

Candidate Name	Centre Number	Candidate Number
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GCSE

236/01

**SCIENCE
FOUNDATION TIER
CHEMISTRY 1**

P.M. THURSDAY, 15 January 2009

45 minutes

For Examiner's use only	
Total Mark	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

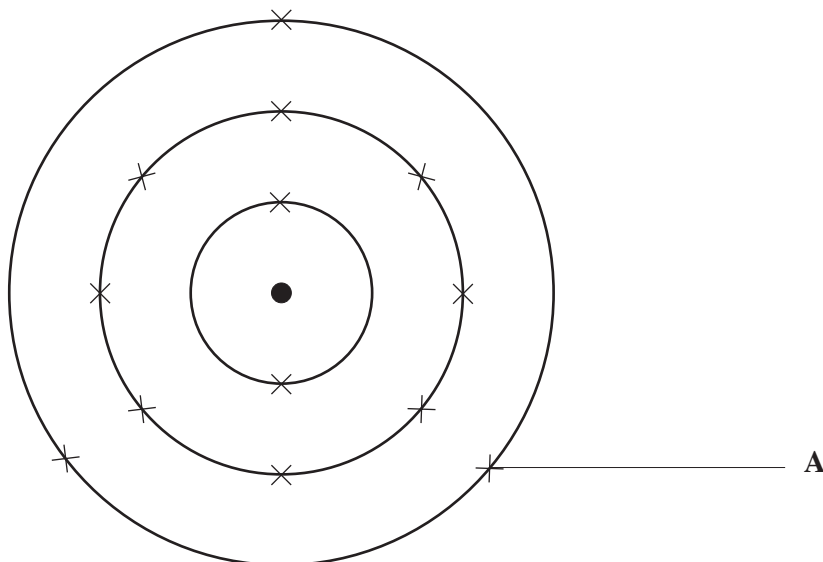
The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The Periodic Table is printed on the back cover of the examination paper and the formulae for some common ions on the inside of the back cover.

Answer **all** questions.

1. (a) The following diagram shows an atom of aluminium.



2	3	8	13	27
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- (i) Use only the numbers from the box above to complete the following sentences.

Each number may be used once, more than once or not at all.

- I. The electronic structure for an atom of aluminium is 2,8, [1]
- II. Aluminium can be found in Group of the Periodic Table of Elements. [1]
- III. The atomic number of aluminium is..... [1]
- IV. Aluminium can be found in Period of the Periodic Table of Elements. [1]
- (ii) The box below shows particles found in atoms. Choose a particle from this box to complete the following sentence.

electron	neutron	proton
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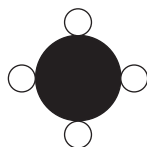
The is the particle labelled **A** in the diagram.

[1]

(b) The key below represents atoms of some elements.



Methane, CH_4 , can be represented by the following diagram:



Use the key given above to draw diagrams representing the molecules:

(i) water, H_2O ; [1]

(ii) carbon dioxide, CO_2 . [1]

2. The table below shows the physical properties of four metals and the non-metal, iodine.

<i>Element</i>	<i>Melting point /°C</i>	<i>Boiling point /°C</i>	<i>Density / g cm⁻³</i>
copper	1084	2570	8.9
gold	1064	3080	19.3
iodine	114	184	4.9
iron	1540	2750	7.9
silver	960	2212	10.5

(i) Name the **metal** with the **lowest** melting point. [1]

(ii) State how the **values** for **two** physical properties of iodine show it to be a non-metal. [2]

Property 1

Property 2

(iii) If you were comparing equal volumes of each metal, state which **metal** would have the **least** mass. [1]

.....

(iv) Give **one** physical property of all metals that is **not** shown in the table. [1]

.....

3. Read the information in the box below.

Compounds are formed when two or more different elements join together. Every compound has its own formula.

Some compounds, such as iron oxide, Fe_2O_3 , and sodium chloride, NaCl , are used as raw materials by the chemical industry. Iron oxide is used to make iron, Fe . Sodium chloride is used to make hydrogen, H_2 , chlorine, Cl_2 , and sodium hydroxide, NaOH .

The chemical industry makes many useful compounds such as sulphuric acid, H_2SO_4 and ammonia, NH_3 .

Use only the information in the box above to answer parts (i) and (ii).

