FOR OFFICIAL USE

G

	KU	PS
Total Marks		

0500/29/01

NATIONAL QUALIFICATIONS 2012

MONDAY, 14 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.

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_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 shows the names of some elements.

A gold	B magnesium	C carbon
D nitrogen	E calcium	F iodine

(*a*) Identify the element with atomic number 79.
You may wish to use page 8 of the data booklet to help you.

A	B	C
D	E	F

1

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

A	B	C
D	E	F

1

(*c*) 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

(3)

[Turn over

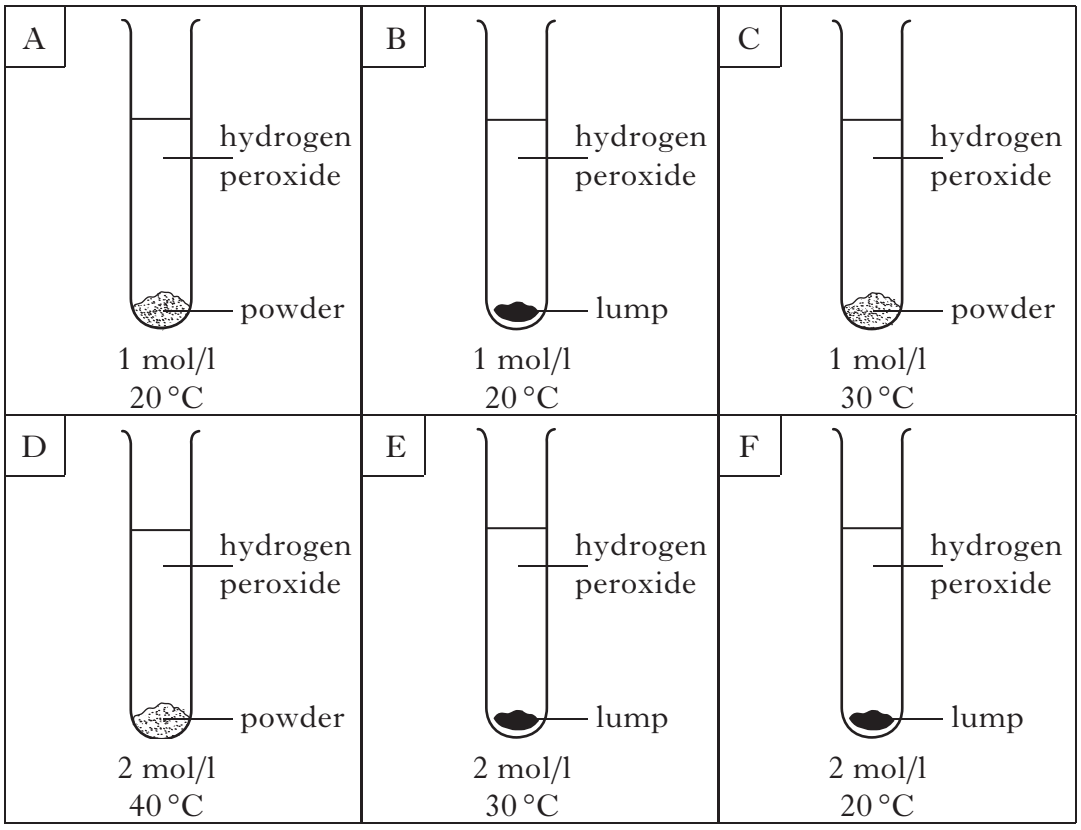
DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

2. A catalyst speeds up the following reaction:

hydrogen peroxide ⟶ water + oxygen

The grid shows reactions carried out using the **same** mass of catalyst with two different concentrations of hydrogen peroxide.



(*a*) Identify the **two** experiments which could be used to show the effect of concentration on the speed 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)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

3. The grid shows the names of some substances.

A potassium	B water	C helium
D air	E sodium chloride	F phosphorus

(*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 mixture.

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 metals.

