FOR OFFICIAL USE

G

	KU	PS
Total Marks		

0500/401

NATIONAL QUALIFICATIONS 2001

THURSDAY, 24 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.

SCOTTISH

DO NOT WRITE IN THIS MARGIN

KU	PS

1. The symbols of some elements are shown below.
You may wish to use page 8 of the data booklet.

A Kr	B Po	C K
D P	E Pt	F Pb

(*a*) Identify the symbol for potassium.

A	B	C
D	E	F

(*b*) Identify the **two** elements discovered in the same year.

A	B	C
D	E	F

(*c*) Identify the element used as a catalyst in a catalytic converter.

A	B	C
D	E	F

[Turn over

DO NOT WRITE IN THIS MARGIN

KU	PS

2. Various reagents can be used to identify substances.

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

(*a*) Identify the reagent used to test for starch.

A
B
C
D
E

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

A
B
C
D
E

(*c*) Identify the reagent used to test for an unsaturated hydrocarbon.

A
B
C
D
E

DO NOT WRITE IN THIS MARGIN

KU	PS

3. Two families of hydrocarbons are alkanes and alkenes.

A propane	B hexene	C pentane
D pentene	E ethene	F propene

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

A	B	C
D	E	F

(*b*) Identify the **two** hydrocarbons with **three** carbon atoms in each molecule.

A	B	C
D	E	F

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

A	B	C
D	E	F

[Turn over

DO NOT WRITE IN THIS MARGIN

KU	PS

4. The grid shows the names of some metals.

A copper	B magnesium	C zinc
D brass	E sodium	F steel

(*a*) Identify the metal which is used to galvanise steel objects.

A	B	C
D	E	F

(*b*) Identify the metal which produces the yellow light in a street lamp.
You may wish to use page 4 of the data booklet.

A	B	C
D	E	F

(*c*) Identify the **two** alloys.

A	B	C
D	E	F

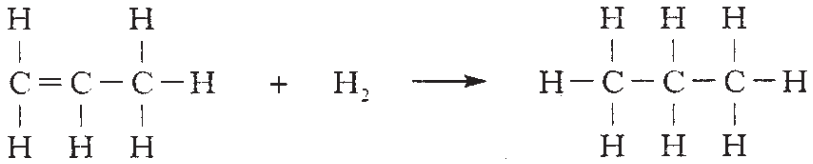
DO NOT WRITE IN THIS MARGIN

KU	PS

5. There are many types of chemical reaction.

A neutralisation	B addition	C electrolysis
D precipitation	E combustion	F displacement

(*a*) Identify the chemical reaction represented by this equation.



A	B	C
D	E	F

(*b*) Identify the chemical reaction which takes place when **acid rain** damages buildings made from carbonate rocks.

A	B	C
D	E	F

[Turn over

DO NOT WRITE IN THIS MARGIN

KU	PS

6. The grid shows the names of some gases.

A methane	B ammonia	C carbon monoxide
D carbon dioxide	E nitrogen	F oxygen

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

A	B	C
D	E	F

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

A	B	C
D	E	F

(*c*) Identify the gas used up by plants during photosynthesis.

A	B	C
D	E	F

(*d*) Identify the **two** gases which combine in the air during lightning storms.

A	B	C
D	E	F

DO NOT WRITE IN THIS MARGIN

KU	PS

7. Gold and silver are both used to make jewellery.
Identify the statement(s) which are true for **both** gold **and** silver.

A	They are **not** transition metals.
B	They conduct electricity.
C	They are found uncombined in the Earth's crust.
D	They react with dilute hydrochloric acid.
E	They are more reactive than copper.