(i) Give an example of

I. a compound,

.....

II. an element.

.....

[2]

(ii) State how compounds are formed.

[1]

.....

(iii) Use the Periodic Table of Elements shown on the **back page of this examination paper** to help you answer this part of the question.

Name the elements present in sulphuric acid, H_2SO_4 .

[1]

....., and

(iv) Give the **total** number of atoms shown in the formula NaOH .

[1]

.....

4. (i) The box below shows the names of some gases found in the atmosphere.

argon	carbon dioxide	neon	nitrogen	oxygen
-------	----------------	------	----------	--------

Choose gases from the box above to answer parts I. and II.

Each gas can be used once, more than once or not at all.

Name the

- I. **two** gases kept in balance in the atmosphere by the two processes of respiration and photosynthesis,

..... and [2]

- II. gas which some scientists believe is mainly responsible for global warming.

..... [1]

- (ii) In the 1960s, Alfred Wegener's idea that all the continents were once joined together as one big land mass was accepted by other scientists.



Pangaea



Continents today

earthquakes	similar patterns of fossils
ocean currents	shapes of continents

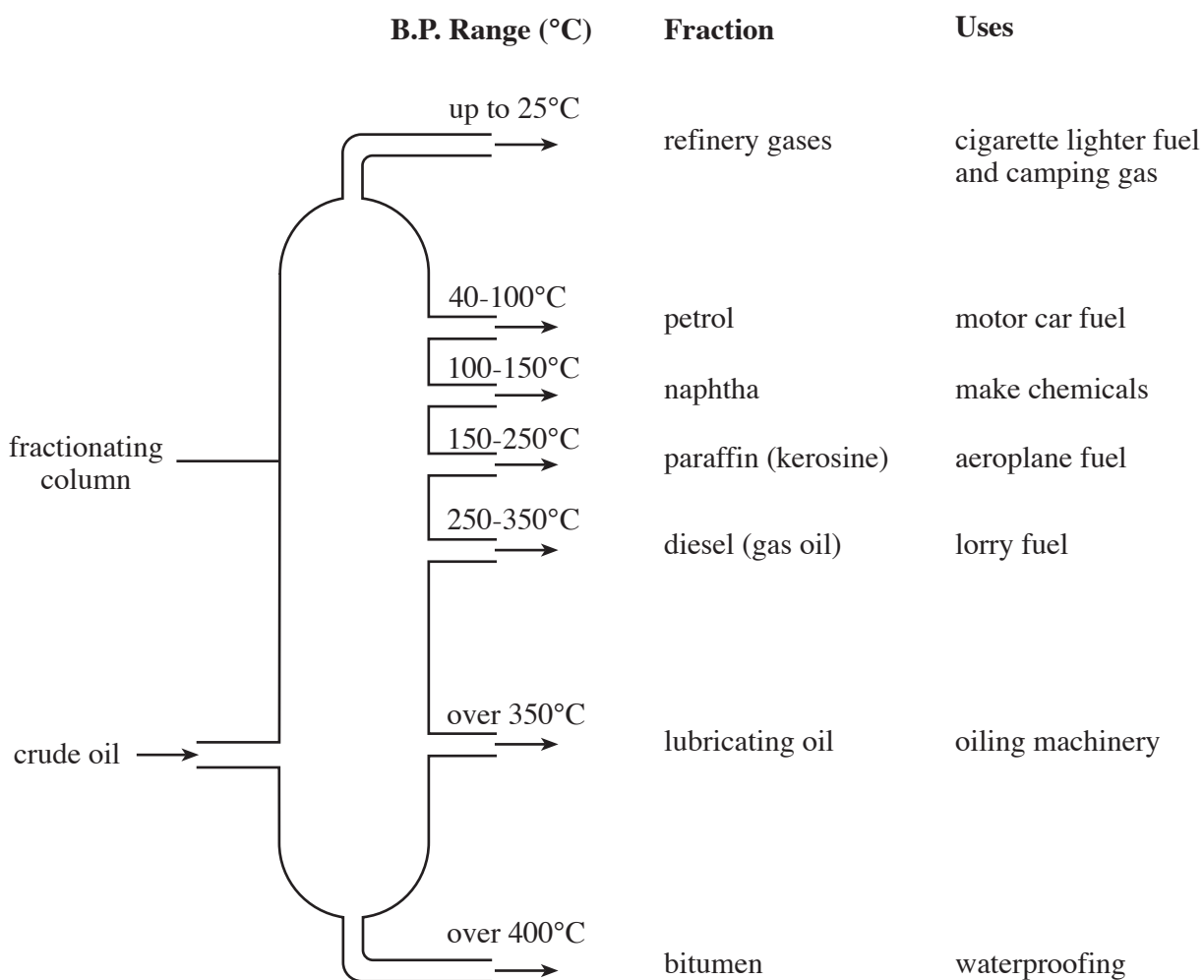
Choose from the box above **two** types of evidence that Wegener used to support his idea. [2]

1.