A silver	B sodium	C magnesium
D nickel	E lead	F iron

(*a*) Identify the metal produced in a Blast Furnace.

A	B	C
D	E	F

1

(*b*) Identify the metal that does **not** react with dilute acid.
You may wish to use page 7 of the data booklet to help you.

A	B	C
D	E	F

1

(*c*) Identify the metal that is stored under oil.
You may wish to use page 8 of the data booklet to help you.

A	B	C
D	E	F

1

(3)

DO NOT WRITE IN THIS MARGIN

Marks KU PS

5.

A butter melting	B distillation of crude oil
C wood burning	D water evaporating

Identify the chemical reaction.

A	B
C	D

(1)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

6. The grid shows the names of some compounds.

A zinc chloride	B magnesium sulphite	C sodium chlorate
D lead carbonate	E hydrogen sulphide	F potassium nitrite

(*a*) Identify the **two** compounds which do not contain oxygen.

A	B	C
D	E	F

1

(*b*) Identify the covalent compound.

A	B	C
D	E	F

1

(2)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

7. The grid shows the names of some gases.

A chlorine	B nitrogen	C ammonia
D oxygen	E hydrogen	F ethene

(*a*) Identify the gas which is a hydrocarbon.

A	B	C
D	E	F

1

(*b*) Identify the gas which turns damp pH paper blue.

A	B	C
D	E	F

1

(*c*) Identify the gas produced when dilute hydrochloric acid reacts with zinc.

A	B	C
D	E	F

1

(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

8. The grid shows the formulae of some ions.

A H^+	B NO_3^-	C Fe^{2+}
D OH^-	E SO_4^{2-}	F Na^+

(*a*) Identify the ion which turns ferroxyl indicator blue.

A	B	C
D	E	F

1

(*b*) Identify the ion that can be used as a fertiliser.

A	B	C
D	E	F

1

(2)

DO NOT WRITE IN THIS MARGIN

Marks KU PS

9. A student made some statements about the rusting of iron.

A	Both air and water are required for rusting to occur.
B	Attaching iron to the positive terminal of a battery prevents rusting.
C	Salt slows down rusting.
D	Rusting is the corrosion of iron.
E	Coating iron in nickel is called galvanising.

Identify the **two** correct statements.

A
B
C
D
E

(2)

[Turn over for Part 2 on *Page twelve*

DO NOT WRITE IN THIS MARGIN

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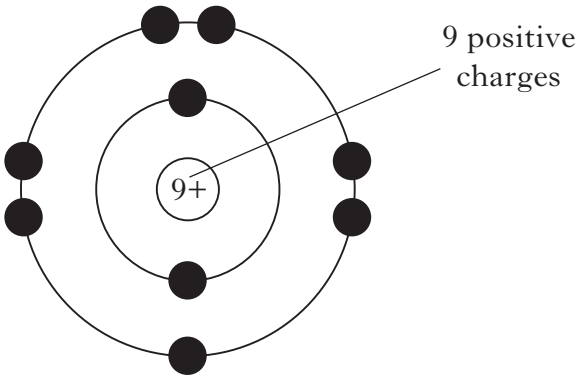
PART 2

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

10. An atom of fluorine can be represented by a simple diagram.



(*a*) Name the structure at the centre of the atom where the positive charges are found.

_____ **1**

(*b*) Fluorine is found in group 7 of the Periodic Table.

Name the family of elements to which fluorine belongs.

_____ **1**

(2)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

11. Metals can be used as catalysts.

Catalyst	Use
platinum	catalytic converter
nickel	making margarine
iron	making ammonia
rhodium	drug manufacture

(*a*) Name the industrial process used to make ammonia.

_____ **1**

(*b*) Platinum is found uncombined in the Earth's crust.
What does this indicate about the reactivity of platinum?

_____ **1**

(*c*) Metals can also be used to make alloys.
Name an alloy.

