

FOR OFFICIAL USE

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G

KU

PS

Total
Marks

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0500/401

NATIONAL
QUALIFICATIONS
2008

THURSDAY, 1 MAY
9.00 AM – 10.30 AM

CHEMISTRY
STANDARD GRADE
General Level

Fill in these boxes and read what is printed below.

Full name of centre

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Town

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Forename(s)

--

Surname

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Date of birth
Day Month Year

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Scottish candidate number

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Number of seat

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- 1 All questions should be attempted.
- 2 Necessary data will be found in the Data Booklet provided for Chemistry at Standard Grade and Intermediate 2.
- 3 The questions may be answered in any order but all answers are to be written in this answer book, and must be written clearly and legibly in ink.
- 4 Rough work, if any should be necessary, as well as the fair copy, is to be written in this book.
Rough work should be scored through when the fair copy has been written.
- 5 Additional space for answers and rough work will be found at the end of the book.
- 6 The size of the space provided for an answer should not be taken as an indication of how much to write. It is not necessary to use all the space.
- 7 Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.



PART 1

In Questions 1 to 9 of this part of the paper, an answer is given by circling the appropriate letter (or letters) in the answer grid provided.

In some questions, two letters are required for full marks.

If more than the correct number of answers is given, marks will be deducted.

A total of 20 marks is available in this part of the paper.

SAMPLE QUESTION

A	CH_4	B	H_2	C	CO_2
D	CO	E	$\text{C}_2\text{H}_5\text{OH}$	F	C

(a) Identify the hydrocarbon.

Ⓐ	B	C
D	E	F

The one correct answer to part (a) is A. This should be circled.

(b) Identify the **two** elements.

A	Ⓑ	C
D	E	Ⓕ

As indicated in this question, there are **two** correct answers to part (b). These are B and F. Both answers are circled.

If, after you have recorded your answer, you decide that you have made an error and wish to make a change, you should cancel the original answer and circle the answer you now consider to be correct. Thus, in part (a), if you want to change an answer A to an answer D, your answer sheet would look like this:

Ⓐ	B	C
Ⓓ	E	F

If you want to change back to an answer which has already been scored out, you should enter a tick (✓) in the box of the answer of your choice, thus:

✓ Ⓐ	B	C
Ⓓ	E	F

Marks

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1. The Periodic Table shows the names of the elements.

A	nitrogen	B	lithium	C	aluminium
D	sodium	E	oxygen	F	platinum

- (a) Identify the **two** elements which have similar chemical properties.
You may wish to use page 8 of the data booklet to help you.

A	B	C
D	E	F

1

- (b) Identify the element discovered in 1807.
You may wish to use page 8 of the data booklet to help you.

A	B	C
D	E	F

1

- (c) Identify the element which is used as the catalyst in the Ostwald Process.

A	B	C
D	E	F

1

- (d) Identify the **two** elements which form a covalent compound.

A	B	C
D	E	F

1

(4)

[Turn over]

Marks

KU PS

2. The grid shows the names of some elements.

A	hydrogen
B	helium
C	oxygen
D	silicon
E	carbon

(a) Identify the **two** elements which exist as **diatomic** molecules.

A
B
C
D
E

1

(b) Identify the element which has the electron arrangement 2,4.
You may wish to use page 1 of the data booklet to help you.

A
B
C
D
E

1

(c) Identify the element which must be present for iron to rust.

A
B
C
D
E

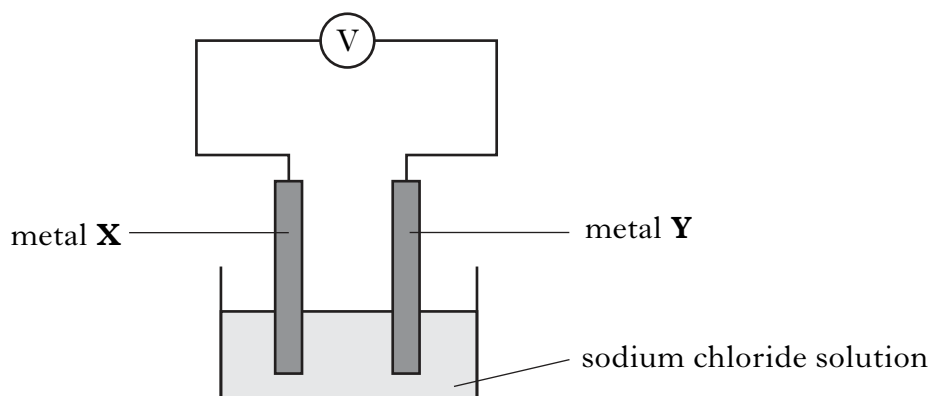
1

(3)

Marks

KU PS

3. Electricity can be produced using electrochemical cells.



	metal X	metal Y
A	copper	lead
B	copper	magnesium
C	copper	copper
D	copper	nickel

- (a) Identify the arrangement which would **not** produce electricity.