2.

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5. (i) Crude oil is separated into fractions in a fractionating column.

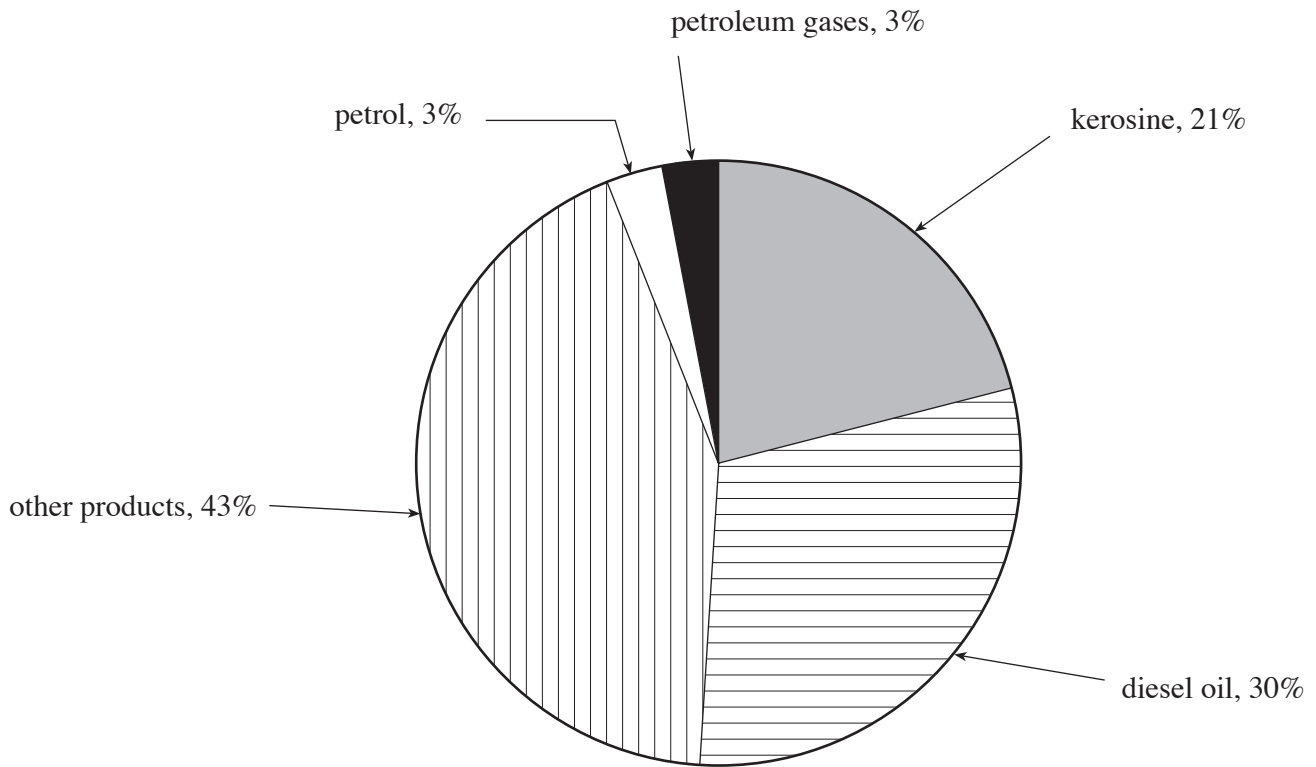


- I. State what must be done to the crude oil as it enters the fractionating column. [1]

- II. Name the fraction with the boiling point range 250 - 350 °C. [1]

- III. Name **one** fraction **not** used as a fuel. [1]

(ii) The pie chart below shows the amount of each fraction obtained from North Sea oil.



