FOR OFFICIAL USE

G

	KU	PS
Total Marks		

0500/401

NATIONAL QUALIFICATIONS 2006

MONDAY, 8 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 6/26770

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Marks | KU | PS

1. The grid contains the names of some metals.

A potassium	B gold	C magnesium
D copper	E zinc	F calcium

(*a*) Identify the metal which has the symbol, K.
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 was discovered in the year 1775.
You may wish to use page 8 of the data booklet to help you.

A	B	C
D	E	F

1

(*c*) Identify the metal which is used to galvanise iron.

A	B	C
D	E	F

1

(*d*) Identify the metal which gives an orange-red flame colour.
You may wish to use page 4 of the data booklet to help you.

A	B	C
D	E	F

1

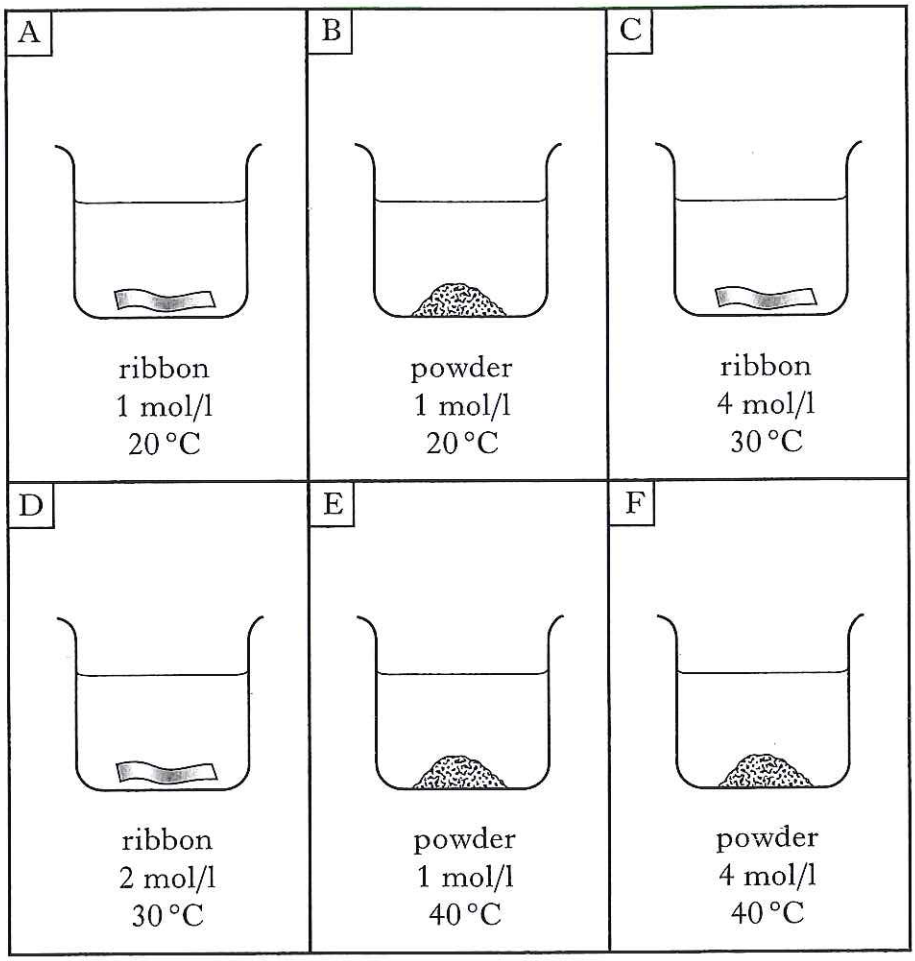
(4)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

2. Lesley and Scott studied the reaction of magnesium with dilute acid. The same mass of magnesium was used in each experiment.



Identify the **two** experiments which could be used to show the effect of temperature on the rate of the reaction.

A	B	C
D	E	F

(1)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

3. Hydrocarbons contain hydrogen and carbon only.

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

(*a*) Identify the **two** hydrocarbons which are alkanes.

A	B	C
D	E	F

1

(*b*) Identify the hydrocarbon which could be produced when ethane is cracked.

A	B	C
D	E	F

1

(*c*) Identify the hydrocarbon with the highest boiling point.
You may wish to use page 6 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

4. Class 4A made some statements about the effect of adding water to an alkaline solution.

A	The pH of the solution will rise.
B	The solution will become more concentrated.
C	The pH of the solution will fall towards 7.
D	Adding water will have no effect on the solution.

Identify the correct statement.