A
B
C
D

1

- (b) Identify the arrangement which would produce the **largest** voltage.
You may wish to use page 7 of the data booklet to help you.

A
B
C
D

1

(2)

[Turn over]

Marks

KU PS

4. The names of some hydrocarbons are shown in the grid.

A	butene	B	ethene	C	methane
D	hexene	E	pentane	F	propene

- (a) Identify the **two** alkanes.

A	B	C
D	E	F

1

- (b) Identify the hydrocarbon with a boiling point of 36 °C.
You may wish to use page 6 of the data booklet to help you.

A	B	C
D	E	F

1

- (c) Identify the hydrocarbon with molecular formula C₄H₈.

A	B	C
D	E	F

1
(3)

Marks

KU PS

5. Coating iron prevents rusting.

A		B		C	
	tin		paint		oil
D		E		F	
	zinc		plastic		magnesium

(a) Identify the coating which is used to galvanise iron.

A	B	C
D	E	F

1(b) Identify the coating, which, if scratched, would cause the iron to rust **fastest**.

You may wish to use page 7 of the data booklet to help you.

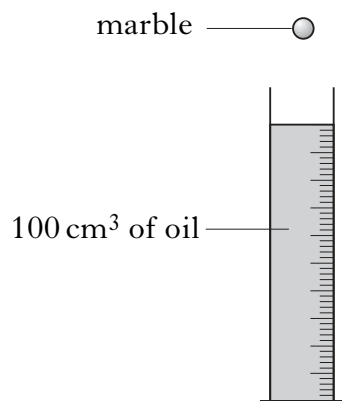
A	B	C
D	E	F

1**(2)****[Turn over]**

Marks

KU PS

6. A student carried out an experiment to investigate the viscosity of different oils.



He timed how long it took for a marble to fall through 100 cm³ of each oil fraction.

His results are shown in the table.

Oil	Time/s
1	6
2	10
3	15
4	23

Identify the **correct** statement.

A	Oil 1 is most viscous.
B	Oil 4 is least viscous.
C	Oil 2 is more viscous than oil 3.
D	Oil 4 is more viscous than oil 1.

(1)

Marks

KU PS

7. The grid shows the names of some chlorides.

A	calcium chloride	B	barium chloride	C	magnesium chloride
D	sodium chloride	E	silver chloride	F	potassium chloride

- (a) Identify the chloride which could be produced by a precipitation reaction.

You may wish to use page 5 of the data booklet to help you.

A	B	C
D	E	F

1

- (b) Identify the chloride which could be used as a fertiliser.

A	B	C
D	E	F

1

(2)

[Turn over]

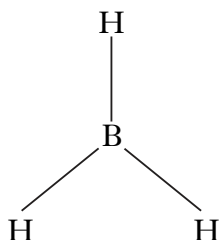
Marks

KU PS

8. Different terms can be used to indicate the number of atoms in a molecule.

	Term	Number of atoms in a molecule
A	tri-atomic	3
B	tetra-atomic	4
C	penta-atomic	5
D	hexa-atomic	6

Identify the term used to describe the following molecule.



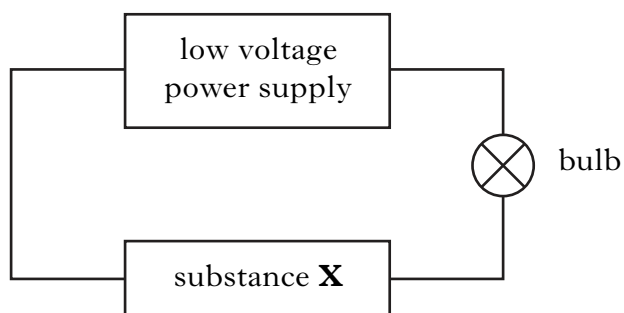
A
B
C
D

(1)

Marks

KU PS

9. A technician set up an experiment to investigate electrical conductivity.



	Substance X
A	molten metal
B	covalent liquid
C	ionic solution
D	ionic solid
E	solid metal

Identify the **two** experiments in which the bulb would **not** light.