% fraction in North Sea Oil

Use the pie chart to complete the following sentences.

- I. The percentage of the diesel oil fraction in North Sea oil is..... % [1]
- II. The fraction which makes up 21% of North Sea oil is [1]

6. Magnesium ribbon reacts with dilute sulphuric acid forming hydrogen.

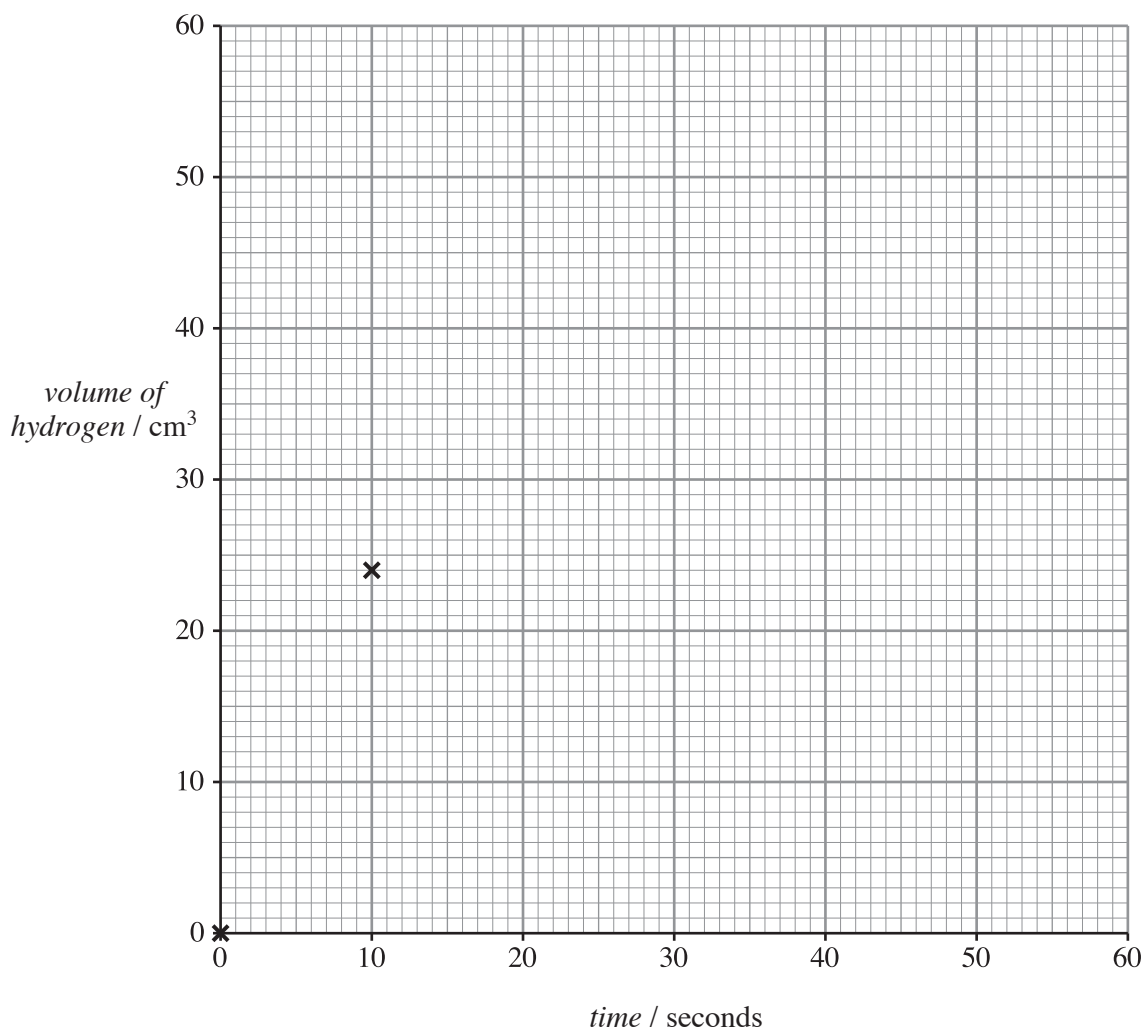
0.05g of magnesium ribbon was placed in excess dilute sulphuric acid.

The volume of hydrogen produced was recorded every 10 seconds.