_____ **1**

(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

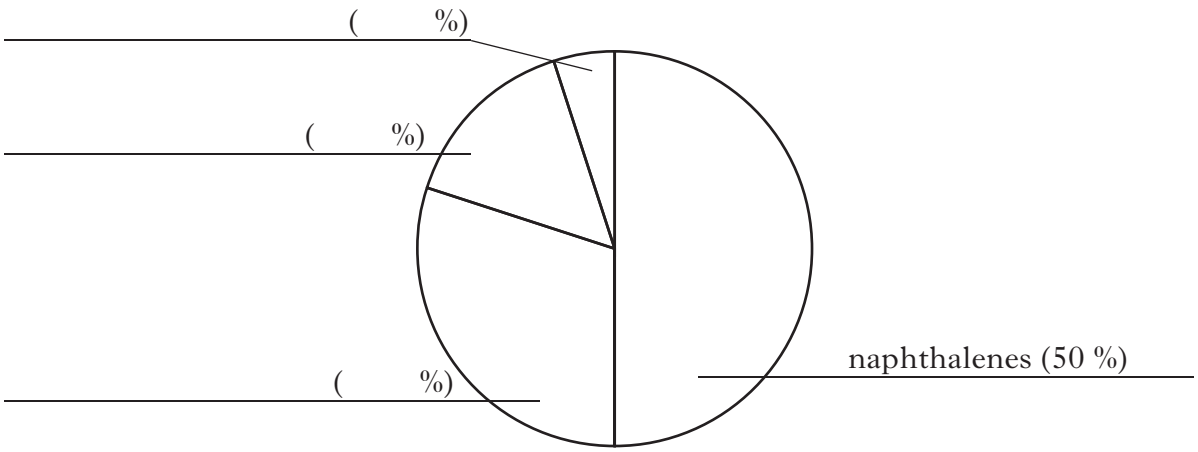
12. One way of classifying the types of hydrocarbon found in crude oil is shown in the table.

Type of hydrocarbon	**% in crude oil**
naphthalenes	50
paraffins	30
aromatics	15
asphalts	

(*a*) Label the pie chart to show the name and percentage for each type of hydrocarbon.

One label has already been completed for you.

(An additional pie chart, if required, can be found on page 27.)



2

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

12. (continued)

(*b*) The table below gives information about some hydrocarbons obtained from the paraffins.

Name	Formula
octane	C_8H_{18}
nonane	C_9H_{20}
decane	$C_{10}H_{22}$
undecane	$C_{11}H_{24}$

Name the family of hydrocarbons in the table.

_____ **1**

(*c*) Eicosane is another member of this family.

A molecule of eicosane contains 20 carbon atoms.

Write the molecular formula of eicosane.

1

(4)

[Turn over

DO NOT WRITE IN THIS MARGIN

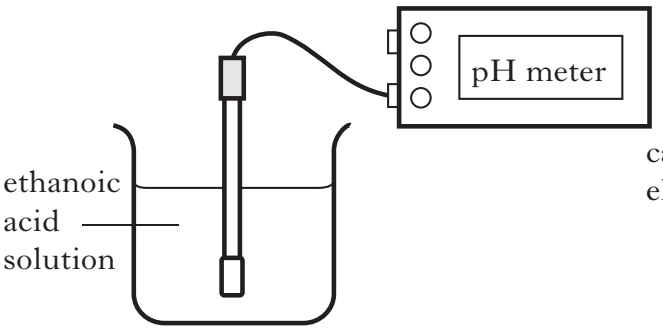
Marks | KU | PS

13. Vinegar is a solution of ethanoic acid in water.

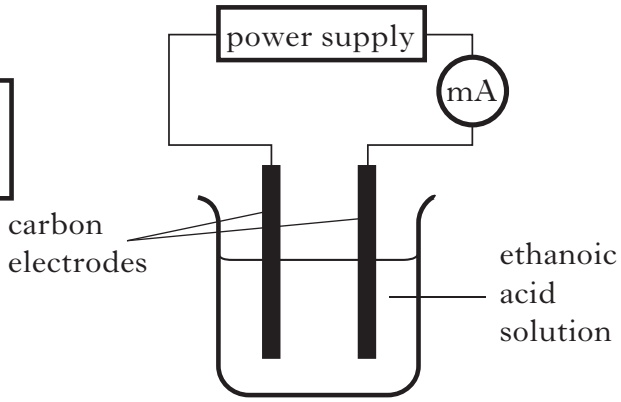
(*a*) A student set up the following experiments.

