FOR OFFICIAL USE

G

	KU	PS
Total Marks		

0500/401

NATIONAL QUALIFICATIONS 2007

THURSDAY, 10 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

Town

Forename(s)

Surname

Date of birth
Day Month Year

Scottish candidate number

Number of seat

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.

SA 0500/401 6/26570

PART 1

In Questions 1 to 8 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 C_2H_5OH	F C

(*a*) Identify the hydrocarbon.

(A)	B	C
D	E	F

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

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

A	(B)	C
D	E	(F)

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:

~~(A)~~	B	C
(D)	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:

✓~~(A)~~	B	C
~~(D)~~	E	F

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

1. The grid contains the names of some elements.

A copper	B magnesium	C iron
D nitrogen	E potassium	F fluorine

(*a*) 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

(*b*) Identify the element found in the same group as calcium.
You may wish to use page 8 of the data booklet to help you.

A	B	C
D	E	F

1

(*c*) Identify the **two** elements which combine to form a covalent compound.

A	B	C
D	E	F

1

(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

2. The grid shows the names of some metals.

A lithium	B gold	C iron
D zinc	E calcium	F magnesium

(*a*) Identify the metal found uncombined in the Earth's crust.

A	B	C
D	E	F

1

(*b*) Identify the metal produced in a blast furnace.

A	B	C
D	E	F

1

(*c*) Identify the metal used as the catalyst in the Haber process.

A	B	C
D	E	F

1

(3)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

3. The grid shows the names of some hydrocarbons.

A methane	B hexane	C pentane
D ethene	E butene	F propane

(*a*) Identify the hydrocarbon with **six** carbon atoms in the molecule.

A	B	C
D	E	F

1

(*b*) Identify the **two** hydrocarbons which are alkenes.

A	B	C
D	E	F

1

(2)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

4. The grid shows the names of some compounds.

A copper carbonate	B potassium sulphite
C sodium fluoride	D calcium sulphide

(*a*) Identify the compound which could be used as a fertiliser.

A	B
C	D

1

(*b*) Identify the compound which produces a yellow flame colour.
You may wish to use page 4 of the data booklet to help you.

A	B
C	D

1

(*c*) Identify the **two** compounds which contain oxygen.

A	B
C	D

1

(3)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

5. A student made the following statements about chemical reactions.

A	A solid is always formed.
B	A gas is always produced.
C	There is always a colour change.
D	A new substance is always formed.

Identify the statement which is true for **all** chemical reactions.

A
B
C
D

(1)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

6. The grid below shows the names of some oxides.

A iron oxide	B copper oxide	C potassium oxide
D calcium oxide	E lead oxide	F nitrogen dioxide

(*a*) Identify the oxide produced by the sparking of air in car engines.

A	B	C
D	E	F

1

(*b*) Identify the oxide which contains an alkali metal.

A	B	C
D	E	F

1

(*c*) Identify the oxide which dissolves in water to produce an acidic solution.

A	B	C
D	E	F

1

(3)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

7. The grid shows some statements which can be applied to different solutions.

A	It has a pH of 7.
B	It reacts with silver.
C	It conducts electricity.
D	It produces chlorine when electrolysed.

(*a*) Identify the statement which is correct for water but **not** for dilute hydrochloric acid.

A
B
C
D

1

(*b*) Identify the statement which is correct for **both** dilute hydrochloric acid and dilute sulphuric acid.

A
B
C
D

1

(2)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

8. The grid shows the names of some substances.

A argon	B crude oil	C sodium
D air	E carbon dioxide	F silicon

(*a*) Identify the **two** non-metal elements.
You may wish to use page 1 of the data booklet to help you.