The experiment was carried out at room temperature. The results obtained are shown below.

<i>time / seconds</i>	0	10	20	30	40	50	60
<i>volume of hydrogen / cm³</i>	0	24	37	45	49	50	50

- (i) Plot the results from the table on the grid below and, using these points, draw a smooth curve of best fit. The first two points have been plotted for you. [3]



(ii) Use the graph to find the

I. volume of hydrogen formed after 15 seconds,

[1]

..... cm³

II. time taken to form 40 cm³ of hydrogen.

[1]

..... seconds

(iii) Choose statements from the box below to complete the sentences that follow.

Each statement can be used once, more than once or not at all.

decrease	increase	stay the same
----------	----------	---------------

I. Using a higher concentration of sulphuric acid causes the **rate** of reaction to

.....

[1]

II. Using sulphuric acid at a lower temperature causes the **rate** of reaction to

.....

[1]

III. Cutting the magnesium ribbon into tiny pieces causes the **rate** of reaction to

.....

[1]

7. (a) Use the **data** and **key** on the Periodic Table of Elements shown on the **back page of this examination paper** to complete the following sentences.

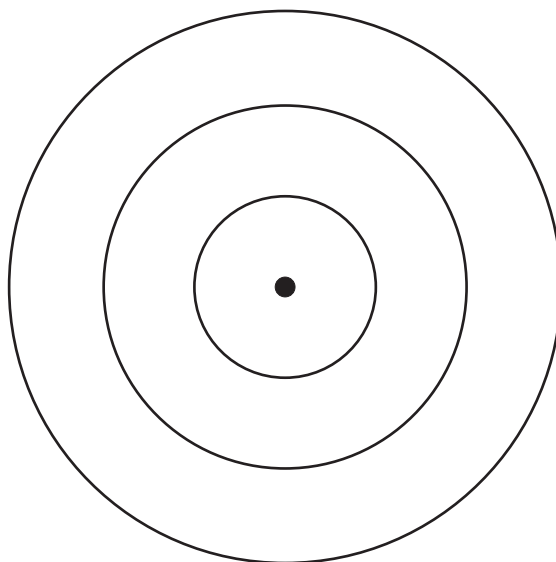
(i) The chemical symbol for phosphorus is [1]

(ii) The element with the atomic number 10 is [1]

(iii) The element which has the electronic structure 2, 8, 6 is [1]

(iv) The element which is in Group 3 and Period 2 is [1]

(b) Using **X** to represent an electron, complete the following diagram to show the electronic structure for an atom of magnesium. [1]



- (c) The diagram below shows part of the periodic table as constructed by Mendeleev in 1869. Elements which had not been discovered in 1869 are shown by an asterisk, *.

<i>Group 1</i>	<i>Group 2</i>	<i>Group 3</i>	<i>Group 4</i>	<i>Group 5</i>	<i>Group 6</i>	<i>Group 7</i>
H						
Li	Be	B	C	N	O	F
Na	Mg	Al	Si	P	S	Cl
K	Ca	*	Ti	V	Cr	Mn
Cu	Zn	*	*	As	Se	Br
Rb	Sr	Y	Zr	Nb	Mo	*
Ag	Cd	In	Sn	Sb	Te	I

Use the Periodic Table of Elements shown on the **back page of this examination paper** to help you answer parts (i) and (ii).