He tested ethanoic acid solutions of different concentrations.

Experiment 1



Experiment 2



His results are shown below.

Ethanoic acid solution	pH	Current/mA
A	3	18
B	4	9
C	5	5

(i) Which ethanoic acid solution is the most acidic, **A**, **B** or **C**?

_____ **1**

(ii) Predict the current, in mA, for an ethanoic acid solution of pH 6.

_____ mA **1**

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

_____ **1**

(3)

DO NOT WRITE IN THIS MARGIN

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14. Polystyrene is a plastic used in packaging.

(*a*) Name the monomer used to make polystyrene.

_____ **1**

(*b*) Name the type of chemical reaction which is used to make polystyrene.

_____ **1**

(*c*) Starch, obtained from natural sources such as barley, can be used to make a packaging material with similar properties to polystyrene.

Suggest one advantage of this material compared to polystyrene.

_____

_____ **1**

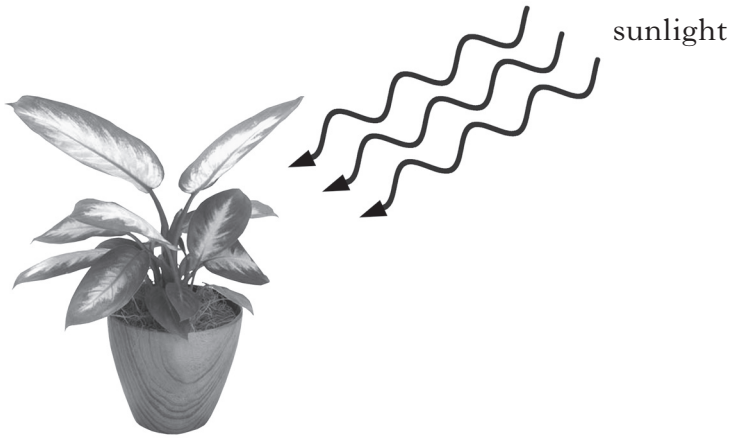
(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

15. (*a*) The carbohydrate glucose is made when green plants absorb light energy from the sun.



(i) Name the chemical, present in green plants, which absorbs light energy.

_____ **1**

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

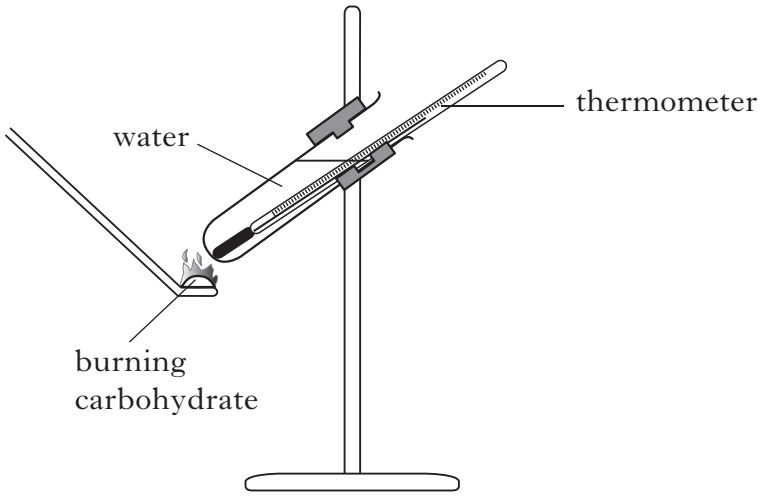
_____

_____ **1**

Marks | KU | PS

15. (continued)

(*b*) A student set up an experiment to investigate the burning of carbohydrates.