A	B	C
D	E	F

1

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

A	B	C
D	E	F

2

(3)

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

PART 2

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

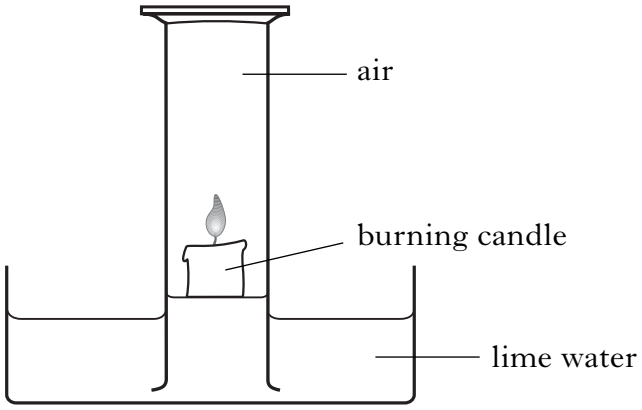
9. Candle wax contains hydrocarbons.

(*a*) Name the elements present in a hydrocarbon.

_____

_____ **1**

(*b*) A student carried out the following experiment.



(i) Which gas is used up when a candle burns?

_____ **1**

(ii) In the experiment, a gas was produced which turned the lime water milky.

Name the gas produced.

_____ **1**

(3)

[Turn over

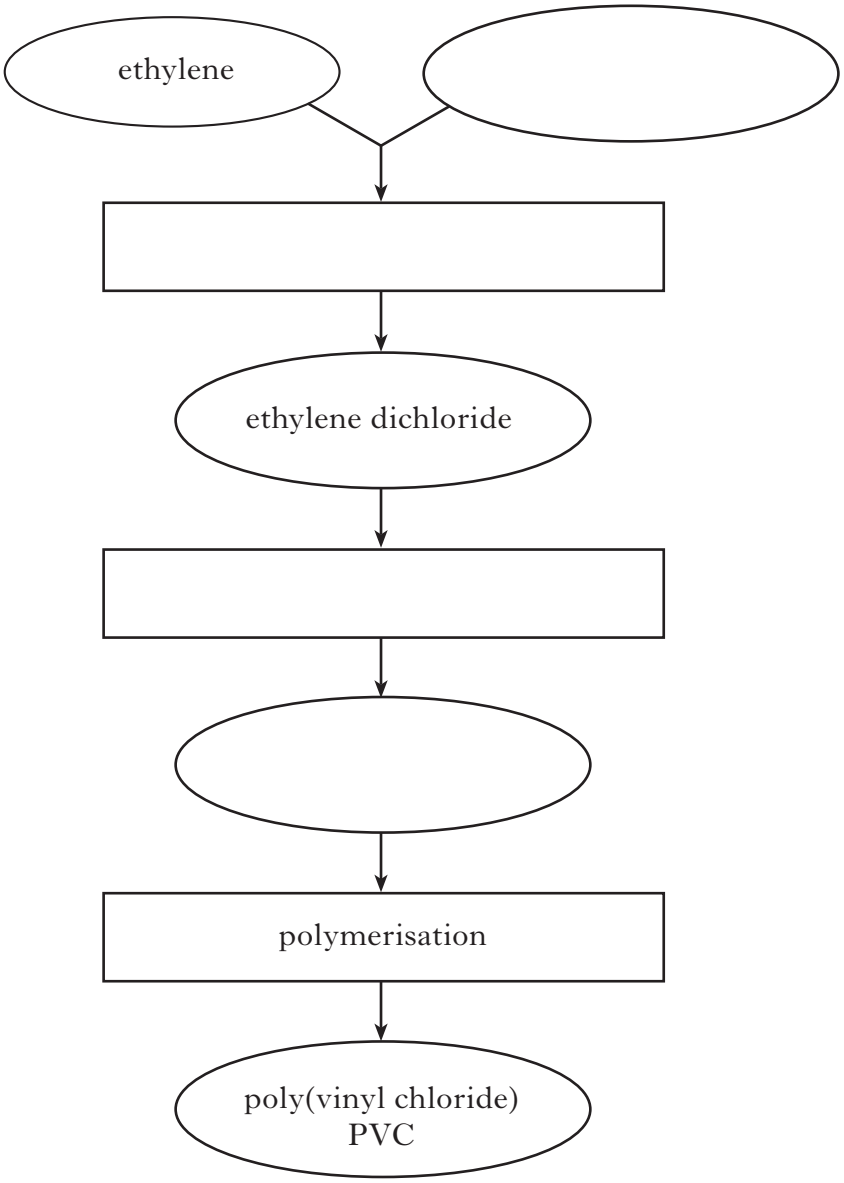
DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