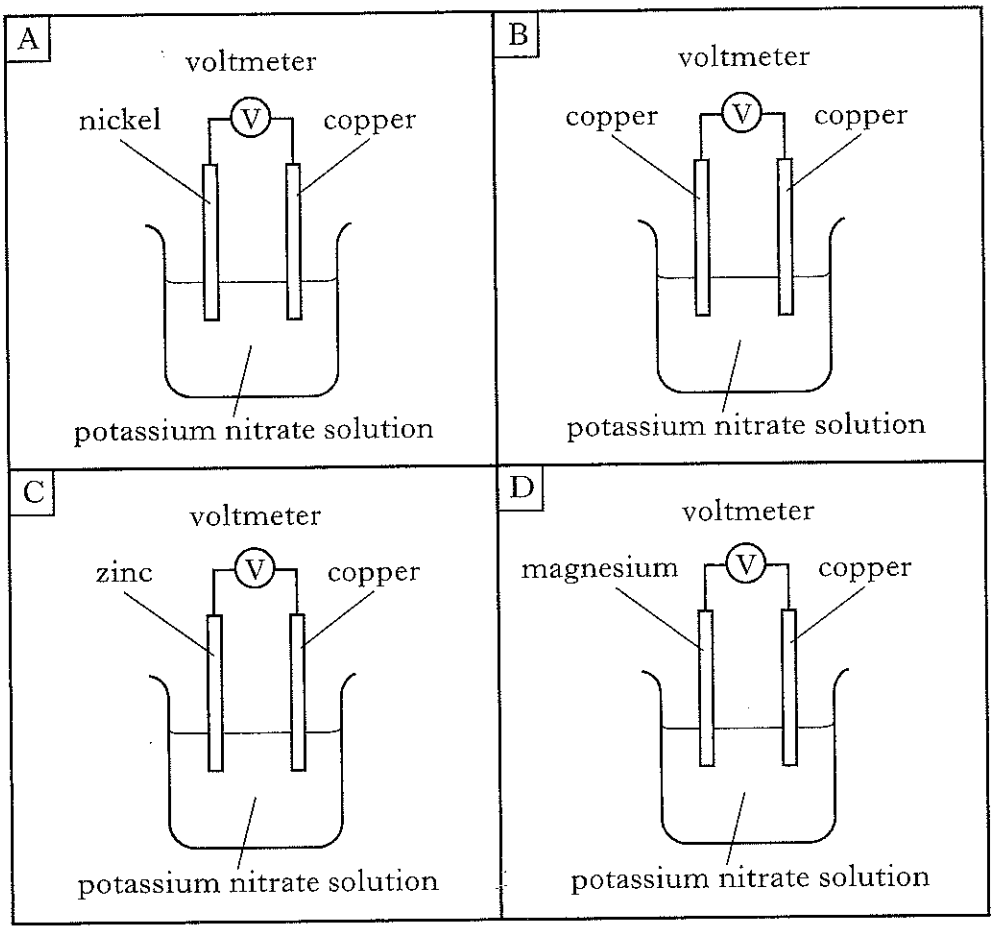
A
B
C
D

(1)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

5. Electricity can be produced using electrochemical cells.



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

A	B
C	D

1

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

A	B
C	D

1

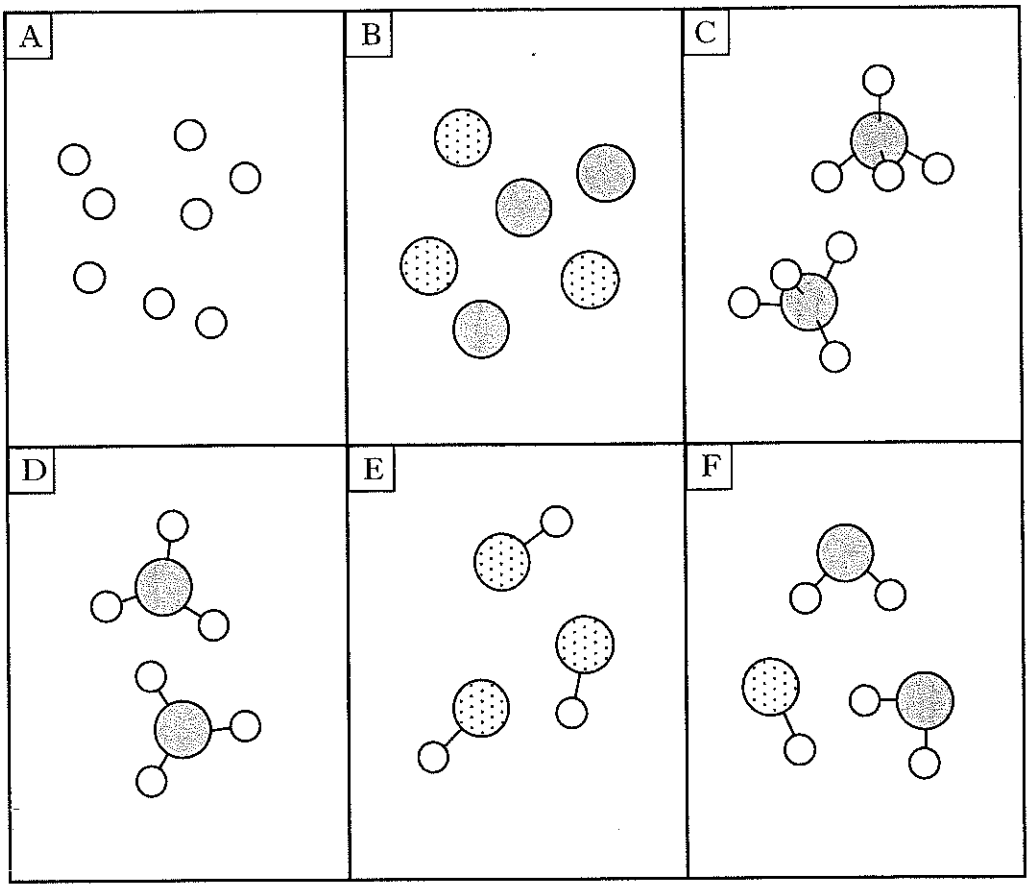
(2)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

