

FOR OFFICIAL USE

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KU PS

Total
Marks

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0500/29/01

NATIONAL
QUALIFICATIONS
2013

WEDNESDAY, 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

Town

Forename(s)

Surname

Date of birth

Day Month Year

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Scottish candidate number

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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.



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	C ₂ H ₅ 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

	KU	PS
1		
1		
1		
(3)		

1. The grid contains the names of some metals.

A	sodium	B	beryllium	C	calcium
D	magnesium	E	potassium	F	lithium

- (a) Identify the metal which was discovered in 1808.

You may wish to use page 8 of the data booklet to help you.

A	B	C
D	E	F

1

- (b) Identify the metal which is an essential element for healthy plant growth.

A	B	C
D	E	F

1

- (c) Identify the metal which gives a red flame colour.

You may wish to use page 4 of the data booklet to help you.

A	B	C
D	E	F

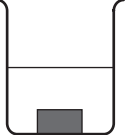
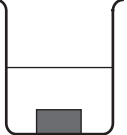
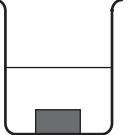
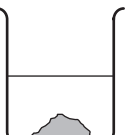
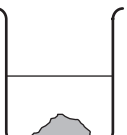
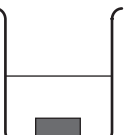
1

(3)

[Turn over

Marks

2. A student investigated the rate of reaction between chalk and dilute hydrochloric acid.

A	 lump 0.5 mol/l 20 °C	B	 lump 1 mol/l 25 °C	C	 lump 1 mol/l 30 °C
D	 powder 1 mol/l 30 °C	E	 powder 0.5 mol/l 25 °C	F	 lump 0.5 mol/l 25 °C

- (a) Identify the **two** experiments that should be compared to show the effect of concentration on the rate of reaction.

A	B	C
D	E	F

1

- (b) Identify the experiment with the **fastest** speed of reaction.

A	B	C
D	E	F

1
(2)

KU	PS

Marks

KU	PS
1	
1	
1	
(3)	

3. The grid contains the names of some elements.

A	carbon	B	sulphur	C	nitrogen
D	neon	E	oxygen	F	phosphorus

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

A	B	C
D	E	F

(b) Identify the noble gas.

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

A	B	C
D	E	F

(c) Identify the gas which makes up approximately 20 % of the air.

A	B	C
D	E	F

[Turn over

Marks

	KU	PS
1		
1		
1		
(3)		

4. The grid contains the names of some compounds.

A	magnesium chloride	B	calcium nitrate	C	barium sulphate
D	sulphur dioxide	E	sodium chloride	F	potassium oxide

- (a) Identify the **two** compounds which contain three elements.

A	B	C
D	E	F

1

- (b) Identify the compound which dissolves in water to form an alkaline solution.

A	B	C
D	E	F

1

- (c) Identify the compound which reacts with water in the atmosphere to produce acid rain.

A	B	C
D	E	F

1

(3)

Marks

KU	PS
1	
	1
1	(2)

5. Coating iron prevents rusting.

A	tin
B	painting
C	plastic
D	zinc
E	magnesium

(a) 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

1

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

A
B
C
D
E

1

(2)

[Turn over

Marks

KU	PS

7. Starch is a carbohydrate.

Identify the **two** correct statements about starch.

A	Starch is a polymer made in plants from glucose.
B	Starch is very soluble in water.
C	Iodine solution can be used to test for starch.
D	Starch is sweet.
E	Starch molecules are made of carbon and hydrogen only.

A
B
C
D
E

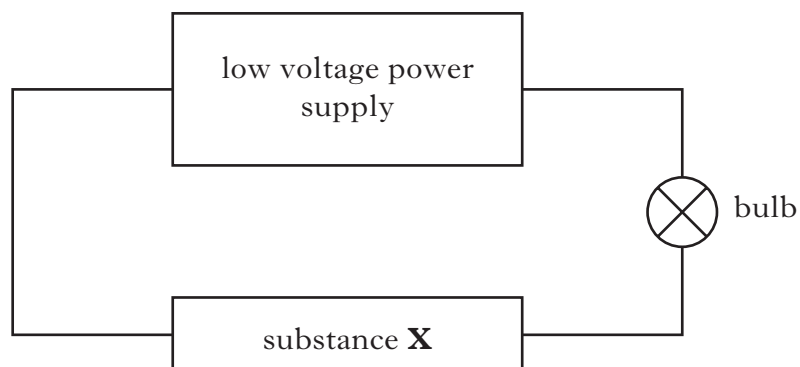
(2)

[Turn over

Marks

KU PS

8. A technician set up some experiments to investigate electrical conductivity.



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

Identify the **two** experiments in which the bulb would light.