A
B
C
D
E

[Turn over

DO NOT WRITE IN THIS MARGIN

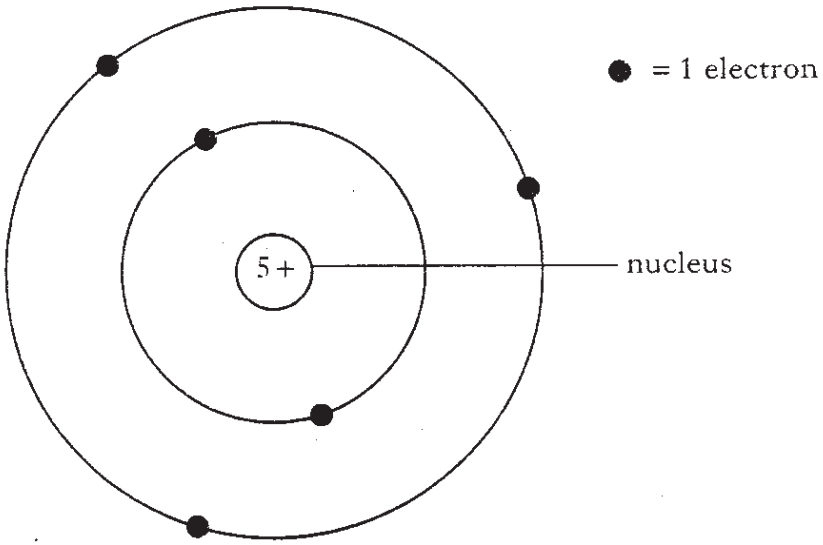
Marks | KU | PS

PART 2

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

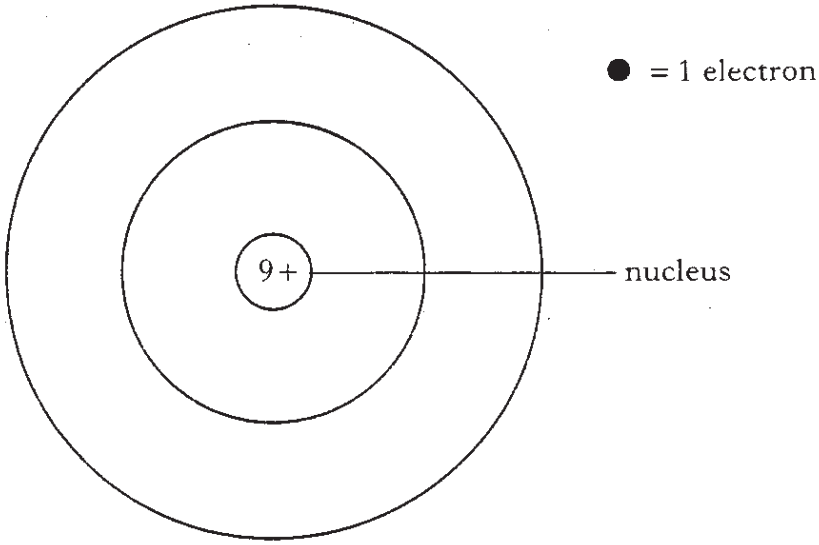
8. The structure of an atom can be represented in a simple diagram.

boron



(*a*) Complete the diagram below to show the structure of a fluorine atom. You may wish to use page 1 of the data booklet.

fluorine



1

(*b*) Why are atoms neutral?

_____

_____

_____ 1

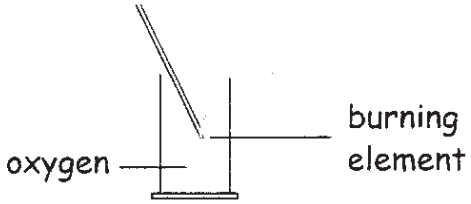
(2)

DO NOT WRITE IN THIS MARGIN

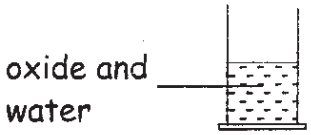
Marks | KU | PS

9. Mr Clarke carried out an experiment with different elements.
The workcard shows what he did.

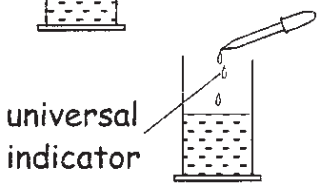
Burn element in oxygen.



Add water to the oxide formed.



Add universal indicator.



Compare the colour of the indicator with a pH chart.

(*a*) (i) Complete the table showing the results Mr Clarke would have obtained.

Name of oxide	pH of solution
carbon dioxide	
sodium oxide	
aluminium oxide	could not be measured

1

(ii) Suggest a reason why the pH of aluminium oxide could not be measured.
You may wish to use page 5 of the data booklet.

_____

_____

1

(*b*) Write an equation, using symbols and formulae, for the reaction between sodium and oxygen.
(There is no need to balance the equation.)