6. Many substances can be represented by simple diagrams.



(*a*) Identify the diagram which could represent an element.

A	B	C
D	E	F

1

(*b*) Identify the diagram which contains **diatomic** molecules.

A	B	C
D	E	F

1

(*c*) Identify the **two** diagrams which **do not** contain molecules.

A	B	C
D	E	F

1

(3)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

7. The grid contains the names of some chemical processes.

A respiration	B fermentation	C filtration
D photosynthesis	E distillation	F cracking

(*a*) Identify the process used to separate alcohol from water.

A	B	C
D	E	F

1

(*b*) Identify the process in which chlorophyll absorbs light energy.

A	B	C
D	E	F

1

(*c*) Identify the **two** processes in which carbon dioxide is produced.

A	B	C
D	E	F

2

(4)

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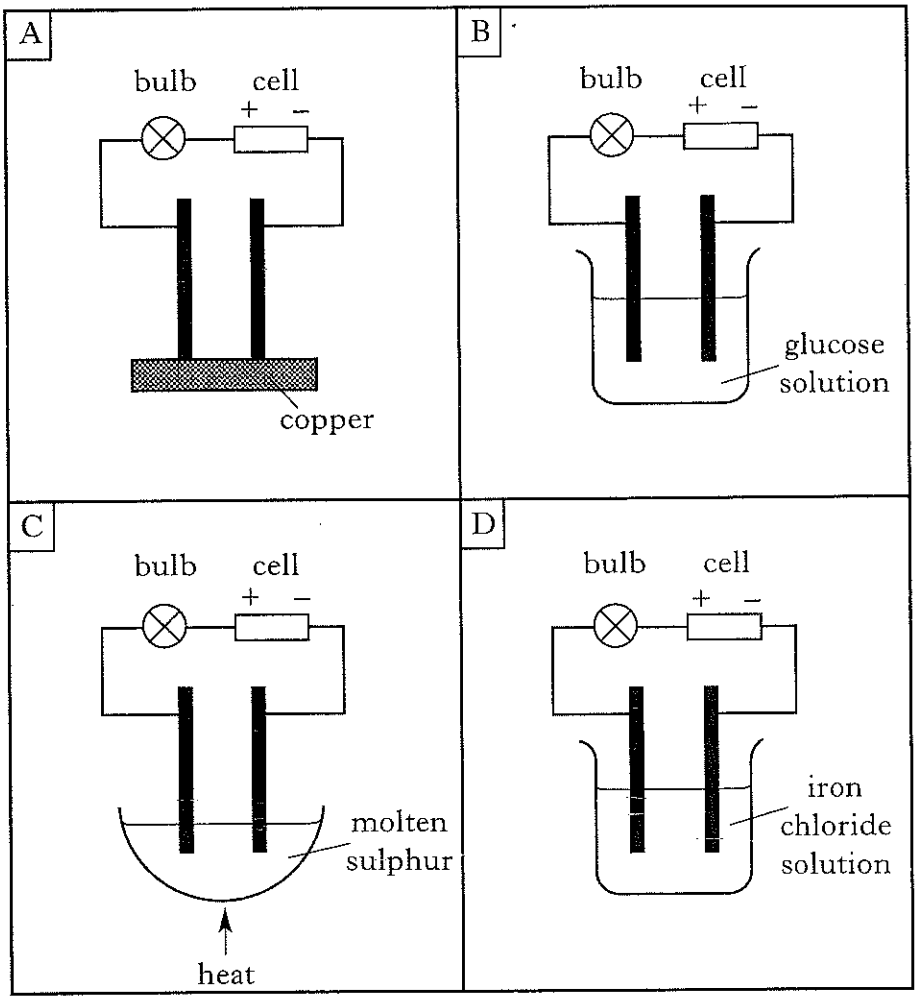
DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

