes,
..... [1]
- (iii) is an opinion and not a scientific fact. [1]

- 12 The chromatogram of an orange felt-tipped pen was compared with various orange inks A, B, C and D. The results are shown below.



(a) Give the **letters** of the two inks that are mixed to make the orange felt-tipped pen. [1]
 and

(b) Give the **letter** of the ink which contains the most soluble substance. [1]

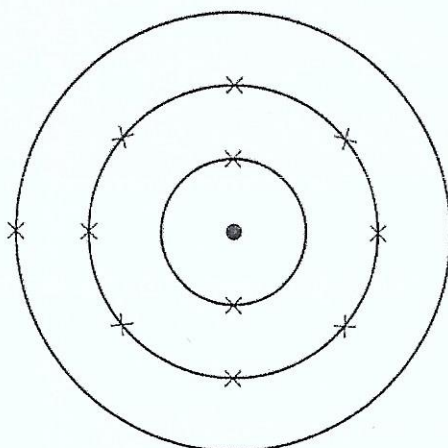
(c) The R_f value of a substance can be used to identify that substance. The R_f value is given by the formula below.

$$R_f = \frac{\text{distance moved by the substance}}{\text{distance moved by the solvent front}}$$

Calculate the R_f value of the substance in ink **B**. [2]

$R_f =$

- 13 (a) The diagram below shows the electronic structure of an element in the Periodic Table.



Using × to represent an electron, draw a similar diagram to show the electronic structure of the element which

- (i) lies directly **below** this one in the Periodic Table, [1]

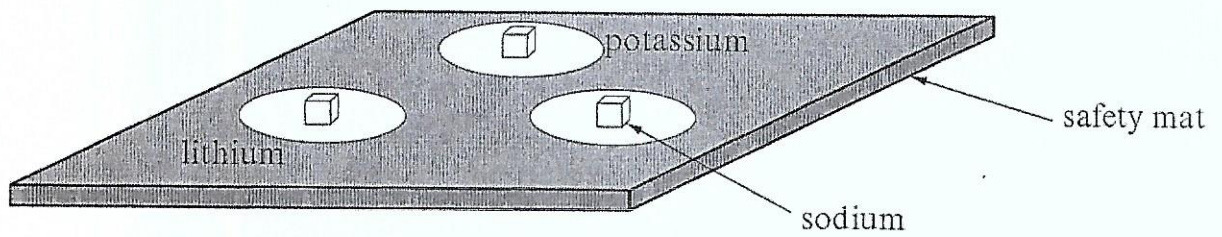
- (ii) lies directly to the **right** of this one in the Periodic Table. [1]

- (b) Carbon has two different types of atom which are represented by $^{12}_6\text{C}$ and $^{13}_6\text{C}$.

Give the term used for different types of atom of the same element. [1]

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14. (a) Freshly cut pieces of lithium, potassium and sodium are left exposed to the atmosphere.



(i) Describe how the appearance of all the metals will change. [1]

.....

(ii) Describe how the reactions will differ. [1]

.....

(b) **A**, **B** and **C** represent the Group 7 elements bromine, chlorine and iodine, but not necessarily in that order. The table below shows the results observed when **A**, **B** and **C** react with hot iron wool.

Group 7 element	Reaction with hot iron wool
A	After a few seconds the iron wool glows. An orange solid is formed.
B	After a few minutes of constant heating the iron wool glows a little. A red-brown solid is formed.
C	The iron wool burns instantly glowing brightly. An orange solid is formed.

(i) Use the above results to identify the Group 7 elements **A**, **B** and **C** and give a reason for your choice. [3]