10. **PVC Production**

In the manufacture of PVC, ethylene and chlorine are passed through a catalyst chamber producing ethylene dichloride. The ethylene dichloride is then cracked to produce vinyl chloride which undergoes polymerisation to form the plastic poly(vinyl chloride), PVC.

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



2

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

10. (continued)

(*b*) Plastics have many different uses. Poly(vinyl chloride) can be used to make clothes. The non-stick coating on saucepans is made from poly(tetrafluoroethene). Plastic bags are made from poly(ethene) while washing-up bowls are made from poly(propene).

Present this information as a table with suitable headings.

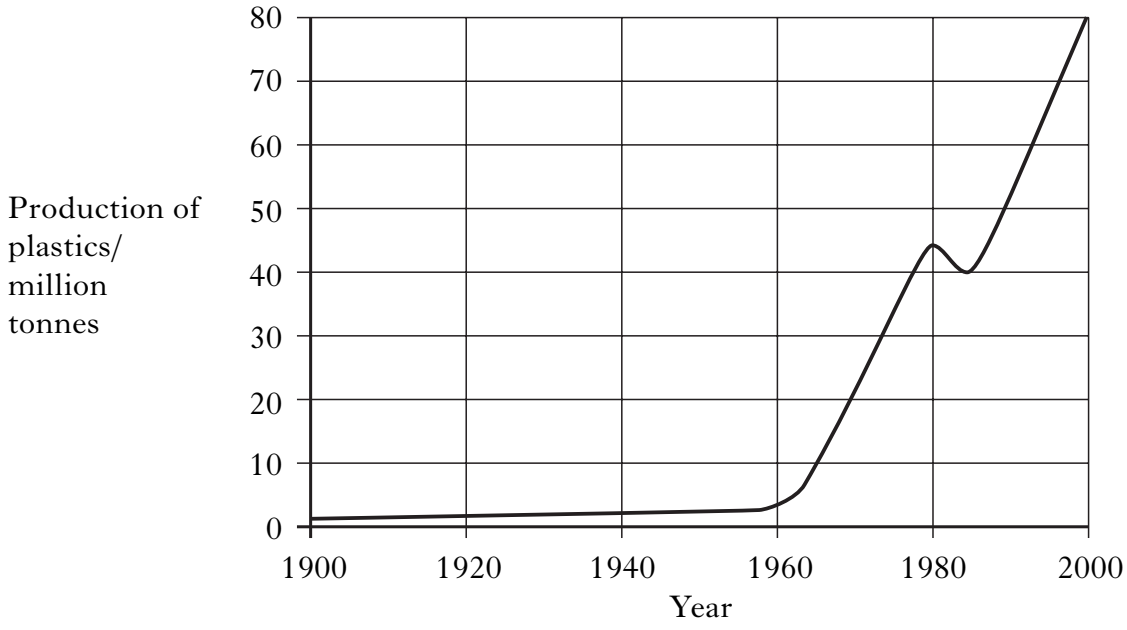
2

(*c*) Name the monomer used to make poly(ethene).

_____

1

(*d*) The graph shows the world production of plastics.



Describe the general trend in the production of plastics from 1960 to 2000.