Her results are shown below.

Carbohydrate	Starting temperature of water/° C	Final temperature of water/° C
glucose	20	44
starch	20	56

Suggest **one** factor that the student would have kept the same to make a fair comparison.

_____ **1**

(*c*) (Circle) the correct words to complete the sentence.

Starch is { sweet / not sweet } and { dissolves / does not dissolve } well in water. **1**

(*d*) Scientists have developed a method of producing hydrocarbons from carbohydrates.

Name the element removed from a carbohydrate to produce a hydrocarbon.

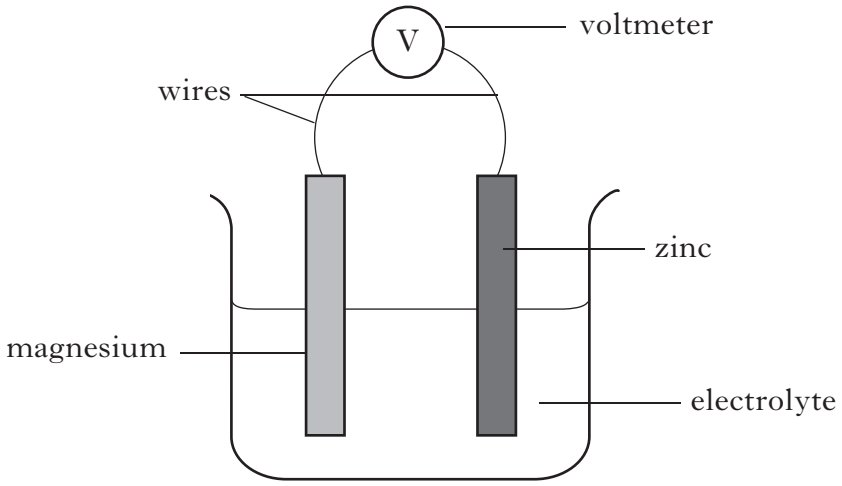
_____ **1**

(5)

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

16. The diagram below shows a cell.



(*a*) Name the type of charged particle that flows through the wires.

_____ **1**

(*b*) The voltage of the cell shown above is 1·51 V.

Name a metal which could replace **zinc** to produce a **greater** voltage.

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

_____ **1**

(*c*) Scientists at the University of St. Andrews have developed a type of battery. It has the advantage of being able to store up to 10 times more energy than some other types of battery.

(i) Suggest another advantage of using this type of battery.

_____

_____ **1**

(ii) The chemical reaction inside this battery produces lithium oxide.

Write the formula for lithium oxide.

1

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

16. (continued)

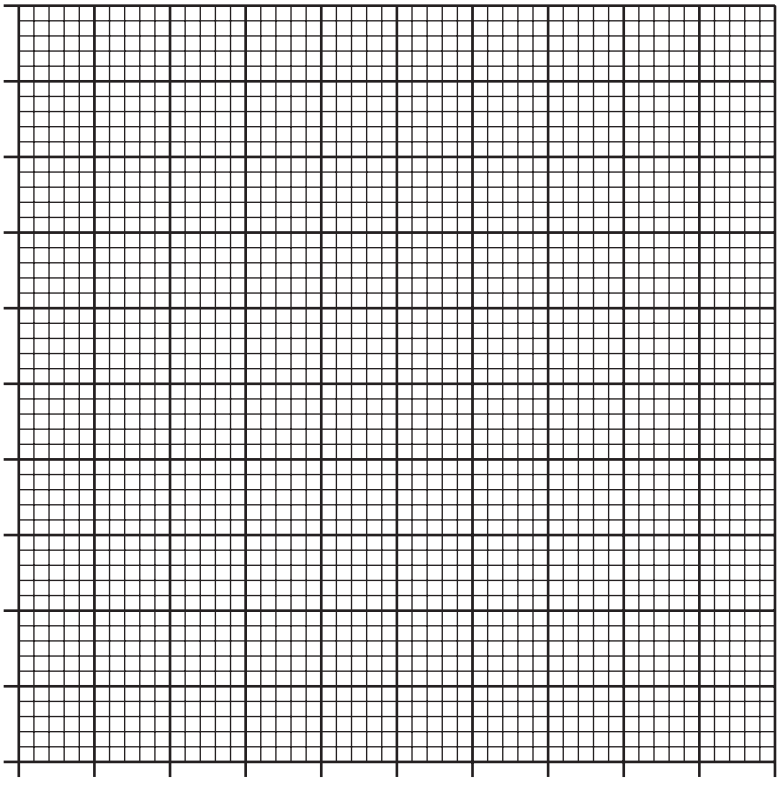
(*d*) The table below shows the maximum storage life of some other types of battery.