8. Stephen was investigating electrical conductivity.
He set up four experiments.



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

A	B
C	D

(2)

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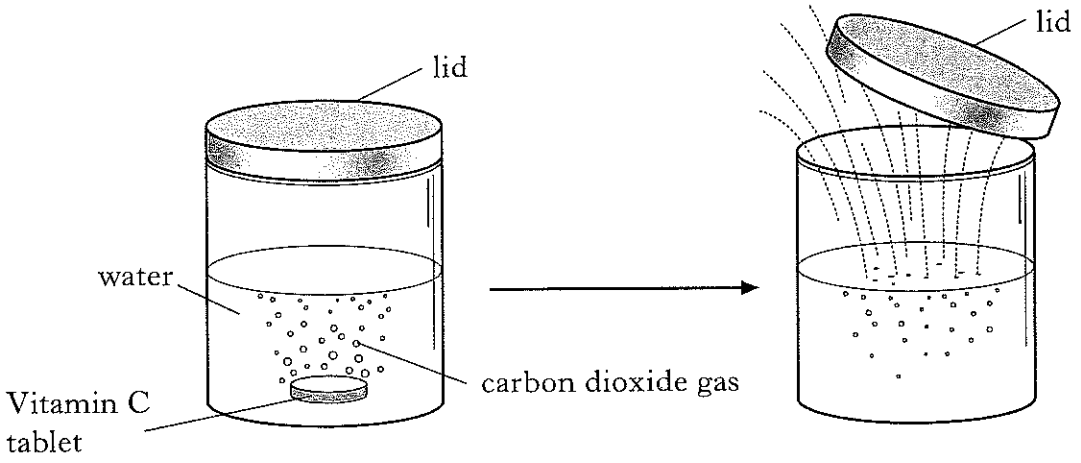
PART 2

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

9. When water is added to some types of Vitamin C tablets, carbon dioxide gas is produced.
A student set up the following experiment and timed how long it took for the gas produced to blow off the container lid.



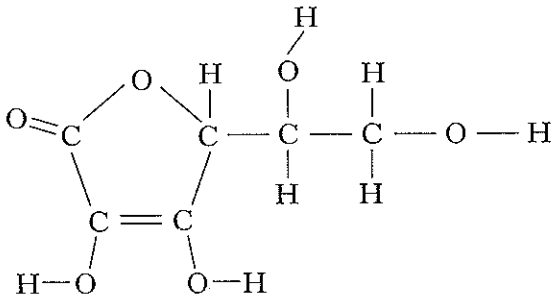
(*a*) State the test for carbon dioxide.

_____ **1**

(*b*) The student repeated the experiment using the same volume of water and the same mass of a **crushed** Vitamin C tablet.
What effect would this have on the time taken for the lid to be blown off the container?

_____ **1**

(*c*) The diagram shows a molecule of Vitamin C.



Complete the formula to show the number of each type of atom in this molecule.

C H O **1**

(3)

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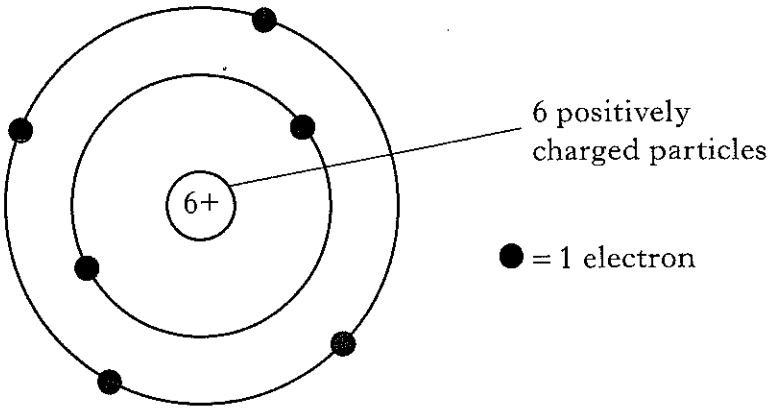
10. An atom can be represented by a simple diagram.

carbon



(*a*) Name the structure at the centre of an atom where the positively charged particles are found.