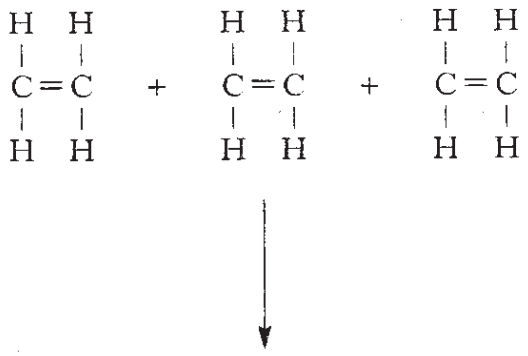
1

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

10. Addition polymers, like poly(ethene), are made from small unsaturated monomers.

(*a*) Draw a section of poly(ethene), showing 3 monomer units joined together.



1

(*b*) Poly(ethene) has many uses because it can be easily shaped when warmed. What term is used to describe this property?

_____

1

_____

DO NOT WRITE IN THIS MARGIN

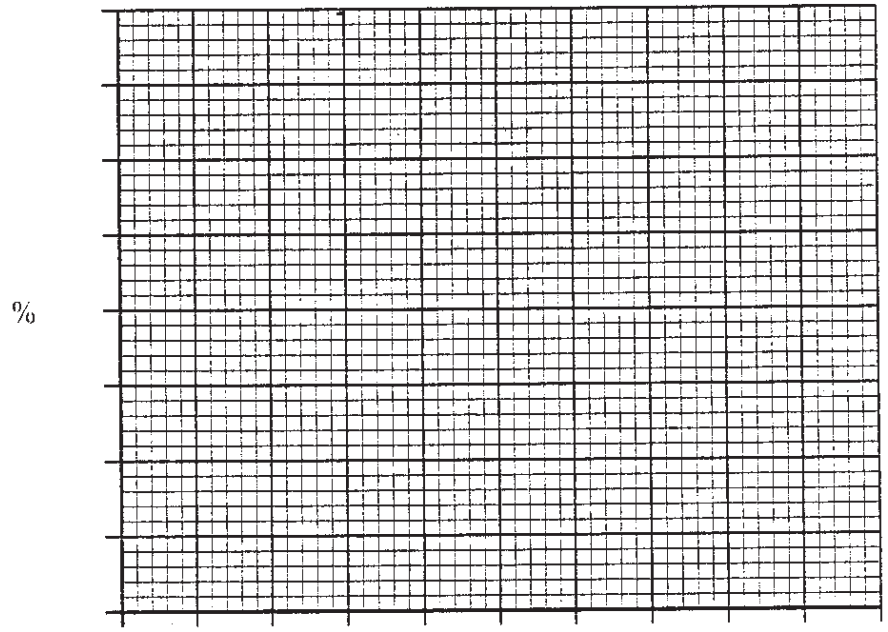
Marks | KU | PS

10. (continued)

(*c*) The table shows some of the uses of poly(ethene).

Use	%
pipes	10
films	14
blow moulding	8
injection moulding	28
other uses	40

Draw a bar chart to show this information.
(*Use appropriate scales to fill most of the graph paper.*)
(Additional graph paper, if required, can be found on page 25.)



2

(4)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

11. Over 2 million tonnes of sulphuric acid are made in the UK every year.

(*a*) The main reaction involves the conversion of sulphur dioxide to sulphur trioxide using a catalyst.

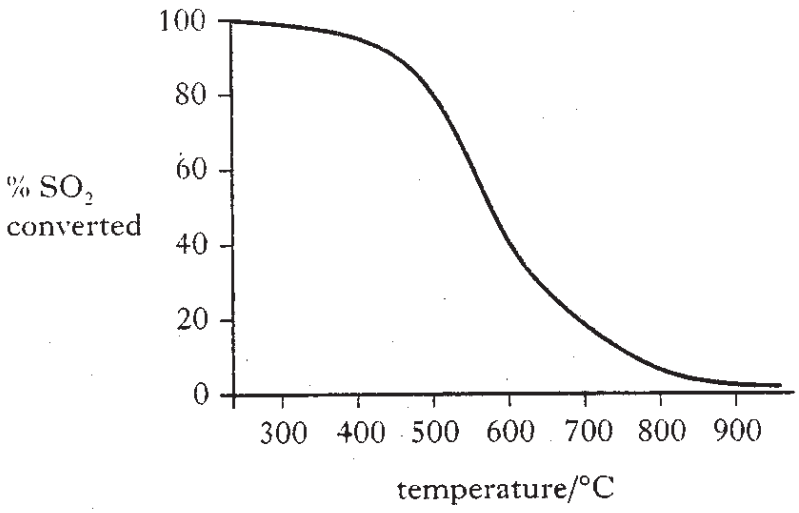
$$\text{sulphur dioxide} + \text{oxygen} \xrightarrow{\text{catalyst}} \text{sulphur trioxide}$$