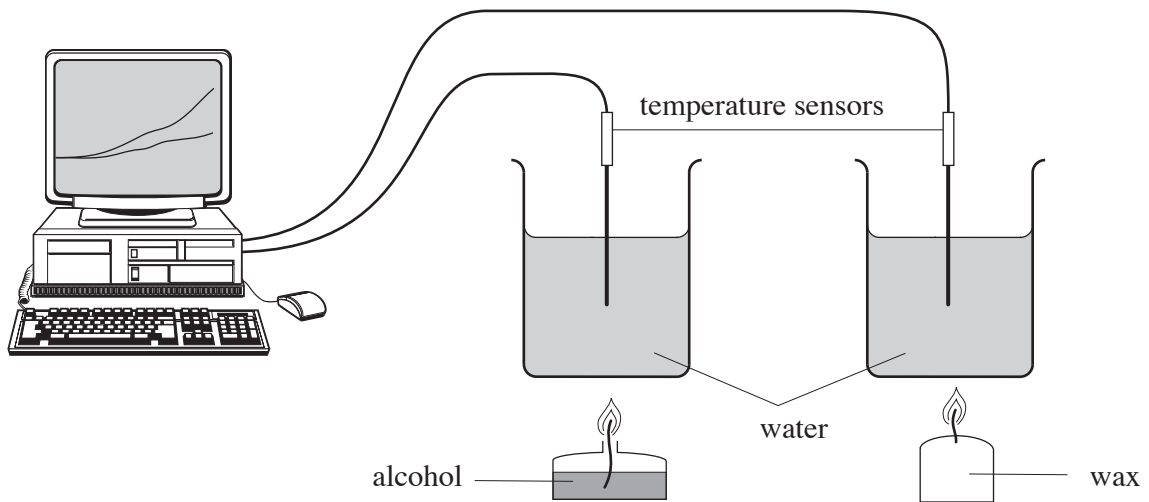
- (i) Name **two** elements found in Group 2 of Mendeleev's periodic table which are **not** found in Group 2 in the present day Periodic Table.

..... and [1]

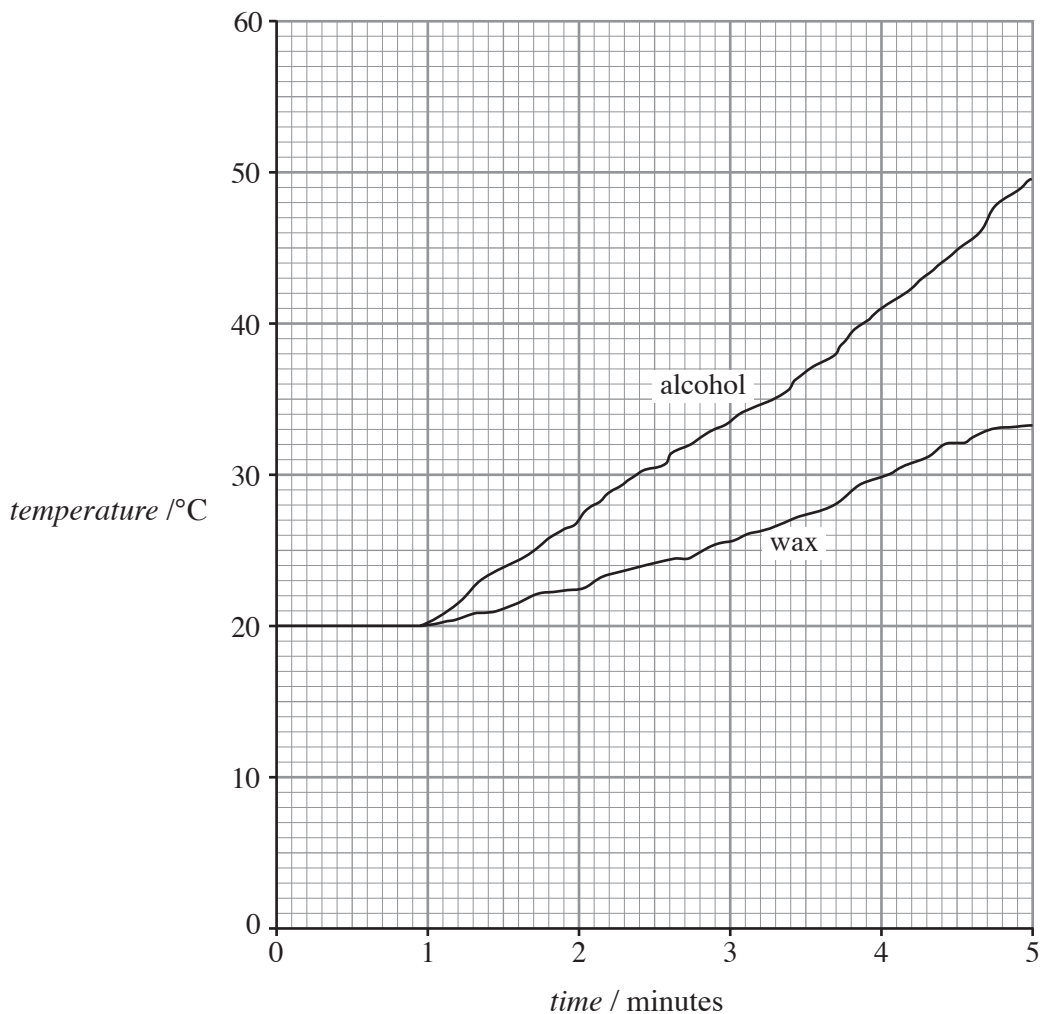
- (ii) Lead is found in Group 4 of the present day Periodic Table but was unknown in 1869. Give the **symbol** of the other element found in Group 4 of the present day Periodic Table which was unknown in 1869.