Type of battery	Storage life/years
alkaline	5
zinc chloride	2
silver oxide	2
nickel-cadmium	7
lithium	10

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

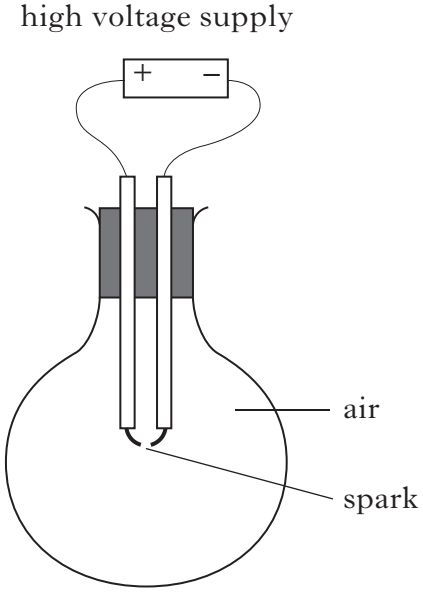
(6)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

17. A teacher demonstrated an experiment to show how nitrogen dioxide is formed in a petrol engine.



(*a*) Name the **two** gases which react to form nitrogen dioxide.

_____ **1**

(*b*) Nitrogen dioxide can be formed naturally in air.
What provides the high voltage spark for this reaction?

_____ **1**

(*c*) Nitrogen dioxide dissolves in water.
Suggest a pH value for this solution.

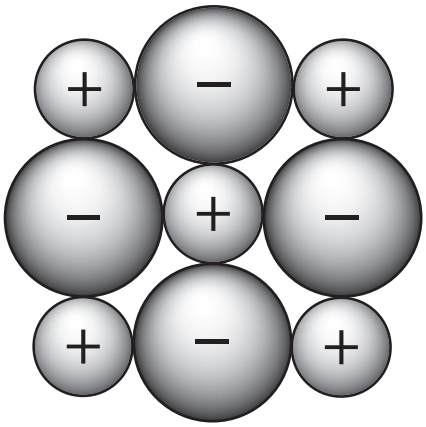
_____ **1**

(3)

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

18. The diagram shows an arrangement of ions in an ionic compound.



(*a*) What term is given to the arrangement of ions in an ionic solid?

_____ **1**

(*b*) Explain why solid ionic compounds do **not** conduct electricity.

_____

_____ **1**

(*c*) Many ionic compounds are coloured.

Compound	Colour
copper sulphate	blue
nickel chloride	green
sodium dichromate	orange
sodium chloride	colourless

Using the information in the table, state the colour of the chloride ion.

_____ **1**

(*d*) Copper can be extracted from the ionic compound copper oxide as shown.

copper oxide + **Y** ⟶ copper + carbon dioxide

Name **Y**.

_____ **1**

(4)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

19. (*a*) The table gives information on the solubility of some compounds in water.

Compound	Solubility/ grams per 100 cm^3
potassium chlorate	10·0
potassium nitrate	33·4
sodium carbonate	7·1
sodium chloride	36·5
sodium nitrate	88·6

Using the information in the table, name the **least** soluble compound.