A
B
C
D
E

(2)

Marks

KU	PS
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9. Identify the **two** correct statements which refer to an atom of potassium.

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

A	It has two more electrons than an atom of argon.
B	It has similar chemical properties to an atom of lithium.
C	It has the same atomic number as an atom of sodium.
D	It is the same size as an atom of fluorine.
E	It will form an ion by losing one electron.

A
B
C
D
E

(2)

[Turn over for Part 2 on *Page twelve*

Marks

	KU	PS
2		
1		
1		

PART 2

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

10. Some plastics have been developed which have unusual properties. Poly(ethenol) is soluble in water. Poly(ethyne) conducts electricity. Biopol is biodegradable, while PVK is photoconductive.
- (a) Present this information as a table with suitable headings.

- (b) What is meant by the term **biodegradable**?

- (c) (i) **Circle** the correct word to complete the sentence below.

When poly(ethenol) dissolves in water, the poly(ethenol)

is the $\left. \begin{array}{l} \text{solute} \\ \text{solvent} \\ \text{solution} \end{array} \right\}$.

Marks

KU PS

10. (c) (continued)

(ii) Poly(ethenol) contains hydroxyl groups.

Its solubility in warm water is affected by the percentage of hydroxyl groups.

Percentage of hydroxyl groups / %	Solubility in warm water
85	very soluble
90	soluble
95	slightly soluble
100	not soluble

What effect does an **increase** in the percentage of hydroxyl groups have on the solubility of poly(ethenol) in warm water?

1
(5)

[Turn over

Marks

KU	PS
----	----

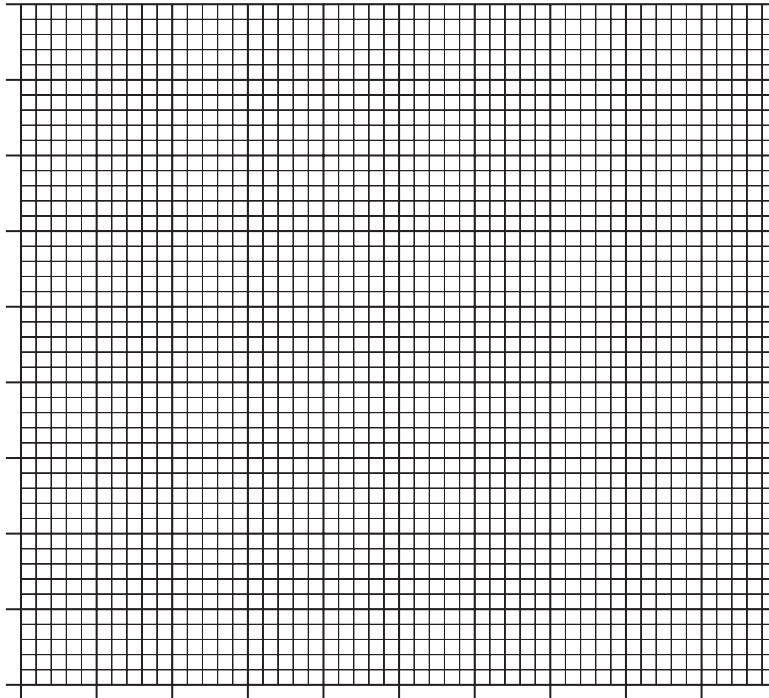
11. Fuel Mix Information gives the percentage of household electricity generated from different fuels.

Fuel Mix Information					
Fuel	Coal	Natural Gas	Nuclear	Renewable	Oil
Percentage /%	33	42	15	6	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 27.)