..... [1]

8. The apparatus below was used to find out which fuel, alcohol or wax, is able to heat up water faster. Temperature sensors were placed in equal volumes of water. After 1 minute, each fuel was set alight.



The graph produced by the computer is shown below.



(i) Use the graph to give the temperature **rise** of the water between 0 and 4 minutes for

I. alcohol, [1]

..... °C

II. wax. [1]

..... °C

(ii) If the heating was continued, state the **maximum** water temperature reached in both beakers.

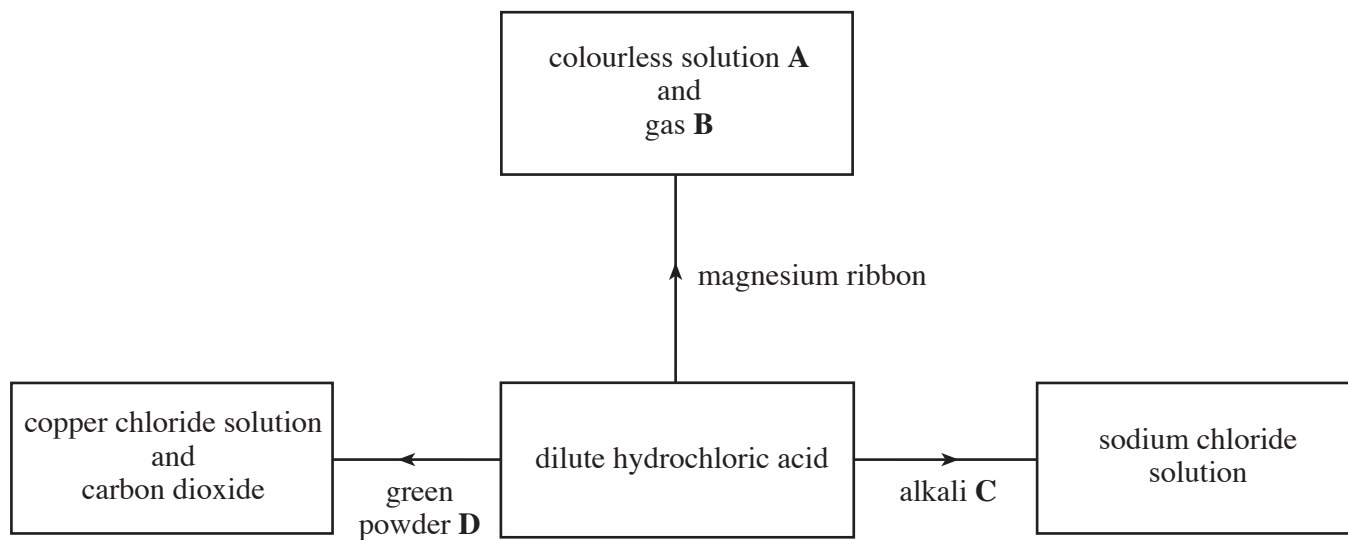
Give a reason for your value.

Maximum temperature °C [1]

Reason

4

9. The diagram below shows some reactions of dilute hydrochloric acid.



Give the name for

- (i) colourless solution **A** [1]
- (ii) gas **B** [1]
- (iii) alkali **C** [1]
- (iv) green powder **D** [1]

4

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FORMULAE FOR SOME COMMON IONS

POSITIVE IONS		NEGATIVE IONS	
Name	Formula	Name	Formula
Aluminium	Al^{3+}	Bromide	Br^-
Ammonium	NH_4^+	Carbonate	CO_3^{2-}
Barium	Ba^{2+}	Chloride	Cl^-
Calcium	Ca^{2+}	Fluoride	F^-
Copper(II)	Cu^{2+}	Hydroxide	OH^-
Hydrogen	H^+	Iodide	I^-
Iron(II)	Fe^{2+}	Nitrate	NO_3^-
Iron(III)	Fe^{3+}	Oxide	O^{2-}
Lithium	Li^+	Sulphate	SO_4^{2-}
Magnesium	Mg^{2+}		
Nickel	Ni^{2+}		
Potassium	K^+		
Silver	Ag^+		
Sodium	Na^+		