A
B
C
D
E

(2)

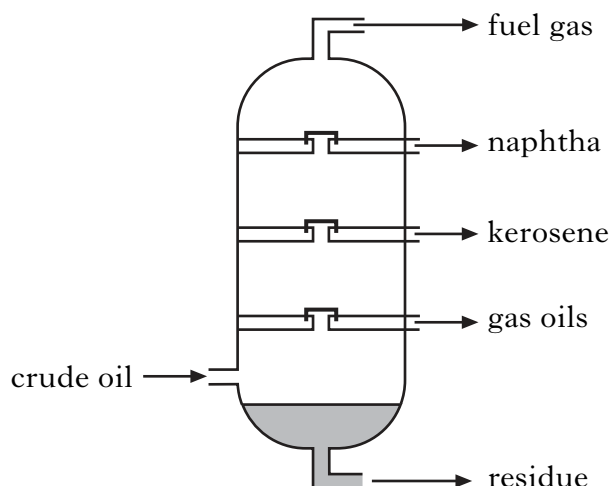
[Turn over

Marks

KU PS

PART 2**A total of 40 marks is available in this part of the paper.**

10. The diagram shows a tower in which crude oil is separated.



- (a) Name the process used to separate crude oil.

1

- (b) Naphtha can be cracked to produce molecules that are more useful.

How does the **size** of these more useful molecules compare to the **size** of the molecules in naphtha?

1

- (c) In industry the catalyst used to crack naphtha is zeolite.

Zeolite is a substance that contains aluminium silicate.

Name the elements present in aluminium silicate.

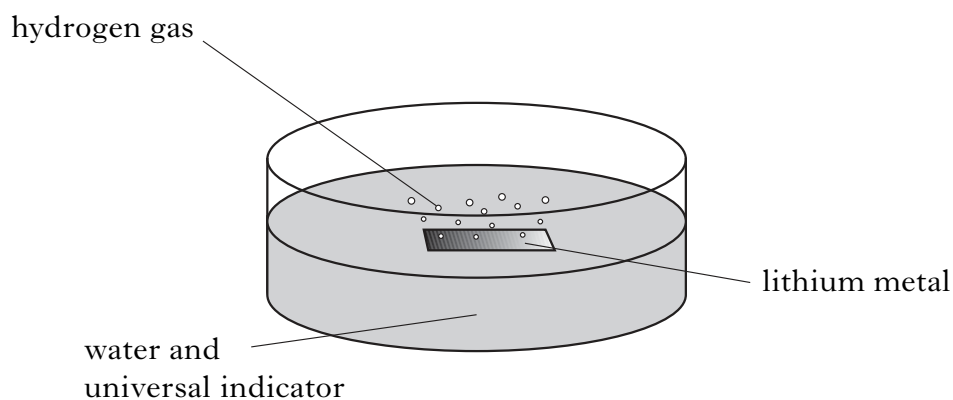
1

(3)

Marks

KU PS

11. A teacher demonstrated the following experiment.



(a) State the test for hydrogen gas.

1

(b) The universal indicator turned purple.

Circle the correct word to complete the sentence.

A solution which turns universal indicator purple is $\left\{ \begin{array}{l} \text{acidic} \\ \text{neutral} \\ \text{alkaline} \end{array} \right\}$.

1

(c) Why are metals, like lithium, stored under oil?

1

(3)