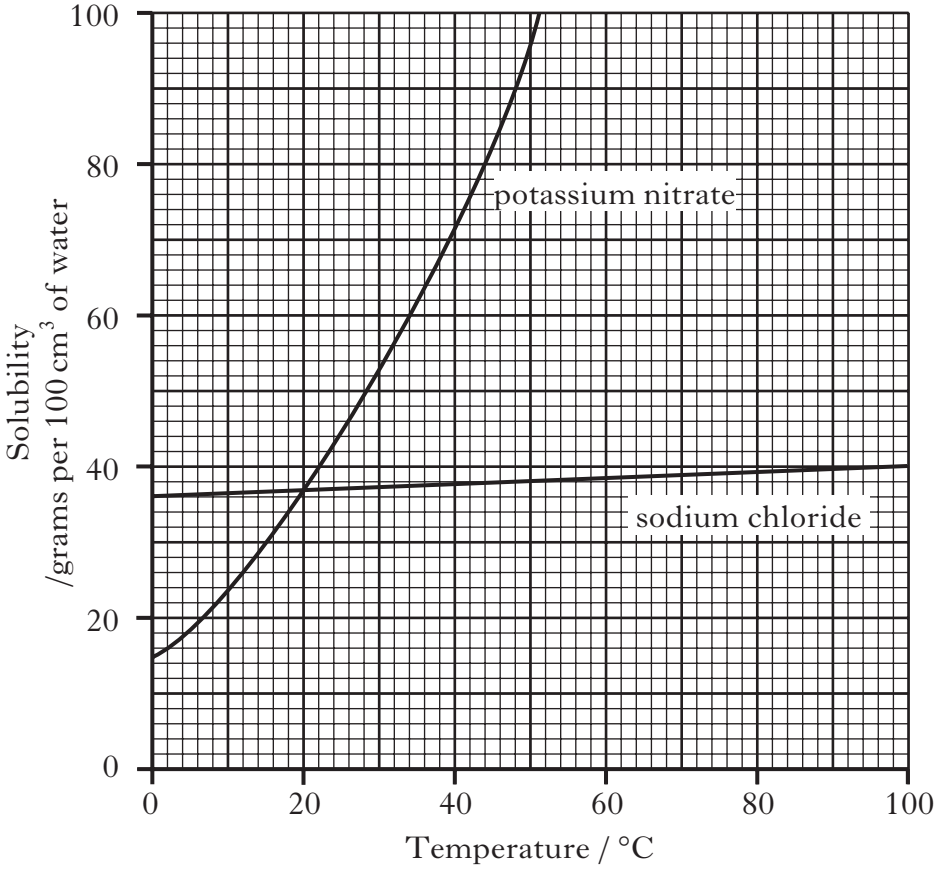
1

_____

Marks | KU | PS

19. (continued)

(*b*) The graph shows the solubility of sodium chloride and potassium nitrate at different temperatures.



(i) At what temperature do sodium chloride and potassium nitrate have the **same** solubility?

_____ °C **1**

(ii) Write a general statement describing the effect of temperature on the solubility of potassium nitrate.

_____

_____ **1**

(3)

[Turn over for Question 20 on *Page twenty-six*

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

20. The table shows word equations for some chemical reactions.

	Word Equation	Type of chemical reaction
A	large alkane ⟶ smaller alkane + alkene	_____
B	lead nitrate + sodium iodide ⟶ sodium nitrate + lead iodide	precipitation
C	potassium hydroxide + hydrochloric acid ⟶ potassium chloride + _____	neutralisation

(*a*) **In the table,**

(i) write the type of chemical reaction represented by word equation **A**; **1**

(ii) complete equation **C**. **1**

(*b*) Alkenes decolourise bromine solution.

What does this tell you about the structure of alkenes?

_____

_____ **1**

(*c*) Name the solid produced in precipitation reaction **B**.