2

Marks	KU	PS
1		
1		
1		
(5)		

11. (continued)

(b) In an exam a student was asked to describe how coal was formed.

Circle the **two incorrect words** in their answer.

Question: How was coal formed?

Answer: Coal was formed over thousands of years from the
remains of animals which decayed under layers
of mud.

(c) Both coal and natural gas can be described as finite resources.

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

(d) Biogas is a renewable fuel. Biogas consists mainly of methane.

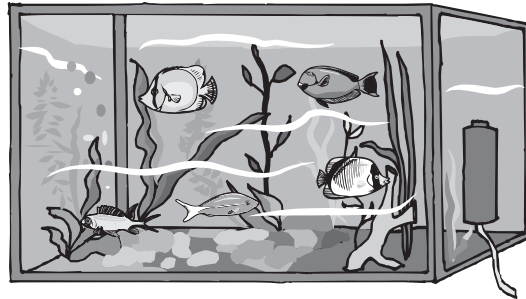
Name the **two** products formed when methane burns in a plentiful supply of air.

[Turn over

Marks

KU	PS
1	
1	
1	
(3)	

13. Green plants, such as Elodea, are placed in fish tanks to supply oxygen. They produce oxygen by photosynthesis.



- (a) Name the substance in green plants which absorbs light energy during photosynthesis.

- (b) The word equation for photosynthesis is:



Identify **X**.

- (c) The table shows how the solubility of oxygen in water changes with temperature.

Temperature /°C	Solubility /mg per litre
10	52
15	36
20	24
25	16
30	

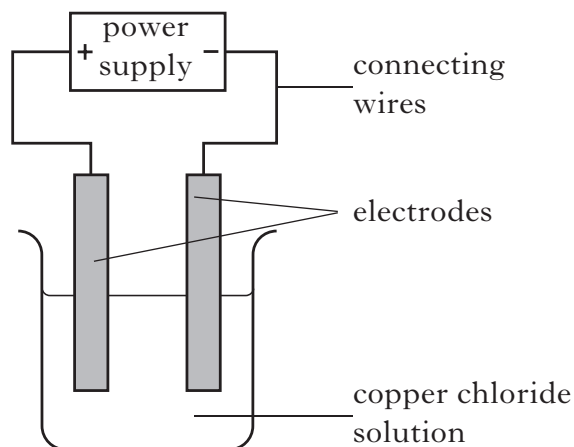
Predict the solubility of oxygen in water at 30 °C.

_____ mg per litre

[Turn over

Marks

14. A student set up the following experiment to break up copper chloride solution into its elements.



- (a) Name this process.

1

- (b) **Circle** the correct word to complete the sentence.

In the experiment the positive metal ions are attracted to

the $\left\{ \begin{array}{l} \text{positive} \\ \text{negative} \end{array} \right\}$ electrode.

1

- (c) A brown solid is produced at one of the electrodes.

What would be **seen** happening at the other electrode?

1

- (d) Name a **non-metal** element which is suitable for use as the electrodes.

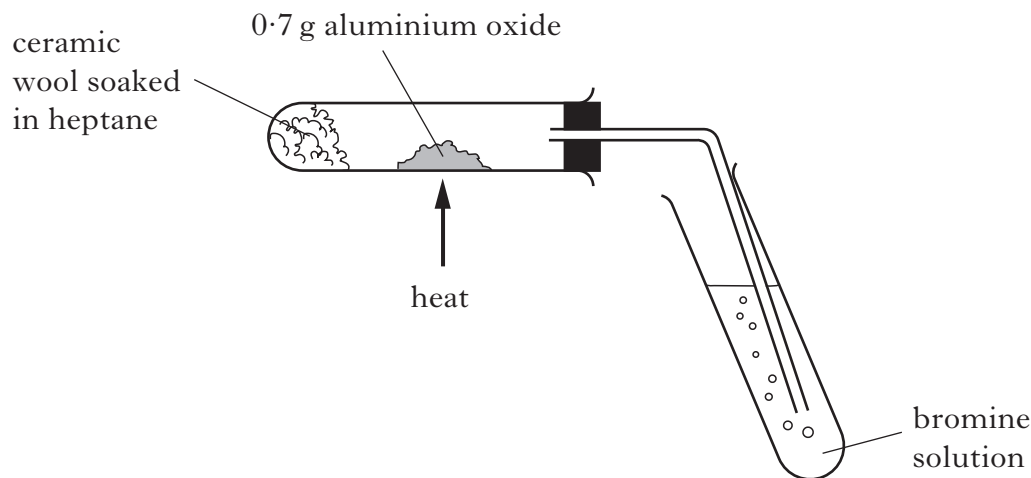
1

(4)

Marks

	KU	PS
1		
1		
1		
(3)		

15. Heptane can be cracked using aluminium oxide as the catalyst.



One of the reactions taking place is:



- (a) Identify **X**.

1

- (b) The product C_3H_6 is an alkene.

What effect would the C_3H_6 have on the bromine solution?

1

- (c) 0.7 g of the catalyst was put into the tube at the start of the experiment.

What mass of catalyst will be present at the end of the experiment?

_____ g

1

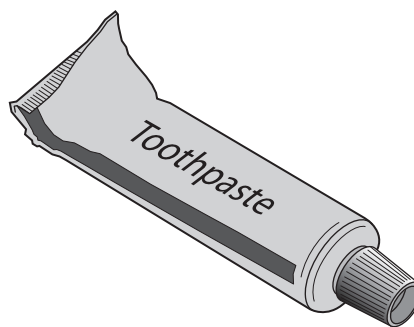
(3)

[Turn over

Marks

KU	PS
1	
1	
1	

16. Indigestion tablets and dental products contain many chemical compounds.



(a) Stomach acid has a pH value of 2.

Indigestion tablets neutralise stomach acid.

What effect do the tablets have on the pH value of stomach acid?

1

(b) Some indigestion tablets contain calcium carbonate.

Calcium chloride, carbon dioxide and water are produced when calcium carbonate reacts with hydrochloric acid in the stomach.

(i) Write a **word** equation for the reaction.

1

(ii) Describe the chemical test, including the result, for carbon dioxide.

1

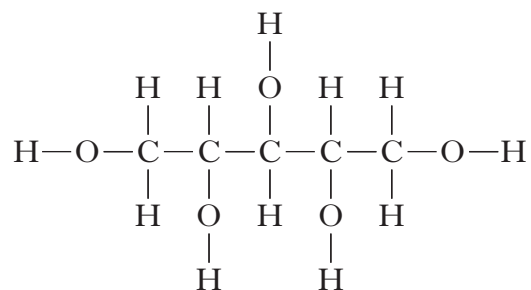
Marks

KU	PS

16. (continued)

(c) Xylitol is a compound found in some toothpastes.

The structure of xylitol is shown below.



Complete the molecular formula for xylitol.

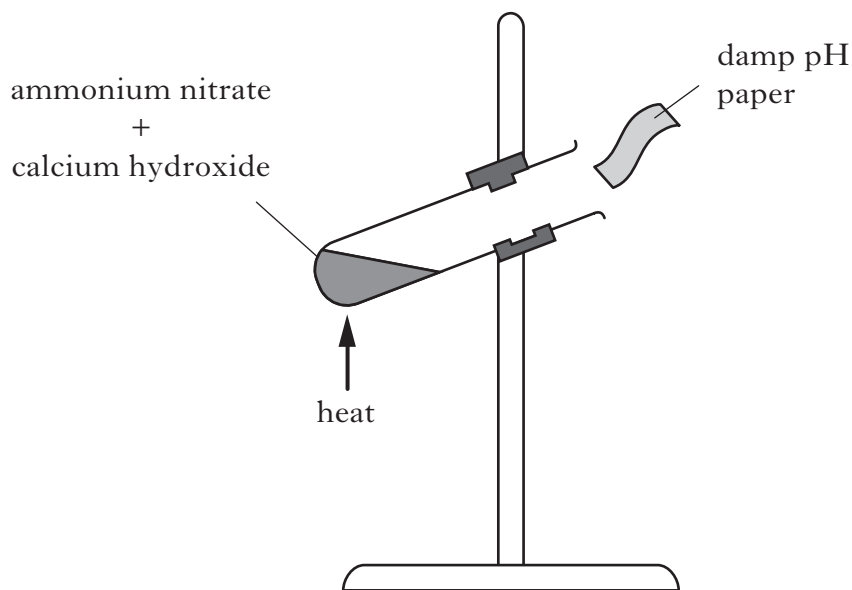
C H O

1
(4)

[Turn over

Marks	KU	PS
1		
1		
1		

17. (a) Ammonia can be prepared in the laboratory as shown.