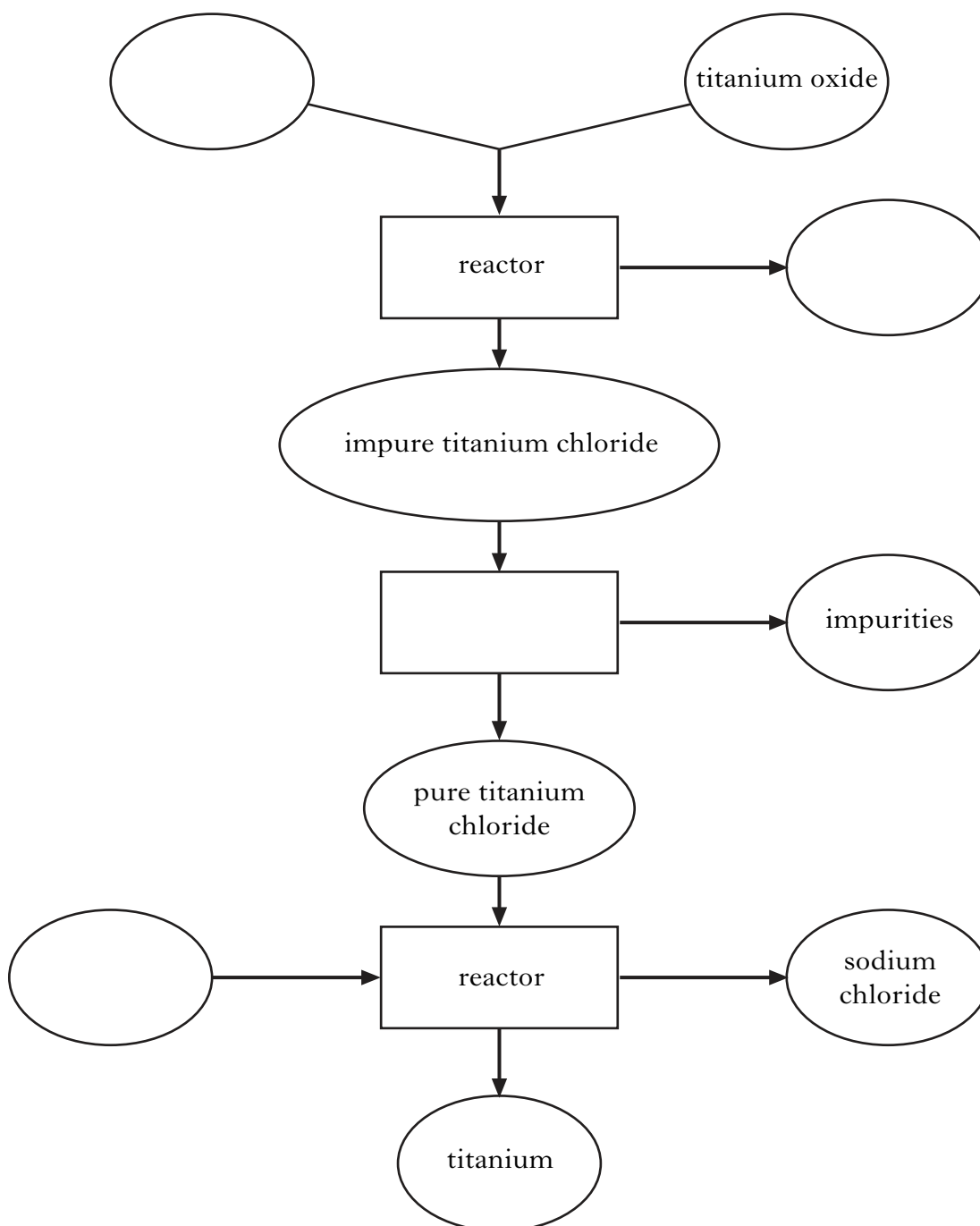
[Turn over]

12.

Manufacture of Titanium

Carbon and titanium oxide are passed through a reactor to produce carbon monoxide and impure titanium chloride. The impurities are removed by distillation. Pure titanium chloride reacts with sodium to produce titanium and sodium chloride.

(a) Use the information to complete the flow diagram.



2

12. (continued)*Marks*

KU PS

- (b) Titanium can be mixed with other metals to make a substance that is strong and lightweight.

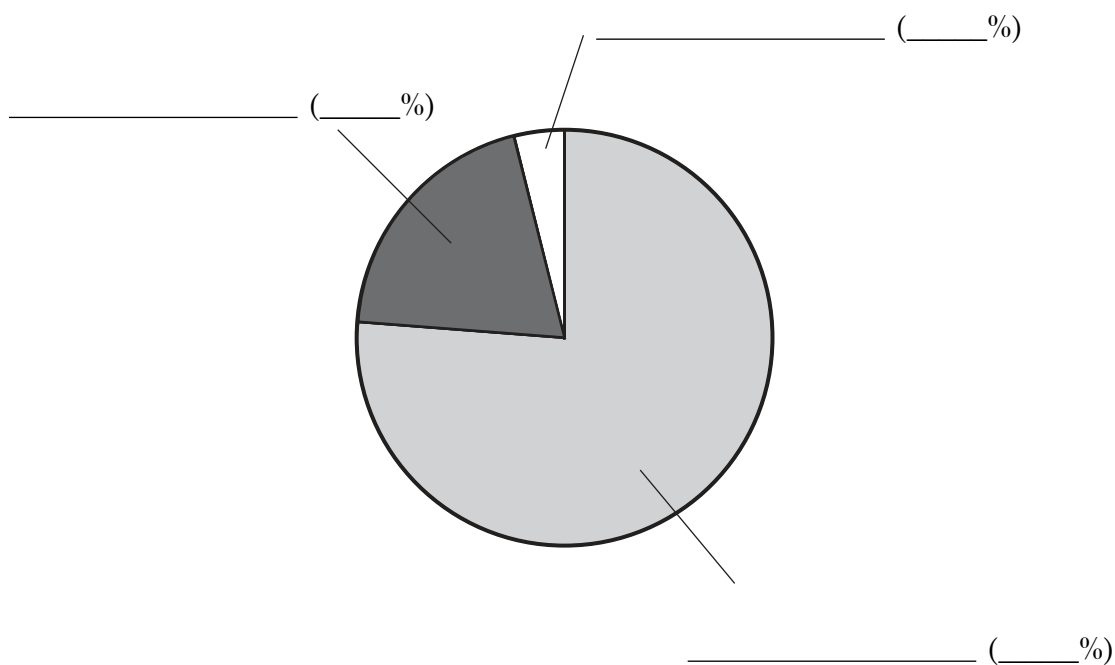
What term is used to describe a mixture of metals?