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

_____ **1**

(4)

[*END OF QUESTION PAPER*]

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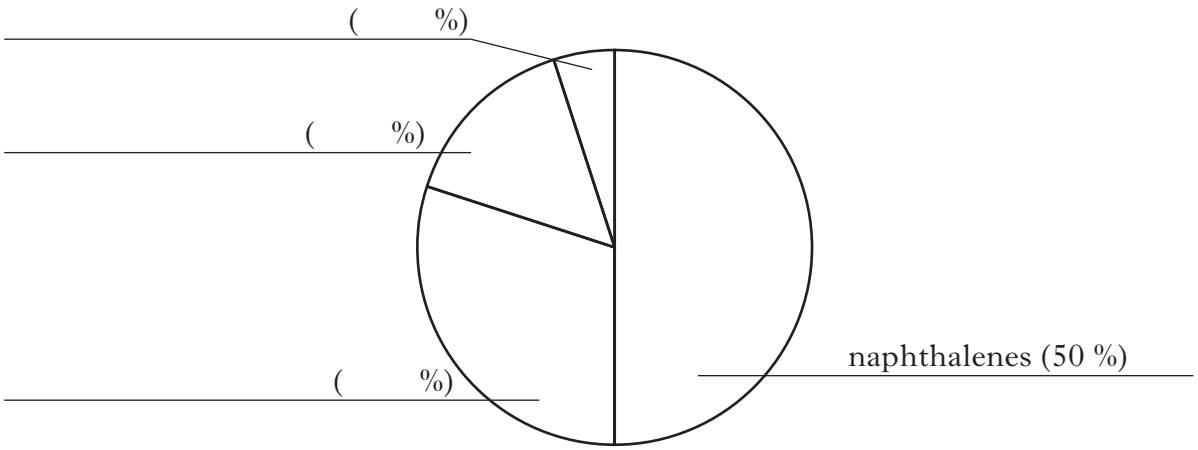
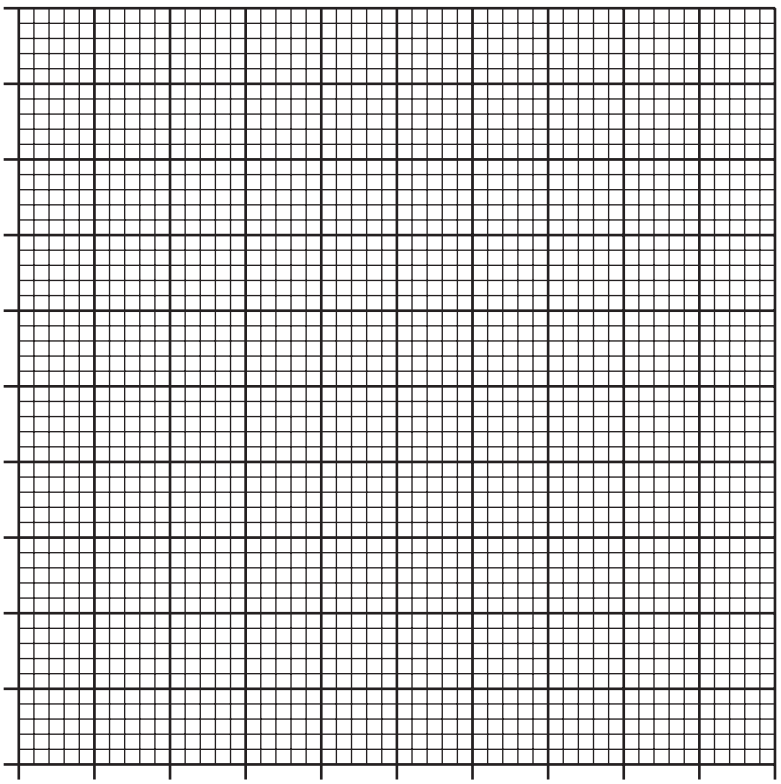
ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL PIE CHART FOR QUESTION 12(*a*)



ADDITIONAL GRAPH PAPER FOR QUESTION 16(*d*)



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ADDITIONAL SPACE FOR ANSWERS