_____

_____

1

(6)

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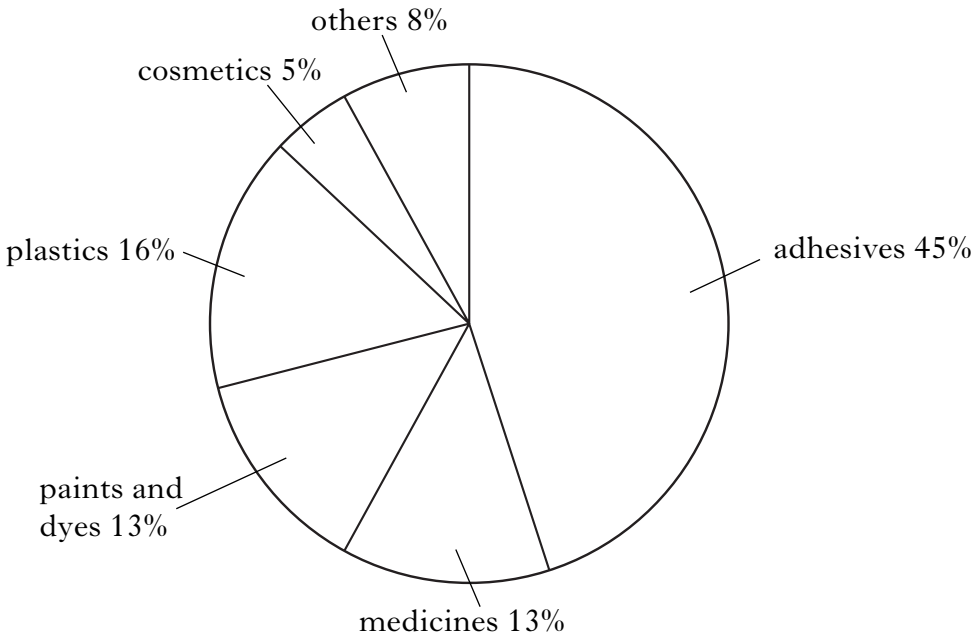
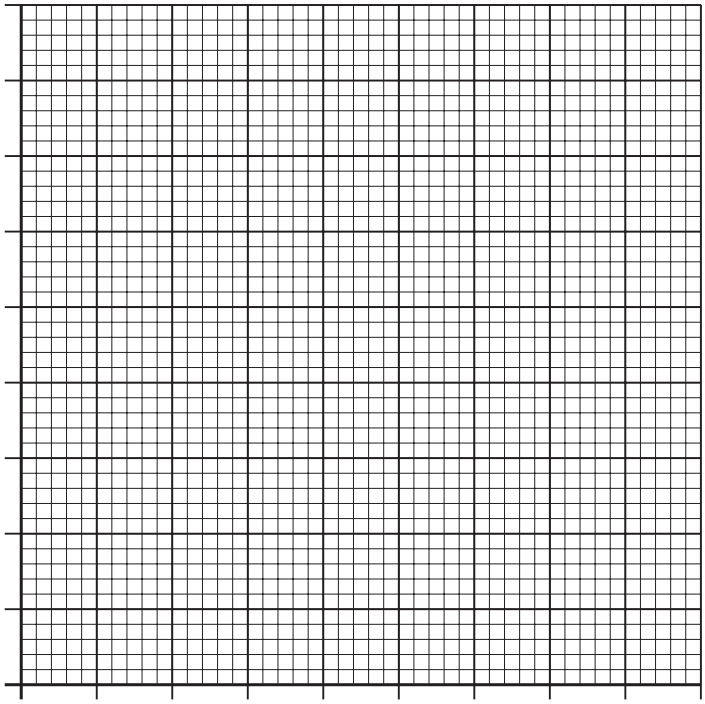
Marks	KU	PS

11. The pie chart shows the uses of ethanoic acid.



(*a*) Draw a bar graph to show the information in the pie chart.
Use appropriate scales to fill most of the graph paper.
(Additional graph paper, if required, can be found on page 23.)

Percentage
%



Use

2

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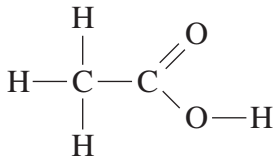
11. (continued)

Marks

KU	PS

(*b*) The diagram shows a molecule of ethanoic acid.



Write the molecular formula for ethanoic acid.

1

(*c*) Describe how you would use universal indicator or pH paper to measure the pH of ethanoic acid solution.

_____

_____

_____ **1**

(*d*) Complete the sentence below by circling the correct answer.