1

- (c) Medical instruments can be made from a mixture of metals containing 76% titanium, 4% zirconium and the rest is other metals.

Label the pie chart to show the name and percentage for each part of the mixture.

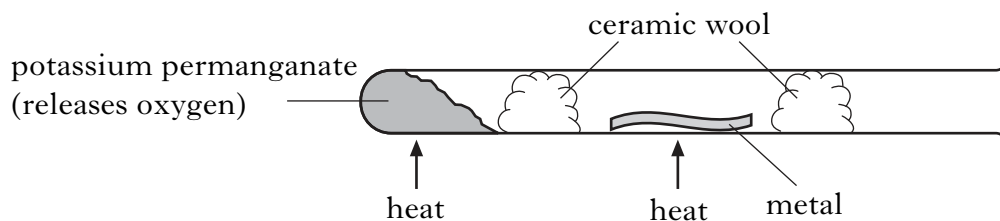
(An additional pie chart, if required, can be found on page 28.)

**2
(5)****[Turn over]**

Marks

KU PS

13. A teacher demonstrated the following experiment.



Her results are shown in the table below.

Metal	Observation
zinc	glowed brightly
copper	dull red glow
silver	no reaction

- (a) (i) Predict what would be seen if the experiment was repeated using magnesium.

You may wish to use page 7 of the data booklet to help you.

1

- (ii) The experiment was repeated using **powdered** zinc.
How would this affect the **speed** of the reaction?

1

- (b) Silver is found uncombined in the Earth's crust.

Name another metal which is found uncombined in the Earth's crust.

You may wish to use page 7 of the data booklet to help you.

1

(3)

Marks

KU PS

14. Flowers produce a sweet-tasting liquid called nectar.

Nectar contains a mixture of sugars such as glucose and sucrose.

(a) To which family of compounds do glucose and sucrose belong?

1

(b) Glucose can be broken down to produce alcohol.

(i) Name this **type** of chemical reaction.

1

(ii) What is the chemical name for the alcohol produced?

1**(3)****[Turn over**

Marks

KU PS

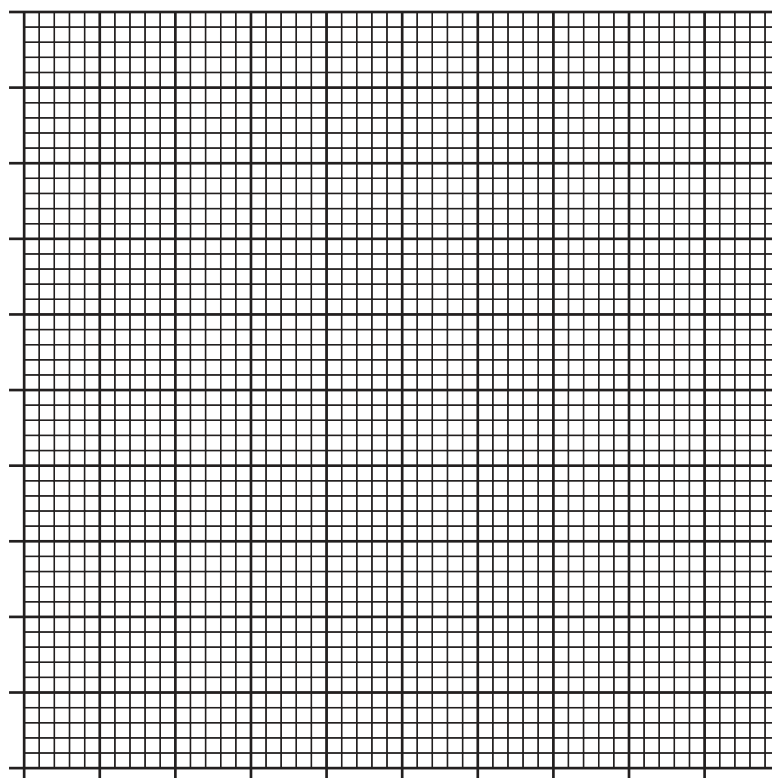
15. The table below shows the mass of some ions found in a 1 litre sample of water.

Ion	Mass/mg
chloride	10
sulphate	50
calcium	70
magnesium	15
potassium	4

- (a) Present the information as a bar chart.

Use appropriate scales to fill most of the graph paper.

(Additional graph paper, if required, can be found on page 28.)



2

(b) The bicarbonate ion is also present in the sample of water.