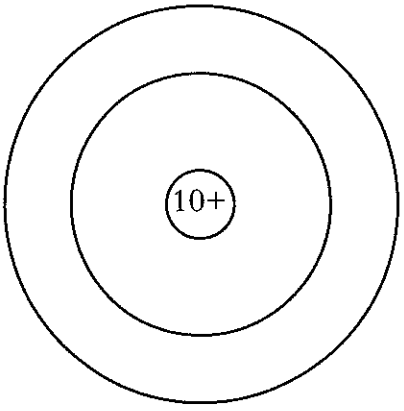
_____ 1

(*b*) (i) Complete the diagram below to show the structure of a neon atom.

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

(An additional diagram, if required, can be found on page 23.)

neon



1

(ii) Neon is found in Group 0 of the Periodic Table.

Name the family of elements to which neon belongs.

_____ 1

(3)

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

11. Crude oil and natural gas are fossil fuels.

(*a*) Fossil fuels are a finite resource.

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

_____ **1**

(*b*) (i) Describe how crude oil was formed.

_____

_____

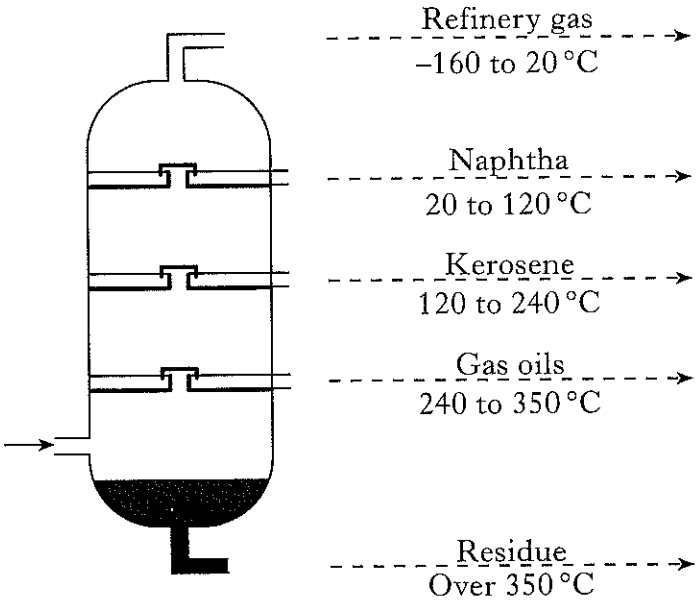
_____

_____

_____ **2**

(ii) The diagram shows fractional distillation of crude oil.

Fraction and boiling point range



Name the fraction which can be used to produce tar for roads.

_____ **1**

(*c*) Some sources of natural gas contain sulphur compounds.

Why are the sulphur compounds removed before the natural gas is used as a fuel?

_____

_____ **1**

(5)

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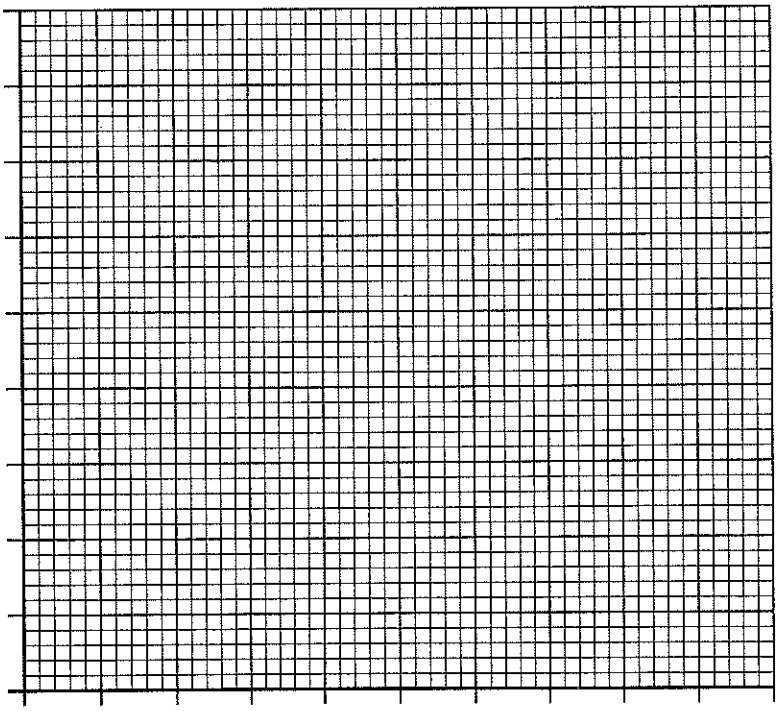
Marks	KU	PS

12. Nitrates are chemicals found in some foods.
The table shows the sources of nitrates in our diet.

Source of nitrates	%
green vegetables	45
water	20
milk	15
potatoes	10
other foods	10

(*a*) 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 23.)



2

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12. (continued)

Marks | KU | PS

(*b*) Nitrates are used as fertilisers as they contain the essential element nitrogen.