Why is a catalyst used?

_____

_____ **1**

(*b*) The graph shows the percentage of sulphur dioxide (SO_2) which can be converted to sulphur trioxide at different temperatures.



Describe the trend shown by the graph.

_____

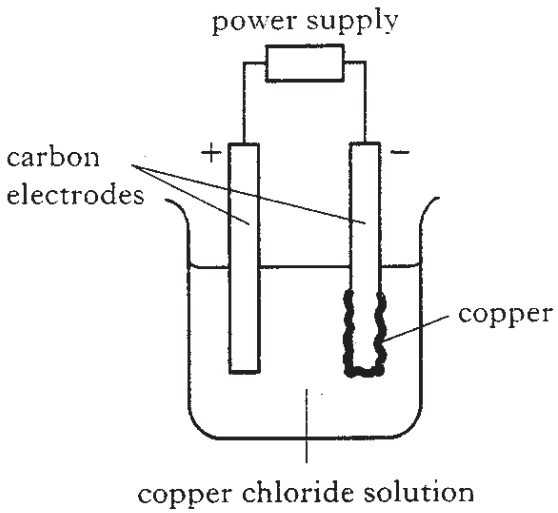
_____

_____ **1**

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

12. Martin set up the following experiment.



(*a*) What type of experiment did Martin carry out?

_____ **1**

(*b*) Why does copper form at the negative electrode?

_____

_____

_____ **1**

(*c*) What would be seen happening at the positive electrode?

_____

_____ **1**

(*d*) Carbon is unreactive and insoluble in water.
Give another reason why it is suitable for use as electrodes.

_____

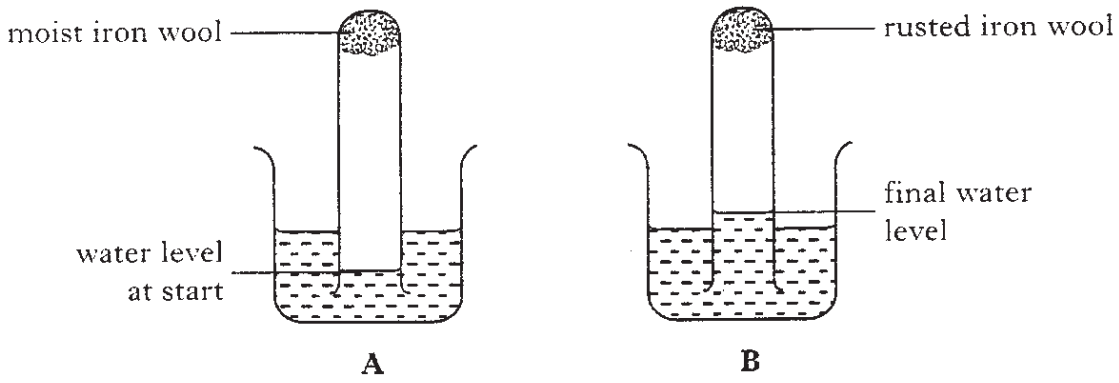
_____ **1**

(4)

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

13. Maureen set up the experiment shown in diagram **A**.
She noticed that the water stopped rising in the test tube when **one fifth** of the air had been used up as shown in diagram **B**.



(*a*) Which gas in air is used up during rusting?

_____ **1**

(*b*) Maureen set up another experiment using a larger piece of moist iron wool.
How would the final water level compare with that shown in diagram **B**?

_____

_____ **1**

(*c*) Write the formula for the iron ion formed during rusting.