The diagram illustrates the process of generating carbon dioxide gas from hydrochloric acid and calcium carbonate, and then testing it. A conical flask containing water is heated by a Bunsen burner. A delivery tube is inserted into the flask, and another tube leads from the top of the flask to a test tube containing lime water. Bubbles of carbon dioxide gas are shown entering the lime water, which is turning milky.

-

1

-

1

(4)

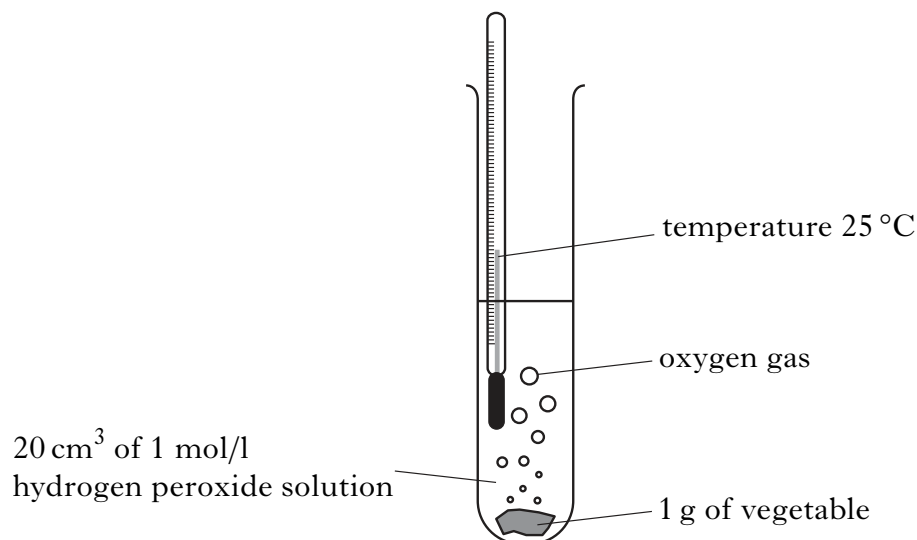
[Turn over

Marks

KU PS

16. A student investigated the amount of the biological catalyst, catalase, in different vegetables.

Catalase breaks down hydrogen peroxide solution to produce water and oxygen.



The results are shown in the table.

Vegetable	Number of bubbles of oxygen gas in 3 minutes
leek	40
potato	10
parsnip	65
horseradish	5

- (a) Using the information in the table, name the vegetable which contains the largest amount of catalase.

1

- (b) What term is used to describe a biological catalyst such as catalase?

1

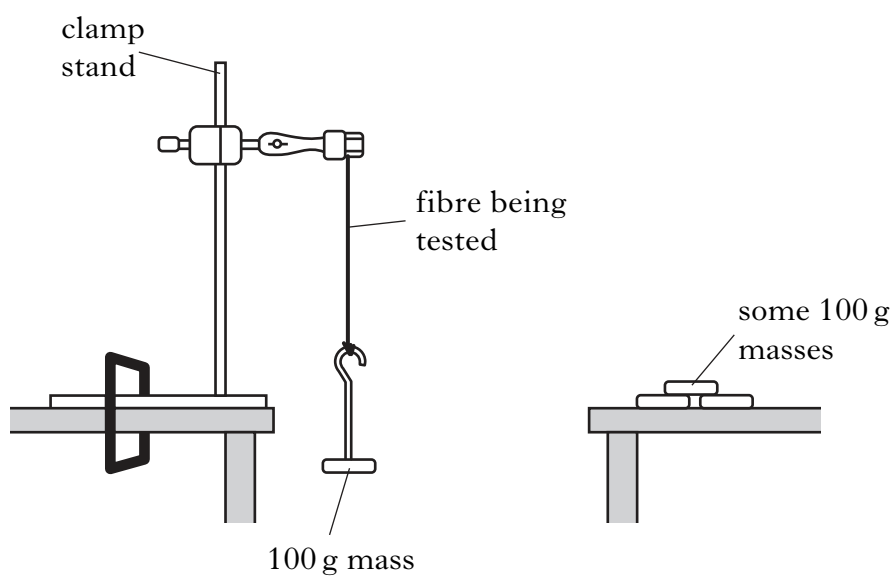
(a) Name the monomer used to make poly(chloroethene).

1

State why this may be an **advantage**.

1

A student used the apparatus shown to investigate the strength of different fibres.



Marks

KU PS

17. (c) (continued)

His results are shown in the table.

Fibre	Mass to break fibres/g
cotton	600
polyester	1200
wool	200
poly(chloroethene)	1000
poly(propene)	1100

- (i) How does the strength of the synthetic fibres compare to the strength of the natural fibres?

1

- (ii) He tested another fibre and found that the mass needed to break it was 300 g.

Predict whether this fibre is natural or synthetic.