Diluting an ethanoic acid solution with water will

increase
not change } the pH number. **1**
decrease

(*e*) Name the ion present in **all** acidic solutions.

_____ **1**

(6)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

12. The Falkirk Wheel is a steel structure which carries boats from one level of the canal to another.

(*a*) The Falkirk Wheel is painted to prevent rusting.

How does painting prevent rusting?

_____

_____ **1**

(*b*) Suggest another method of preventing steel from rusting.

_____ **1**

(*c*) (i) Steel is an alloy

What is meant by the term alloy?

_____ **1**

(ii) The table gives information on the hardness of some steel alloys.

Carbon present in steel alloy/%	***Hardness/units***
0·1	123
0·2	157
0·3	190
0·4	220
0·5	260

Predict the hardness of a steel alloy containing 0·6% carbon.

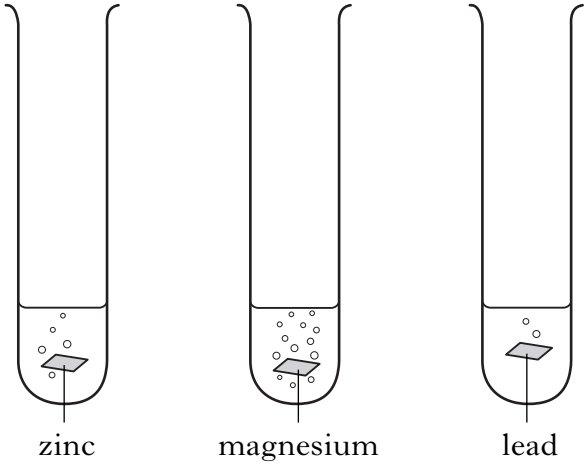
_____ units **1**

(4)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

13. Naveed carried out an experiment to investigate the reactivity of metals with dilute sulphuric acid.



(*a*) Place the metals in order of reactivity (most reactive first).

_____ **1**

(*b*) Name the gas produced when a metal reacts with dilute sulphuric acid.

_____ **1**

(*c*) What would happen to the rate of the reaction if Naveed repeated the experiment using a higher concentration of sulphuric acid?

_____ **1**

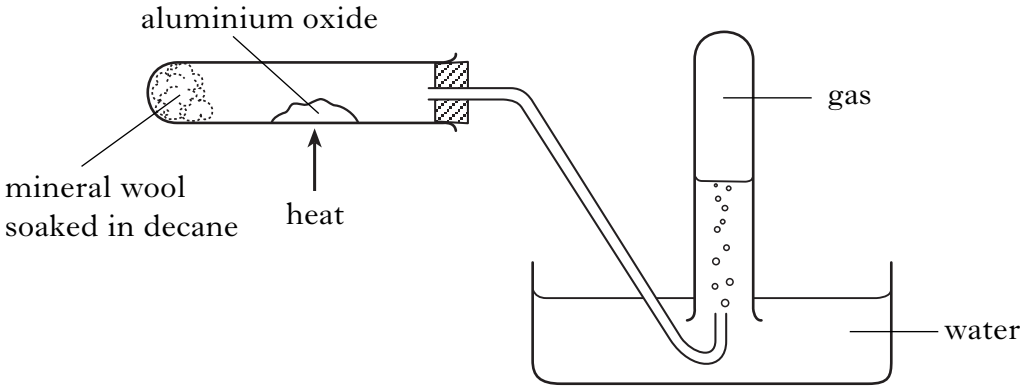
(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

14. Cracking long-chain hydrocarbons produces smaller, more useful molecules.



One of the reactions taking place is:

$$\underset{\text{decane}}{C_{10}H_{22}} \longrightarrow \underset{\text{octane}}{C_8H_{18}} + \mathbf{X}$$

(*a*) Draw a structural formula for octane.

1

(*b*) (i) Write the molecular formula for **X**.

1

(ii) **X** decolourises bromine solution.

What does this indicate about **X**?