_____ **1**

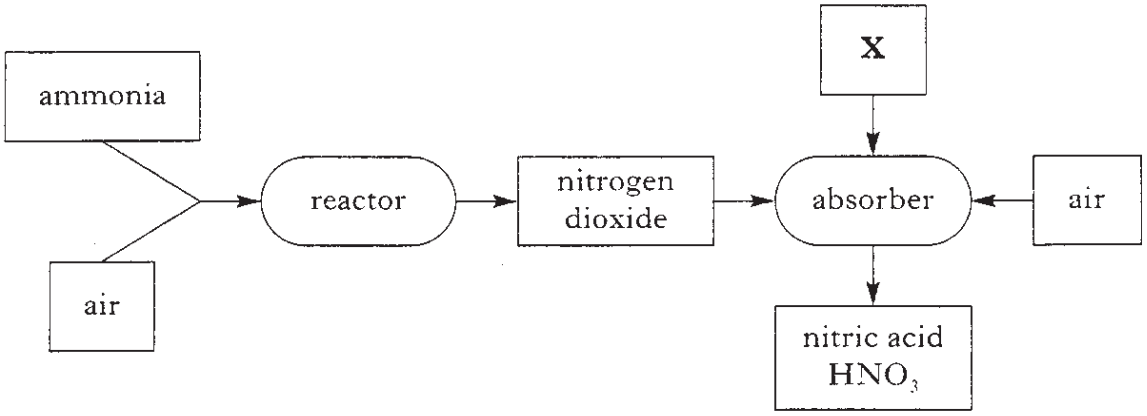
(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

14. (*a*) The flow diagram shows how ammonia is converted to nitric acid.



(i) Name the industrial process used to manufacture nitric acid.

_____

_____ **1**

(ii) Name substance **X**.

_____ **1**

(*b*) Ammonia and nitric acid react together to form ammonium nitrate. Give a use for ammonium nitrate.

_____

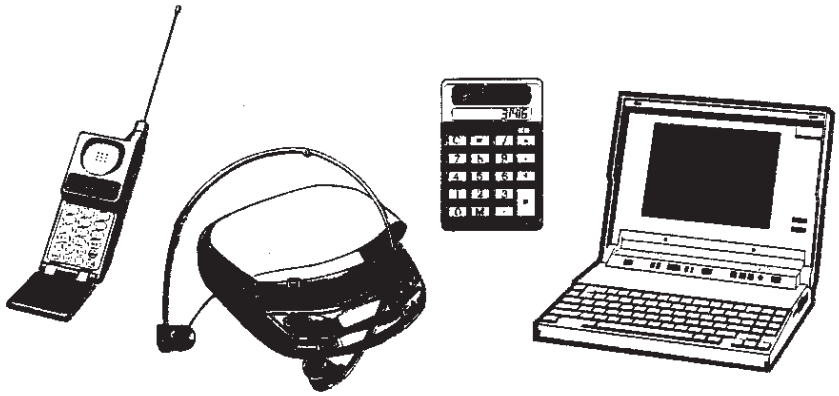
_____ **1**

(3)

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

15. Batteries can be used to power everyday items.
A battery is a number of cells joined together.



(*a*) (i) What happens inside a battery to produce electricity?

_____

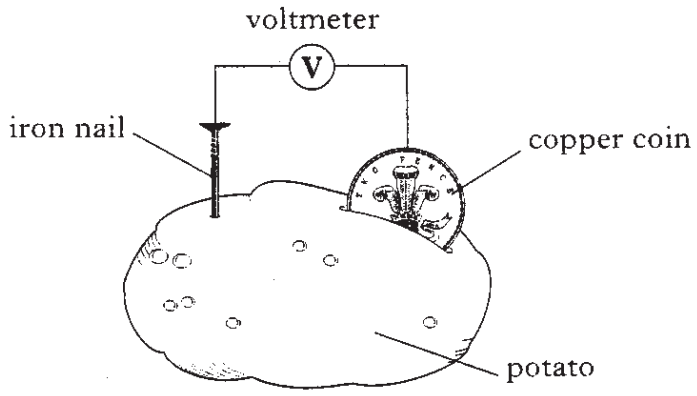
_____ 1

(ii) Suggest an advantage in using a battery rather than mains electricity.

_____

_____ 1

(*b*) 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 voltage if the iron nail was replaced with aluminium foil?
You may wish to use page 7 of the data booklet.