1**(4)****[Turn over]**

(a) Hydrogen sulphide burns in oxygen to produce sulphur dioxide and water.

1

1



(ii) The table shows the percentage of sulphur trioxide produced at different temperatures.

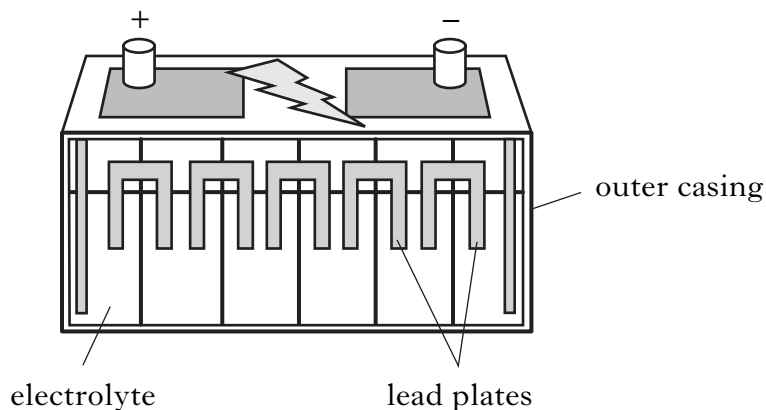
What effect does increasing the temperature of the catalyst have on the percentage of sulphur trioxide produced?

1
(3)

Marks

KU PS

19. Rechargeable batteries are used in cars.



- (a) Name the electrolyte used in a car battery.

1

- (b) A car battery has six cells joined together.

The voltage of the car battery is **12 volts**.

What is the voltage of **one** cell in the car battery?

_____ volts

1

- (c) Some cars use the fuel “LPG” rather than petrol.

What is meant by the term **fuel**?

1

- (d) “LPG” is a mixture of hydrocarbons.

Name the **two** compounds produced when “LPG” burns in a plentiful supply of air.

1

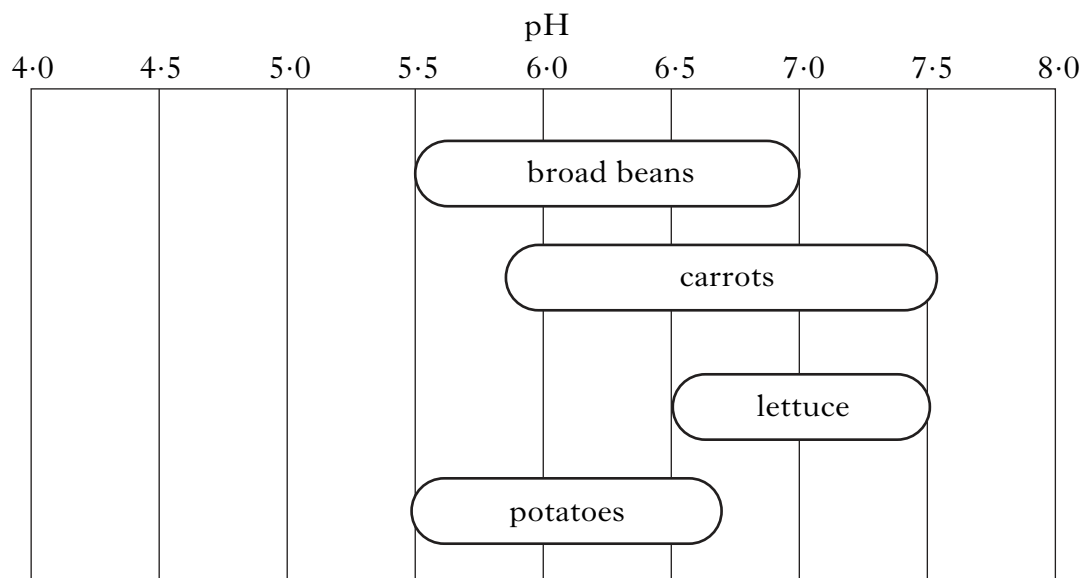
(4)

[Turn over]

Marks

KU PS

20. The chart shows the pH range of soil in which different vegetables can grow successfully.



- (a) The soil in a garden has a pH of 6.0.

Name the vegetable which would **not** grow successfully in this garden.

1

- (b) Another garden has soil pH of 4.5.

Name a substance that could be added to the soil in order to grow all the vegetables successfully.

1

(2)

Marks

KU PS

21. Acids have many uses.

(a) Phosphoric acid is found in a fizzy drink.

Suggest the pH of the fizzy drink.

1

(b) Nitric acid can be used to make fertilisers.

Explain why there has been a major increase in the use of fertilisers over the last 100 years.

1

(c) Dilute hydrochloric acid reacts with zinc metal.