PERIODIC TABLE OF ELEMENTS

1 2

Group

3

4

5

6

7

0

1 H 1 Hydrogen

${}^7_3\text{Li}$ Lithium	${}^9_4\text{Be}$ Beryllium											${}^{19}_9\text{F}$ Fluorine	${}^{20}_{10}\text{Ne}$ Neon				
${}^{23}_{11}\text{Na}$ Sodium	${}^{24}_{12}\text{Mg}$ Magnesium											${}^{35}_{17}\text{Cl}$ Chlorine	${}^{40}_{18}\text{Ar}$ Argon				
${}^{39}_{19}\text{K}$ Potassium	${}^{40}_{20}\text{Ca}$ Calcium	${}^{45}_{21}\text{Sc}$ Scandium	${}^{48}_{22}\text{Ti}$ Titanium	${}^{51}_{23}\text{V}$ Vanadium	${}^{52}_{24}\text{Cr}$ Chromium	${}^{55}_{25}\text{Mn}$ Manganese	${}^{56}_{26}\text{Fe}$ Iron	${}^{59}_{27}\text{Co}$ Cobalt	${}^{59}_{28}\text{Ni}$ Nickel	${}^{64}_{29}\text{Cu}$ Copper	${}^{65}_{30}\text{Zn}$ Zinc	${}^{70}_{31}\text{Ga}$ Gallium	${}^{73}_{32}\text{Ge}$ Germanium	${}^{75}_{33}\text{As}$ Arsenic	${}^{79}_{34}\text{Se}$ Selenium	${}^{80}_{35}\text{Br}$ Bromine	${}^{84}_{36}\text{Kr}$ Krypton
${}^{86}_{37}\text{Rb}$ Rubidium	${}^{88}_{38}\text{Sr}$ Strontium	${}^{89}_{39}\text{Y}$ Yttrium	${}^{91}_{40}\text{Zr}$ Zirconium	${}^{93}_{41}\text{Nb}$ Niobium	${}^{96}_{42}\text{Mo}$ Molybdenum	${}^{99}_{43}\text{Tc}$ Technetium	${}^{101}_{44}\text{Ru}$ Ruthenium	${}^{103}_{45}\text{Rh}$ Rhodium	${}^{106}_{46}\text{Pd}$ Palladium	${}^{108}_{47}\text{Ag}$ Silver	${}^{112}_{48}\text{Cd}$ Cadmium	${}^{115}_{49}\text{In}$ Indium	${}^{119}_{50}\text{Sn}$ Tin	${}^{122}_{51}\text{Sb}$ Antimony	${}^{128}_{52}\text{Te}$ Tellurium	${}^{127}_{53}\text{I}$ Iodine	${}^{131}_{54}\text{Xe}$ Xenon
${}^{133}_{55}\text{Cs}$ Caesium	${}^{137}_{56}\text{Ba}$ Barium	${}^{139}_{57}\text{La}$ Lanthanum	${}^{179}_{72}\text{Hf}$ Hafnium	${}^{181}_{73}\text{Ta}$ Tantalum	${}^{184}_{74}\text{W}$ Tungsten	${}^{186}_{75}\text{Re}$ Rhenium	${}^{190}_{76}\text{Os}$ Osmium	${}^{192}_{77}\text{Ir}$ Iridium	${}^{195}_{78}\text{Pt}$ Platinum	${}^{197}_{79}\text{Au}$ Gold	${}^{201}_{80}\text{Hg}$ Mercury	${}^{204}_{81}\text{Tl}$ Thallium	${}^{207}_{82}\text{Pb}$ Lead	${}^{209}_{83}\text{Bi}$ Bismuth	${}^{210}_{84}\text{Po}$ Polonium	${}^{210}_{85}\text{At}$ Astatine	${}^{222}_{86}\text{Rn}$ Radon
${}^{223}_{87}\text{Fr}$ Francium	${}^{226}_{88}\text{Ra}$ Radium	${}^{227}_{89}\text{Ac}$ Actinium															

Key:

