

FOR OFFICIAL USE

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KU PS

Total
Marks

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0500/401

NATIONAL
QUALIFICATIONS
2010

FRIDAY, 30 APRIL
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

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



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	B	C
CH_4	H_2	CO_2
D	E	F
CO	$\text{C}_2\text{H}_5\text{OH}$	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. The grid contains the symbols for some elements.

A	B	C
Pt	Na	P
D	E	F
N	S	Ne

(a) Identify the symbol for sodium.

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 which was the first to be discovered.

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

A	B	C
D	E	F

1

(c) Identify the symbol for a noble gas.

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

A	B	C
D	E	F

1
(3)

[Turn over

Marks

2. The grid contains the names of some reagents used in chemical tests.

A	B	C
bromine solution	ferroxyl indicator	universal indicator
D	E	F
lime water	Benedict's solution	iodine solution

(a) Identify the reagent used to test the pH of a dilute acid.

A	B	C
D	E	F

(b) Identify the reagent used to test for glucose.

A	B	C
D	E	F

1

1
(2)

KU	PS

Marks

KU PS

4. The grid shows the names of some oxides.

A	potassium oxide	B	nitrogen dioxide	C	carbon monoxide
D	carbon dioxide	E	hydrogen oxide	F	sulphur dioxide

- (a) Identify the oxide produced by the sparking of air.

A	B	C
D	E	F

1

- (b) Identify the oxide which dissolves in water to produce an alkaline solution.

A	B	C
D	E	F

1

(2)

Marks

5. The grid shows the formulae for some compounds.

A	CuCl ₂	B	Na ₂ O	C	LiF
D	SO ₂	E	BaF ₂	F	SiCl ₄

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

A	B	C
D	E	F

1

(b) Identify the compound 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
(2)

[Turn over]

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Marks	KU	PS
	2	
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(5)		

11. (b) (continued)

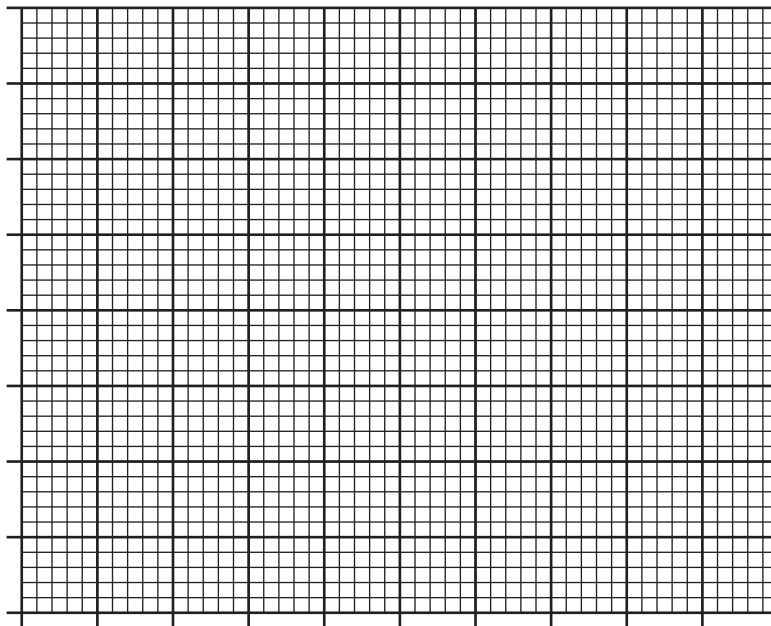
The results of the investigation are shown in the table.

Name of plant	Number of bubbles of oxygen gas produced in 3 minutes
Elodea	19
Cabomba	32
Hornwort	12
Parrots Feather	24
Duckweed	8

- (i) Draw a bar graph to show the information in the table.

Use appropriate scales to fill most of the graph paper.

(Additional graph paper, if required, can be found on page 25.)



2

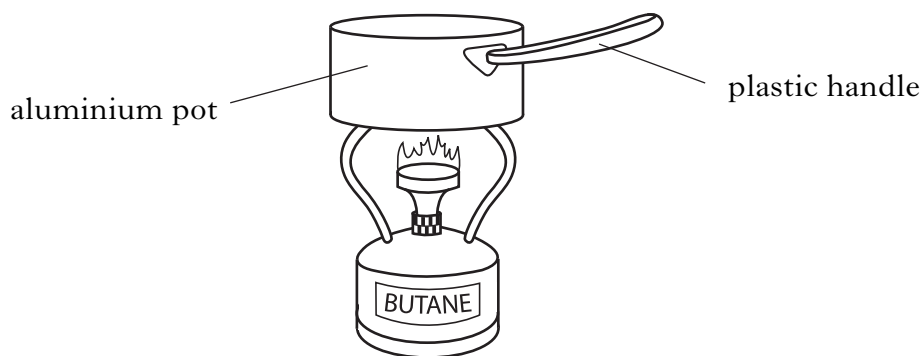
- (ii) Suggest **one** factor that needs to be kept the same to make this investigation fair.

1
(5)

Marks

KU PS

12. Butane is a hydrocarbon which can be used as a fuel.



- (a) When butane burns in oxygen, carbon dioxide and water are produced. Write an equation, using symbols and formulae, for the burning of butane, C_4H_{10} . There is no need to balance the equation.

1

- (b) The aluminium pot is strong, light and does not melt when heated.
- (i) Give **another** property of the aluminium which makes it suitable for this use.

1

- (ii) The handle of the cooking pot is made from a plastic which does **not** melt when heated.

What **term** is used to describe this type of plastic?

1

- (c) After some time the bottom of the pot becomes covered in a black substance. Suggest what the black substance could be.

1

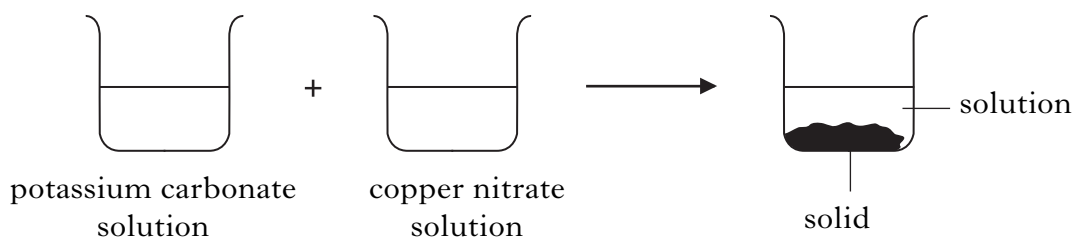
(4)

Marks	KU	PS
1		
1		
1		
1		
(4)		

13. Potassium carbonate is a compound made up of different elements.

(a) Name the elements present in potassium carbonate.

(b) When potassium carbonate solution and copper nitrate solution are mixed, a chemical reaction takes place.



(i) Name this type of chemical reaction.

(ii) Name the **solution** formed in this reaction.

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

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

[Turn over

14. Iron can be mixed with other elements to produce steel for different uses.



Chromium is added to make steel suitable for use in cooking pots. Railway tracks are made from steel which contains manganese. Titanium is added to make steel suitable for aircraft parts while adding tungsten produces steel used to make hammers.

(a) Present the above information in a table with suitable headings.

2

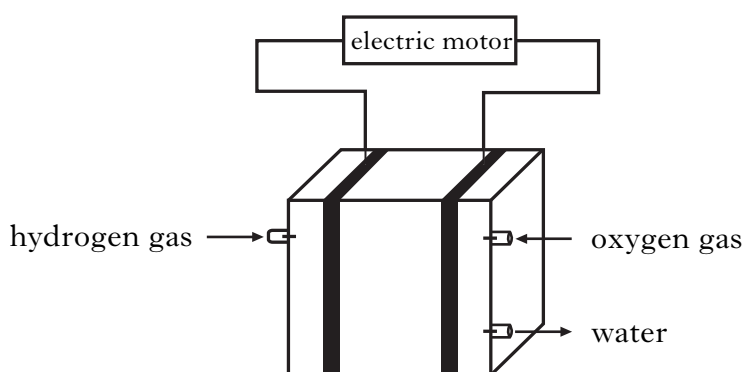
Marks	KU	PS
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1		
(5)		

15. A hydrogen molecule is made up of two hydrogen atoms joined together.

(a) What **term** is used to describe a molecule made up of **two** atoms?

(b) Hydrogen can be obtained by passing electricity through dilute acid.
What name is used to describe this process?

(c) Hydrogen can be used in fuel cells to supply electricity to run a car.



(i) Suggest **one** advantage of using fuel cells rather than petrol to power cars.

(ii) Suggest a possible source of oxygen for use in the fuel cell.

(iii) Platinum is used as the catalyst in the fuel cell.

What is the purpose of a catalyst?

Marks

KU	PS

16. Fertilisers are added to soil to provide essential elements required for healthy plant growth.



(a) Nitrogen is an essential element.

Name **one** other essential element required for healthy plant growth.

1

(b) Some compounds containing essential elements are unsuitable for use as fertilisers.

Suggest a reason for this.

1

(c) Certain plants contain bacteria which can convert nitrogen from the air into nitrogen compounds.

Which part of the plant contains these bacteria?

1

(3)

[Turn over

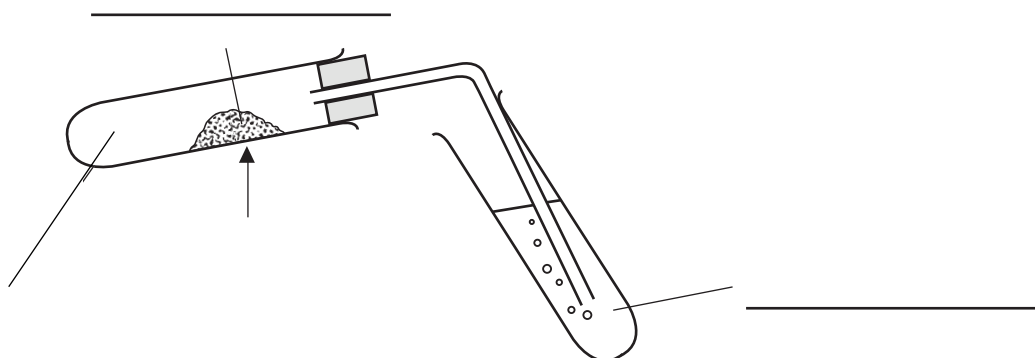
Marks	Marks	
	KU	PS
1		
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(4)		

17. Octane is a hydrocarbon.

(a) To which family of hydrocarbons does octane belong?

(b) The diagram shows the apparatus used to crack octane.

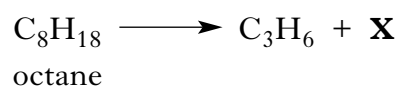
Octane is cracked using an aluminium oxide catalyst. Bromine solution is used to show that some of the products are unsaturated.



(i) Label the diagram of the apparatus used to crack octane.

(An additional diagram, if required, may be found on page 25.)

(ii) One of the reactions taking place is:



Identify **X**.

(iii) The product, C_3H_6 can be used to make a polymer.

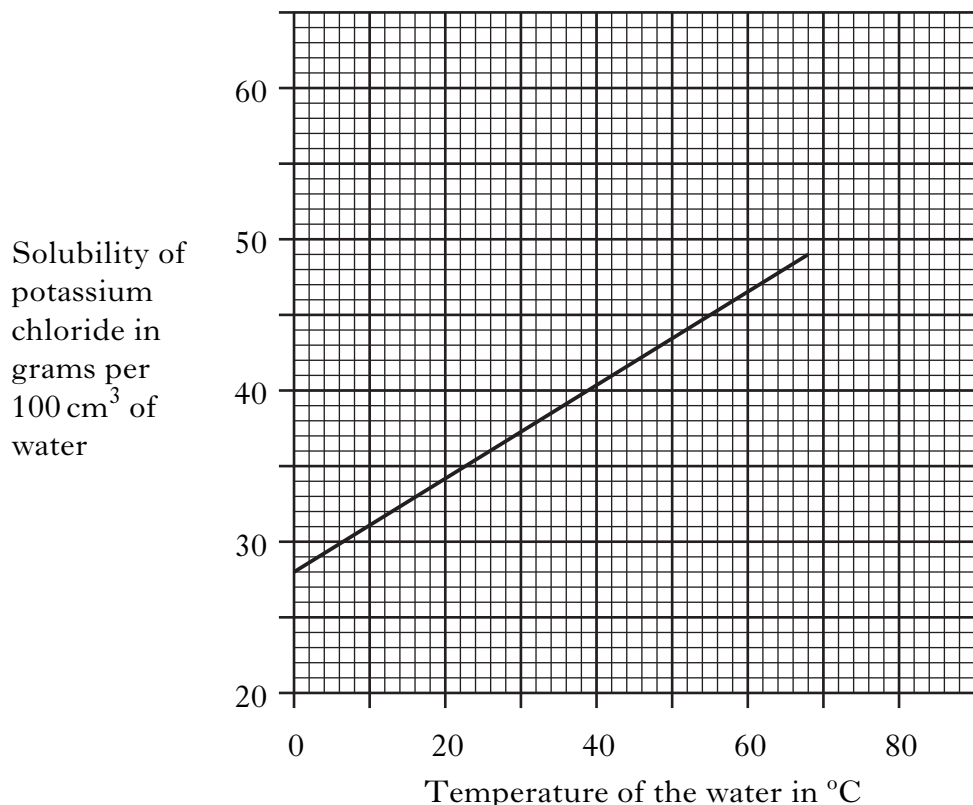
Name the polymer formed when many C_3H_6 molecules join together.

Marks	Marks	
	KU	PS
1		
1		
1		
(3)		

18. Ionic compounds such as potassium chloride can dissolve in water to form a solution.

(a) What **term** can be used to describe the water?

(b) The graph shows how the temperature of the water affects the solubility of potassium chloride.



(i) How does the temperature of the water affect the solubility of the potassium chloride?

(ii) Predict the solubility of potassium chloride at 80 °C.

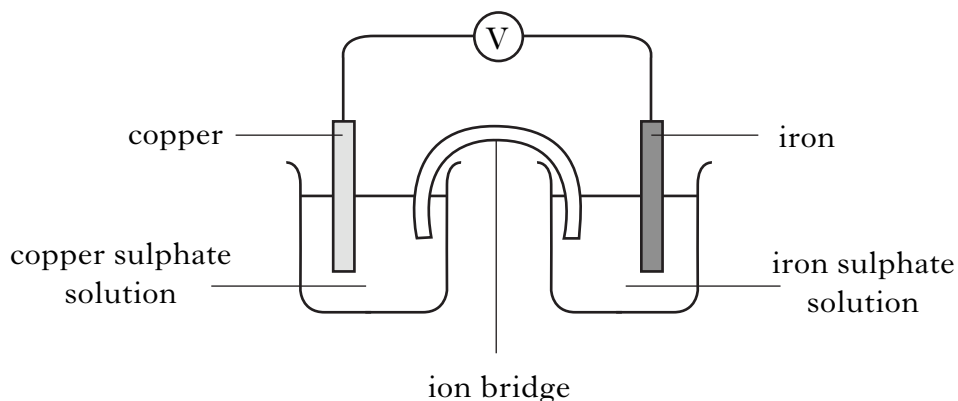
_____ grams per 100 cm³ of water.

[Turn over for Question 19 on Page twenty-four

Marks

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19. A student set up the cell shown.



- (a) **On the wires**, indicate the direction of electron flow.
- (b) Why do ionic compounds, like copper sulphate, conduct electricity when in solution?
- _____
- _____
- _____
- (c) Name a metal which could be used to replace the iron to produce a smaller voltage.
- You may wish to use page 7 of the data booklet to help you.
- _____
- (d) What is the purpose of the ion bridge?
- _____
- _____

1

1

1

1

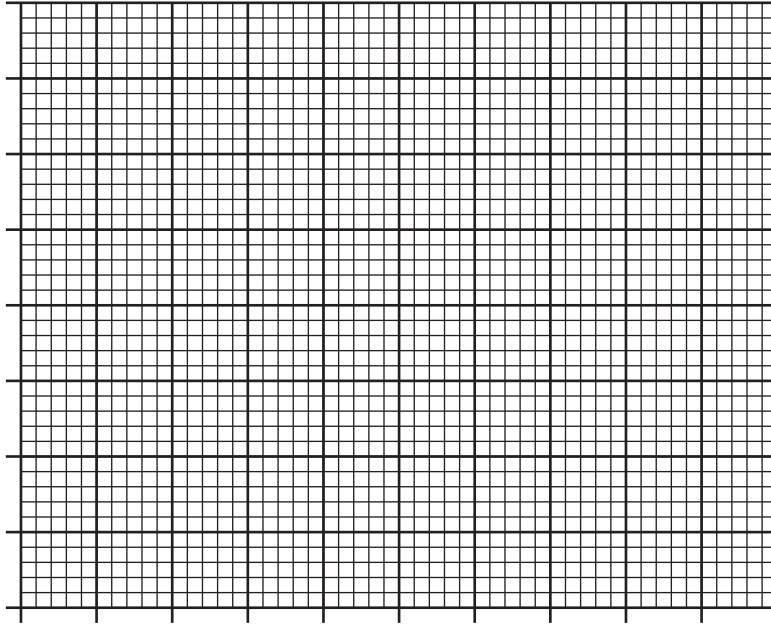
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[END OF QUESTION PAPER]

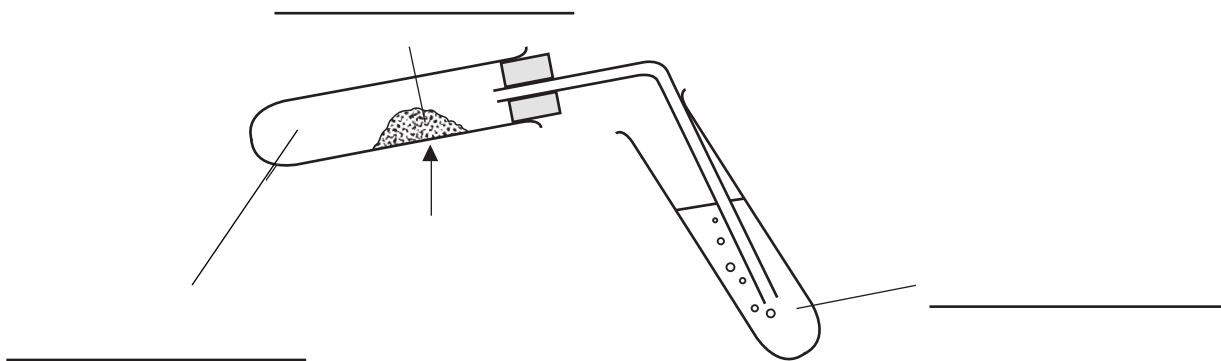
ADDITIONAL SPACE FOR ANSWERS

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ADDITIONAL GRAPH PAPER FOR QUESTION 11(b)(i)



ADDITIONAL DIAGRAM FOR QUESTION 17(b)(i)



ADDITIONAL SPACE FOR ANSWERS

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ADDITIONAL SPACE FOR ANSWERS

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ADDITIONAL SPACE FOR ANSWERS

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