_____

1

(*c*) 0·1 g of aluminium oxide was used as a catalyst.

(i) What mass of aluminium oxide will be present at the end of the experiment?

_____ g

1

(ii) Write the formula for aluminium oxide.

1

(5)

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

15. A battery is a number of cells joined together.

(*a*) (i) Give **one** advantage of using a battery rather than mains electricity.

_____

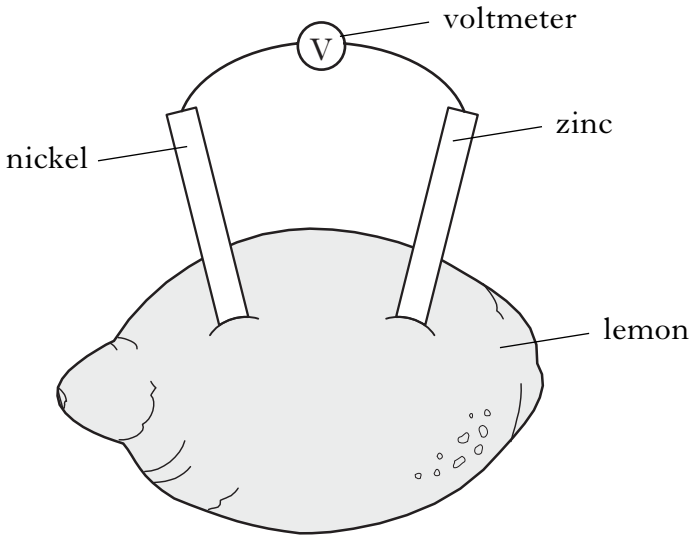
_____ **1**

(ii) Why does a battery stop producing electricity after some time?

_____

_____ **1**

(*b*) A simple cell was set up as shown below.



(i) Draw an arrow **on the wire** to show the direction of electron flow.

You may wish to use page 7 of the data booklet to help you. **1**

(ii) Would the voltage be higher **or** lower if the nickel were replaced by copper?

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

_____ **1**

(4)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

16. Starch and sucrose are carbohydrates.

(*a*) Describe the chemical test, including the result, for starch.

_____

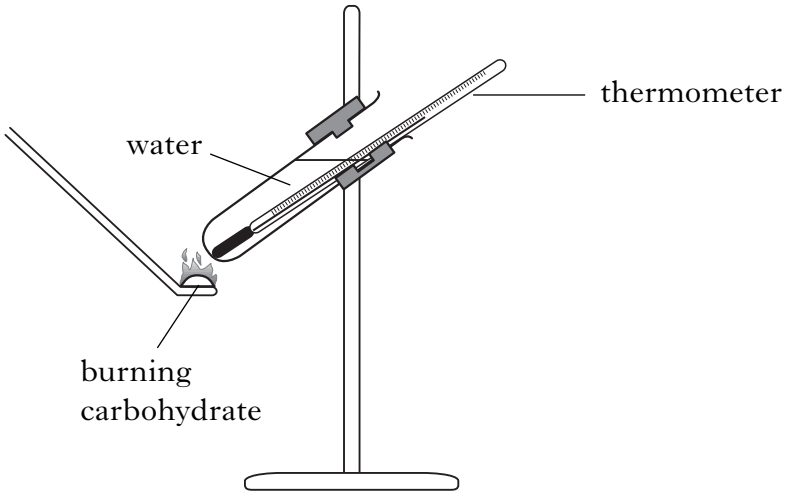
_____ **1**

(*b*) Starch is made by joining glucose molecules together.

Name the **type** of chemical reaction taking place.

_____ **1**

(*c*) Harry set up an experiment to investigate the burning of carbohydrates.



His results are shown below.

Carbohydrate	***Starting temperature of water/°C***	***Final temperature of water/°C***
starch	18	38
sucrose	18	52

DO NOT WRITE IN THIS MARGIN

	Marks	KU	PS

16. (*c*) (continued)

(i) Which carbohydrate, starch or sucrose, released the most heat energy?

_____ **1**

(ii) Harry used the same volume of water in each experiment.