(i) Name **one** other essential element for plant growth.

_____ **1**

(ii) Suggest another property of nitrates which makes them suitable for use as fertilisers.

_____ **1**

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

Which part of the plant contains these bacteria?

_____ **1**

(5)

[Turn over

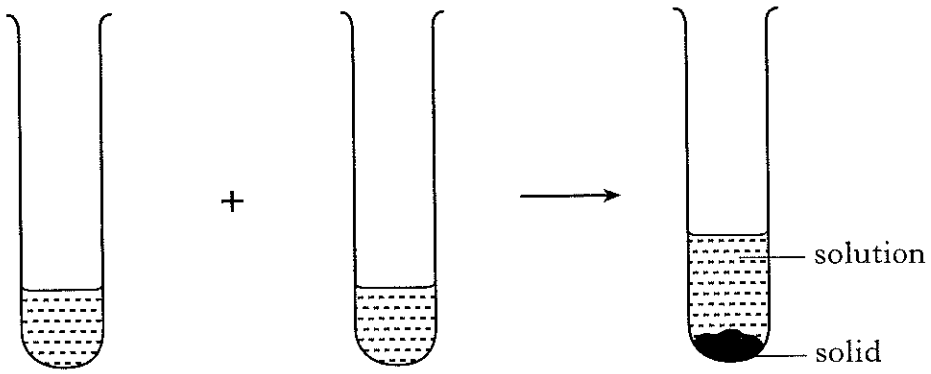
DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

13. (*a*) Name the elements present in lead nitrate.

_____ 1

(*b*) When lead nitrate solution and potassium iodide solution are mixed, a chemical reaction takes place.



lead nitrate solution

potassium iodide solution

(i) Name the solid formed in this reaction.

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

_____ 1

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

_____

_____

_____ 1

(3)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

14. The table contains information about the reaction of butene with some of the Group 7 elements.

Element	Speed of reaction
fluorine	explosive
chlorine	very fast
bromine	fast

(*a*) Predict the speed of the reaction when butene reacts with iodine.

_____ **1**

(*b*) Butene is an unsaturated hydrocarbon.

(i) Write the molecular formula for butene.

_____ **1**

(ii) Describe a chemical test, including the result, to show that butene is unsaturated.

_____

_____ **1**

(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

15. The elements found in Group 0 have many uses.

Helium is lighter than air and can be used in airships. Neon is used in advertising signs and the main use of argon is in light bulbs. Krypton can be used in certain types of lasers.

(*a*) Present this information as a table with suitable headings.

2

(*b*) Information on Group 0 elements is shown below.

Atomic number	2	10	18	36	54
Atomic size (nm)	0·49	0·51	0·88	1·03	1·24

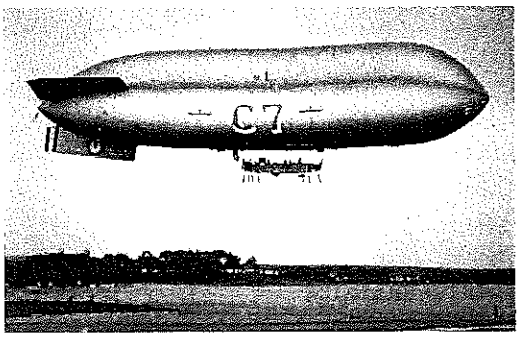
What happens to the atomic size as the atomic number increases?

_____

_____

1

(*c*) Hydrogen is another gas which is lighter than air and in the past was used in airships.



Suggest why hydrogen is no longer used in airships.

_____

1

(4)