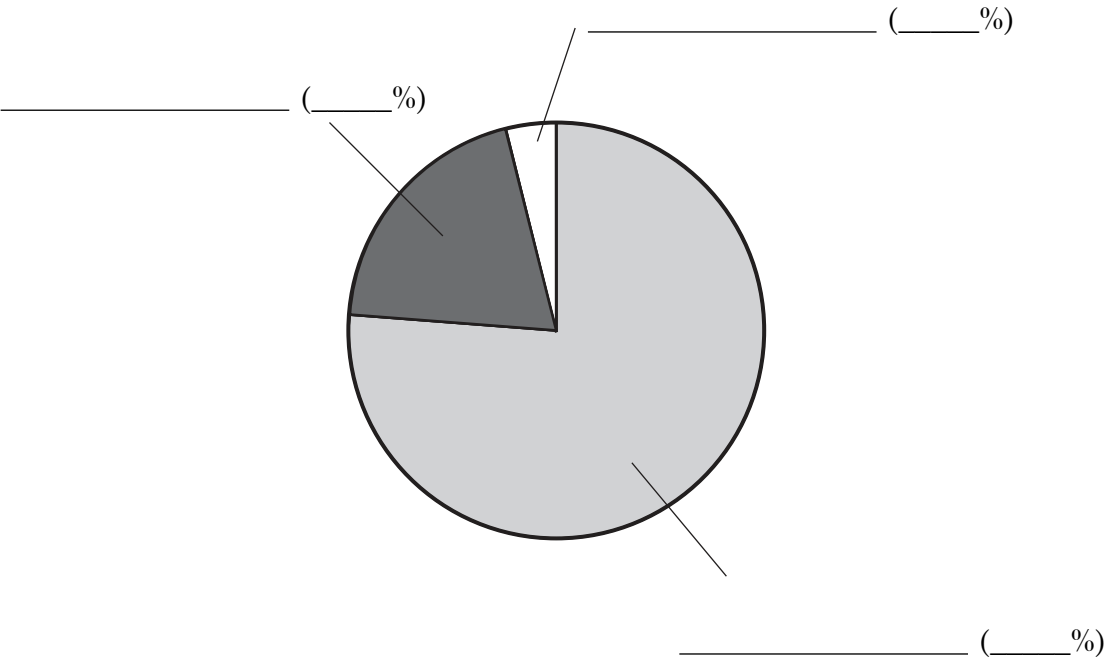
The equation for the reaction is:

hydrochloric acid + zinc $\longrightarrow$ compound **X** + hydrogenName compound **X**.

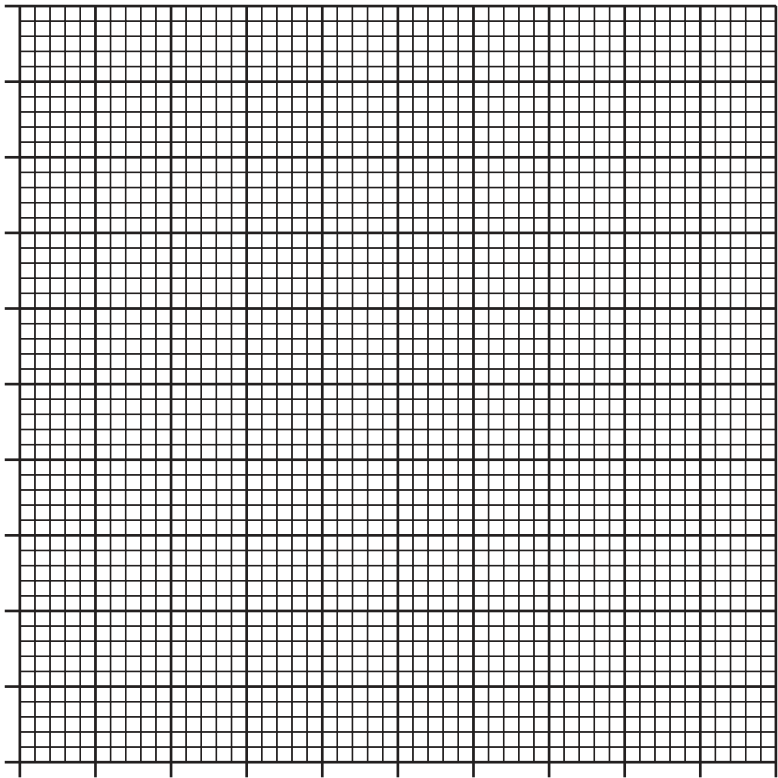
1**(3)***[END OF QUESTION PAPER]*

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL PIE CHART FOR QUESTION 12(c)



ADDITIONAL GRAPH PAPER FOR QUESTION 15(a)



ADDITIONAL SPACE FOR ANSWERS

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