A **B** **C**

Reason

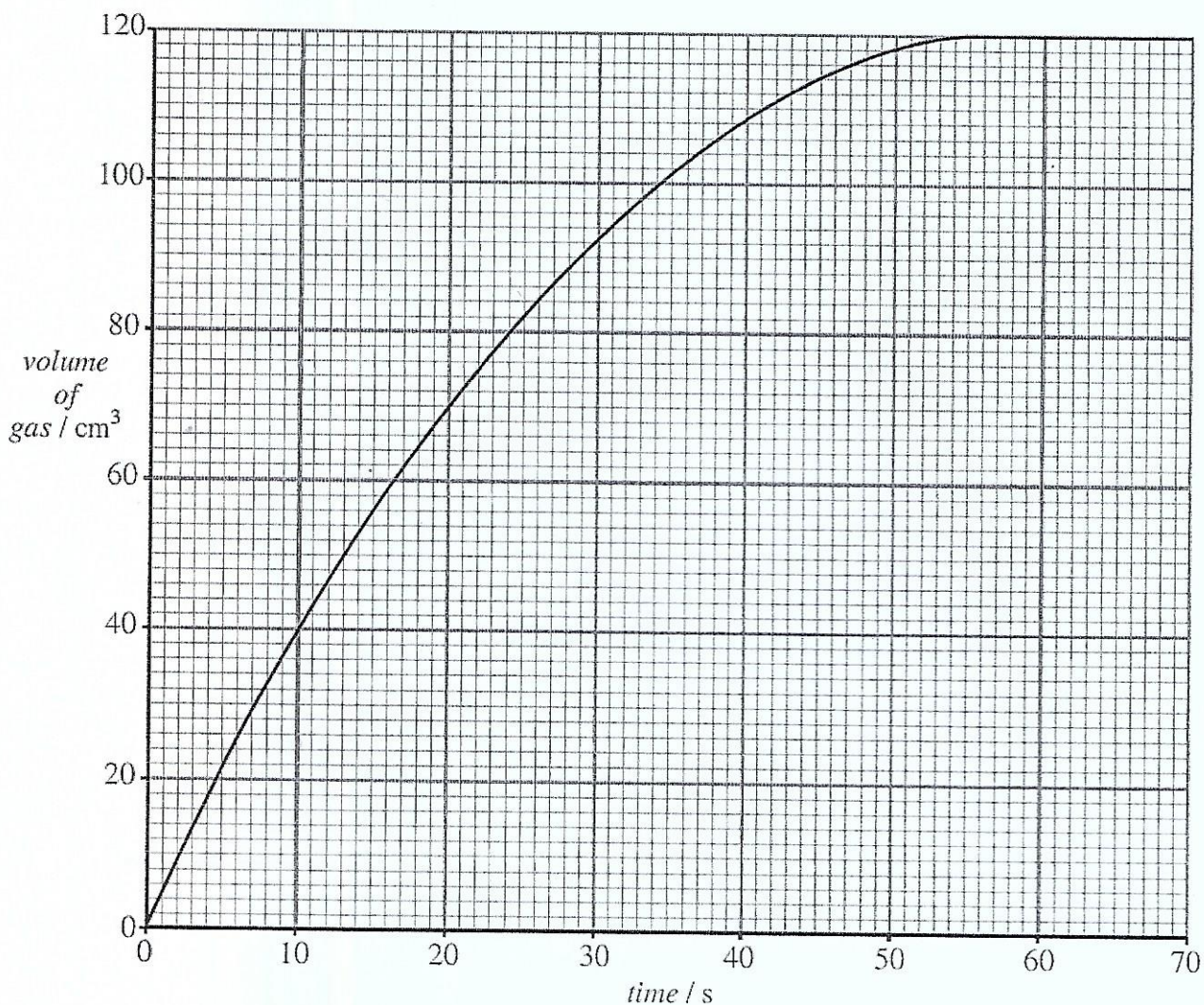
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(ii) Chlorine reacts with iron forming iron(III) chloride.

Write a balanced **symbol** equation for the reaction between chlorine and iron. [3]



15. The following graph shows the volume of carbon dioxide produced when excess limestone is added to 100 cm^3 of hydrochloric acid at room temperature.



- (i) Use the graph to find
- I. the volume of carbon dioxide produced after 20 seconds,
 cm^3 [1]
 - II. the time taken for the reaction to stop.
 seconds [1]
- (ii) I. On the grid above, draw the curve you would expect if the reaction were repeated using exactly the same volume and concentration of acid at a **higher temperature** with the limestone still in excess.
 Label the graph A. [2]
- II. Give a reason, in terms of particles, for the difference in the rate of reaction. [2]

.....

.....

- (iii) On the grid below, draw a curve to show how the mass of limestone would change during the reaction. [2]