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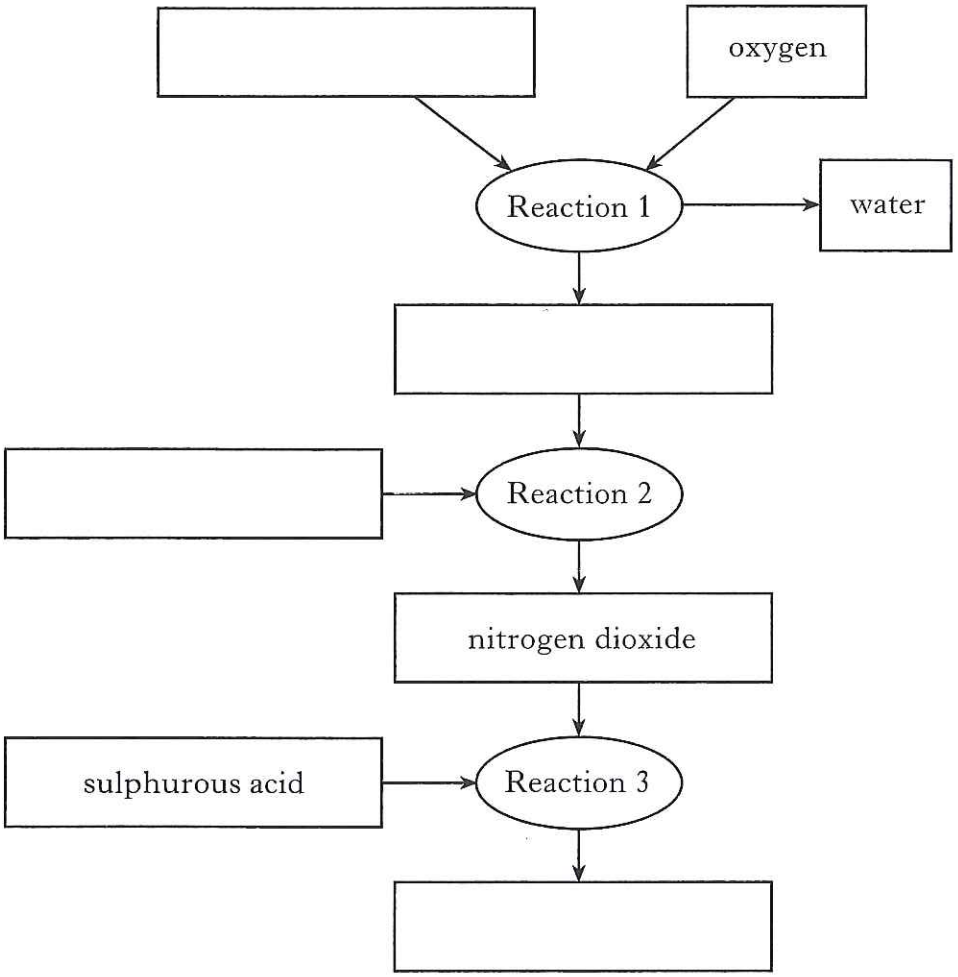
Marks	KU	PS

16. A method of making sulphuric acid

Ammonia reacts with **oxygen** to produce **nitrogen monoxide**. **Water** is also produced in the reaction. The **nitrogen monoxide** reacts with more **oxygen** to form **nitrogen dioxide**. **Sulphuric acid** is produced when the **nitrogen dioxide** reacts with **sulphurous acid**.

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



2

(*b*) Write the formula for nitrogen dioxide.

_____

1

(3)

[Turn over

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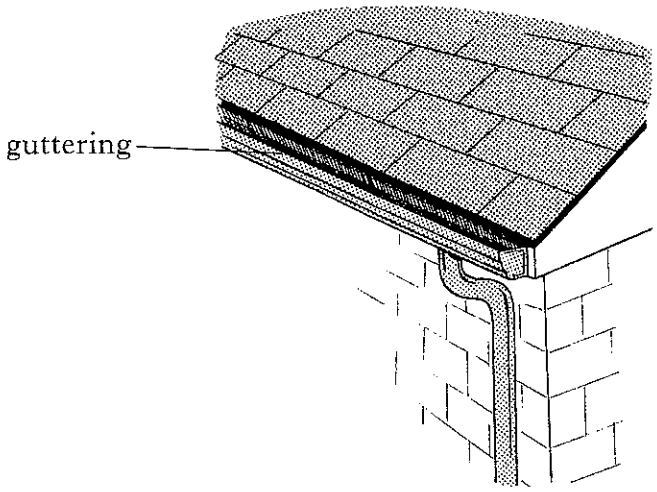
Marks	KU	PS

17. Guttering is used on the outside of houses to collect rain water and drain it away from the roof. Guttering can be made from plastic or iron.



(*a*) Suggest an advantage in using plastic instead of iron.

_____

_____ **1**

(*b*) Plastics are synthetic.

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

_____

_____ **1**

(*c*) Why are the fumes from burning plastics dangerous?

_____

_____ **1**

(3)

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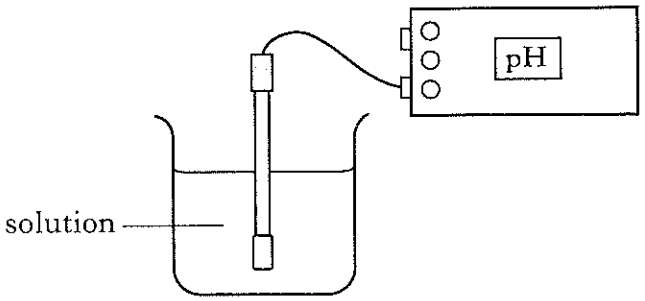
Marks | KU | PS

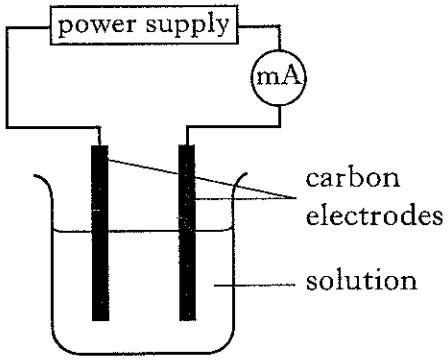
18. Michael set up the following experiments.