Suggest another variable which would have to be kept the same to make a fair comparison.

_____ **1**

(*d*) Animals and plants obtain energy by breaking down carbohydrates.

Name this process.

_____ **1**

(5)

[Turn over for Question 17 on *Page twenty-two*

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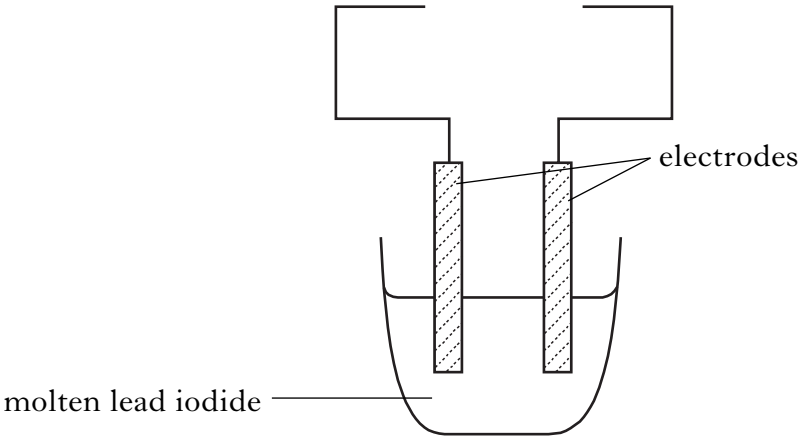
Marks | KU | PS

17. (*a*) A technician set up the following experiment to electrolyse molten lead iodide.



(i) In the diagram, the technician has left out a piece of apparatus needed to electrolyse molten lead iodide.

Name the piece of apparatus which has been left out of the circuit.

_____ **1**

(ii) During electrolysis, the lead iodide is broken down into its elements.

Write a **word** equation for this reaction.

_____ **1**

(*b*) Why do ionic compounds, like lead iodide, **not** conduct electricity when **solid**?

_____

_____

_____ **1**

(*c*) Name the non-metal element which can be used as the electrodes.

_____ **1**

(4)

[*END OF QUESTION PAPER*]

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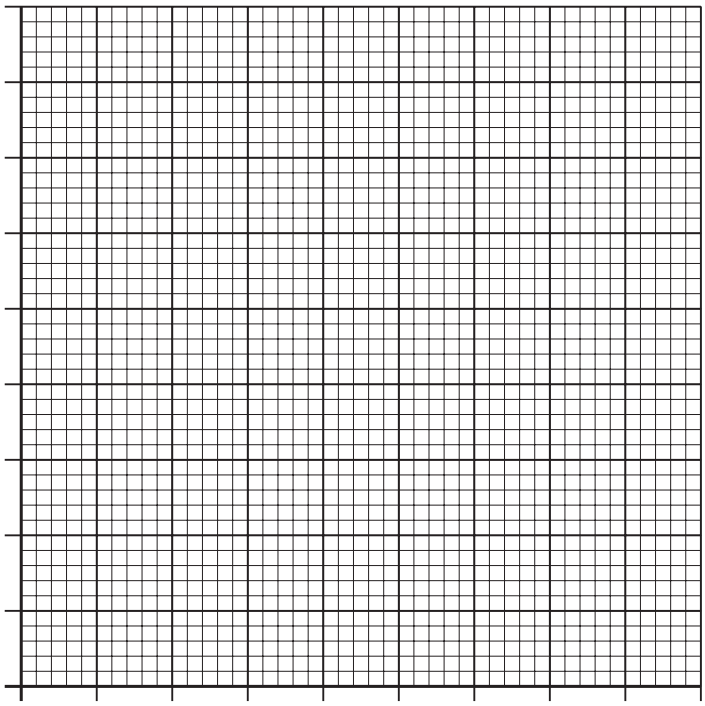
ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 11(*a*)

Percentage
%



Use

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KU	PS

ADDITIONAL SPACE FOR ANSWERS

DO NOT WRITE IN THIS MARGIN

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