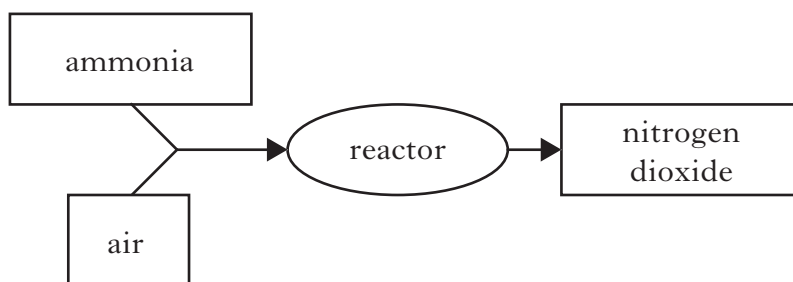


What colour will the pH paper turn?

- (b) Ammonia can be used in industry to manufacture nitric acid.

Name this industrial process.

- (c) The flow diagram shows one part of this process.



The reaction is exothermic.

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

<i>Marks</i>	KU	PS
1		
(4)		

17. (continued)

(d) Nitrogen dioxide is also produced in a natural process which takes place in the atmosphere.

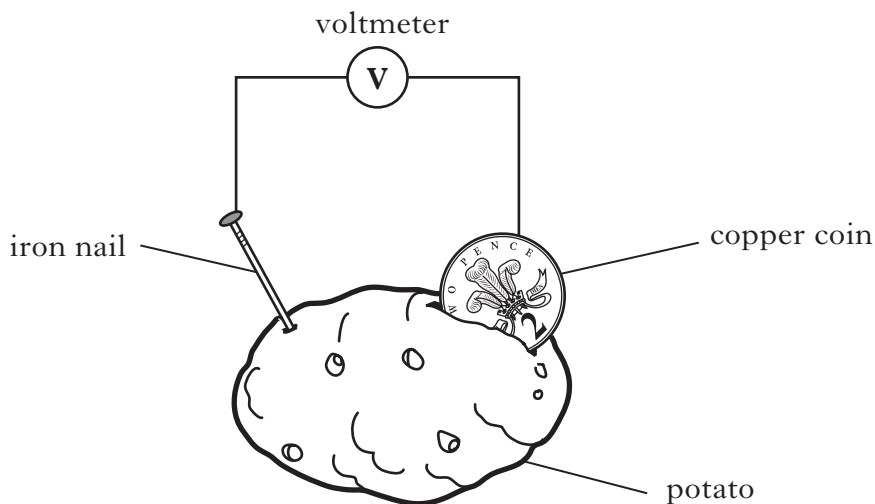
What provides the energy for this process?

[Turn over

Marks

KU	PS

18. (a) A simple cell can be made from everyday objects.



- (i) Draw an arrow **on the wire** to show the direction of electron flow. **1**
- (ii) What would happen to the size of the voltage if the iron nail was replaced with aluminium foil?

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

1

(b) A battery is a number of cells joined together.

State **one** advantage of a battery over mains electricity.

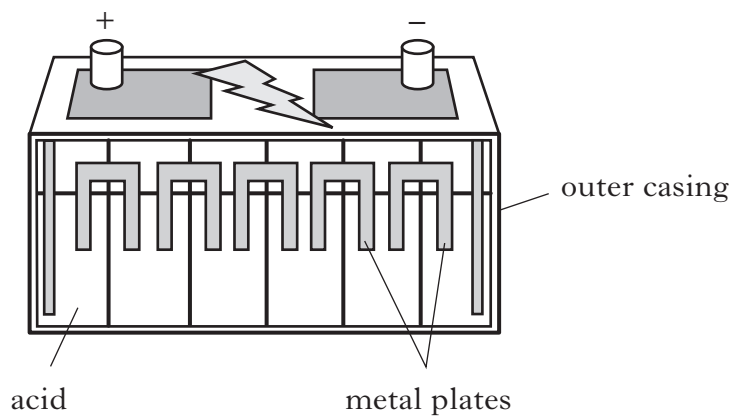
1

Marks

KU	PS

18. (continued)

(c) The type of battery used in cars is shown below.