He tested nitric acid solutions of different concentrations.

Experiment 1



Experiment 2



His results are shown in the table.

Nitric acid solution	pH	Current/mA
A	1	380
B	2	120
C	3	20

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

_____ **1**

(*b*) Predict the current, in mA, for a nitric acid solution of pH4.

_____ **1**

(*c*) Suggest a factor that Michael should have kept constant in **Experiment 2** to make a fair comparison.

_____ **1**

(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

19. Maggie was advised not to wear a silver ring and a gold ring on the same finger. The sweat from her hand would act as an electrolyte and a cell would be set up.

(*a*) What is the purpose of an electrolyte in a cell?

_____

_____ **1**

(*b*) Circle the correct words to complete the sentence below.
You may wish to use page 7 of the data booklet to help you.

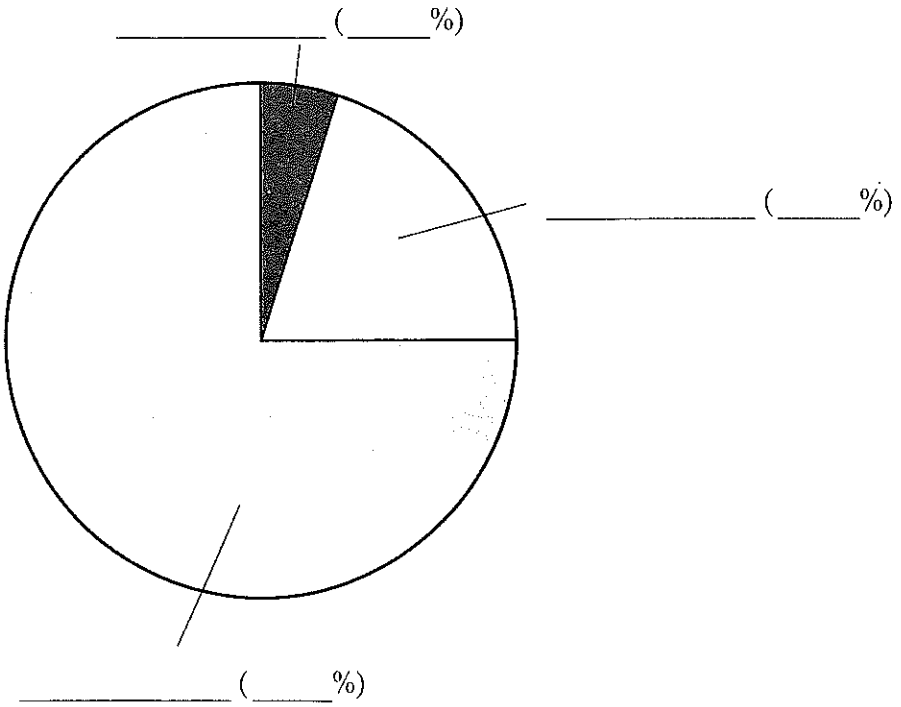
In the cell, electrons flow from the $\left\{\begin{matrix}\text{gold}\\\text{silver}\end{matrix}\right\}$ ring to the $\left\{\begin{matrix}\text{gold}\\\text{silver}\end{matrix}\right\}$ ring. **1**

(*c*) 18-carat gold is a mixture of gold with other metals.

(i) What name is given to a mixture of metals such as 18-carat gold?

_____ **1**

(ii) 18-carat gold contains 75% gold and 5% silver. The rest is copper.
Label the pie chart to show the name and percentage of each metal used to make 18-carat gold.
(An additional pie chart, if required, can be found on page 24.)



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[END OF QUESTION PAPER]

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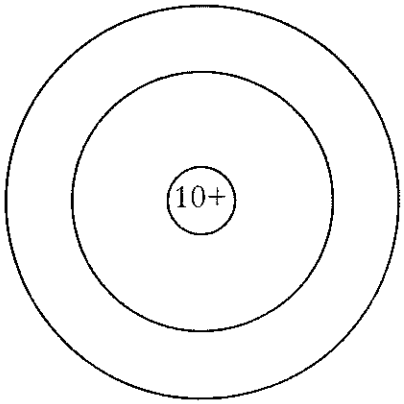
ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL DIAGRAM FOR QUESTION 10(*b*)(i)

neon



ADDITIONAL GRAPH PAPER FOR QUESTION 12(*a*)

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