(i) Name the **metal** used to make the plates in a car battery.

1

(ii) 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

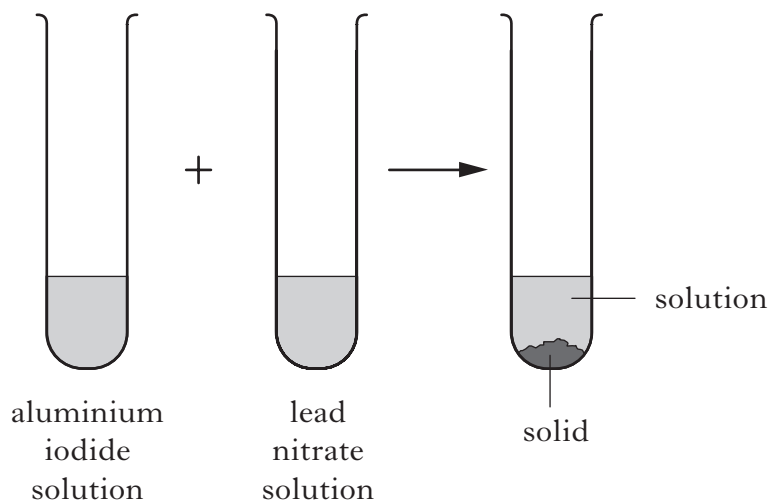
(5)

[Turn over for Question 19 on Page twenty-six

19. (a) Write the formula for aluminium iodide.

Marks	KU	PS
1		

(b) When aluminium iodide solution and lead nitrate solution are mixed together a chemical reaction takes place.



(i) Name the solution formed in this reaction.

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

1

(ii) How could the solid be separated from the solution?

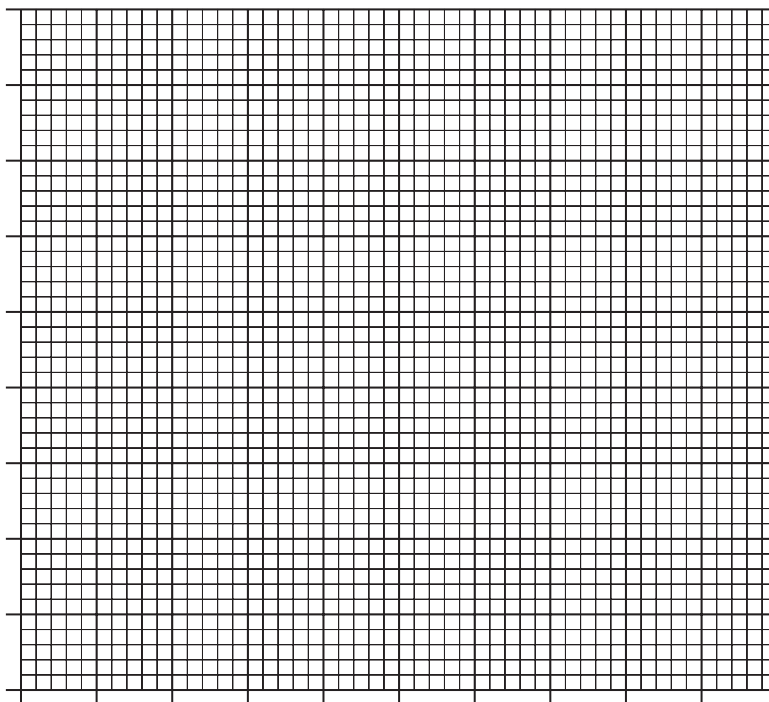
1

(3)

[END OF QUESTION PAPER]

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 11(a)



ADDITIONAL SPACE FOR ANSWERS

KU	PS