_____

_____ 1

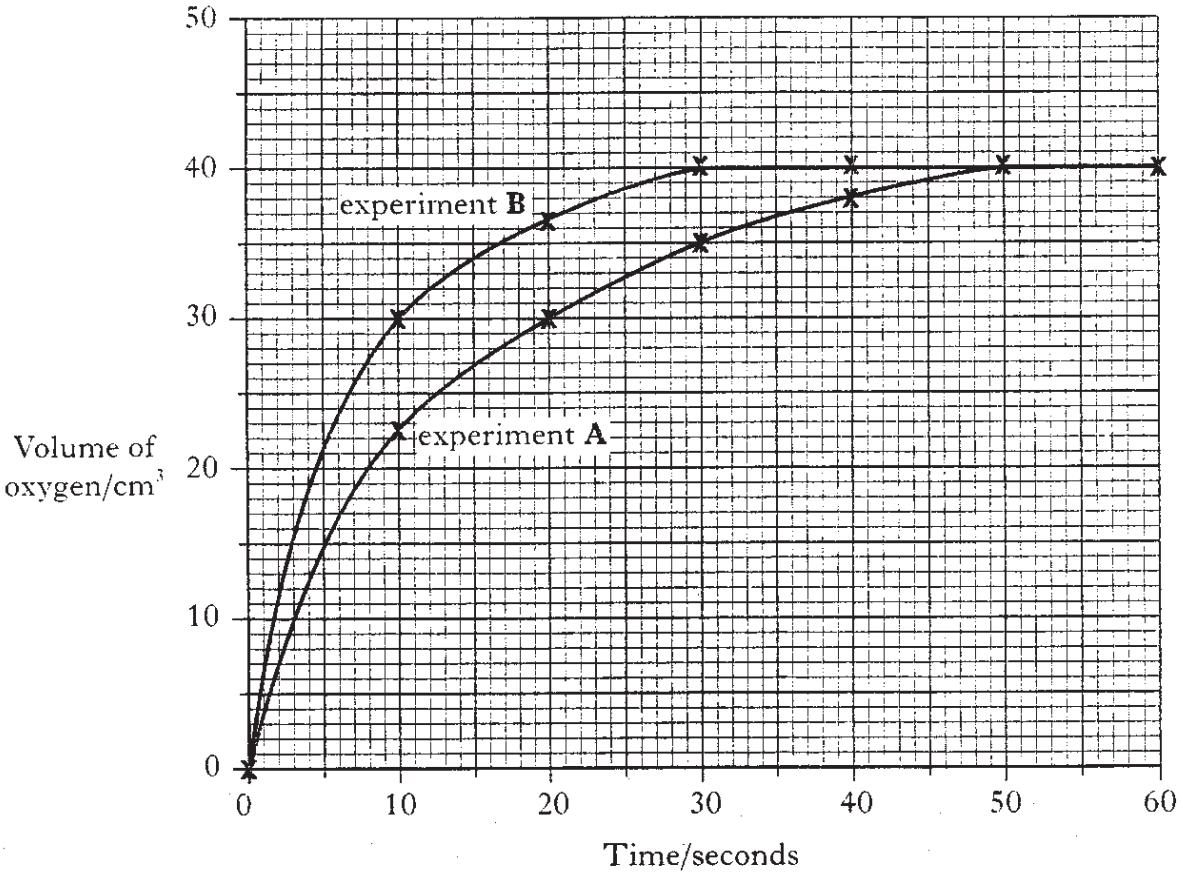
(4)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

16. Sam added manganese dioxide to hydrogen peroxide solution and measured the volume of oxygen produced.

Her results for two experiments at different temperatures are shown below.



(*a*) What volume of oxygen was collected in experiment **A**?

_____ cm^3 **1**

(*b*) The same volume and concentration of hydrogen peroxide was used in both experiments **A** and **B**.

How can you tell this from the graph?

_____

_____

_____

_____ **1**

WRITE IN THIS MARGIN

Marks	KU	PS

16. (continued)

(*c*) At the start, experiment **B** was faster than experiment **A**.
How can you tell this from the graph?

_____

_____

_____

_____ **1**

(*d*) 0·2 g of the catalyst, manganese dioxide, was present at the start of experiment **A**.
What mass of catalyst would be left at the end of the experiment?

_____ g **1**

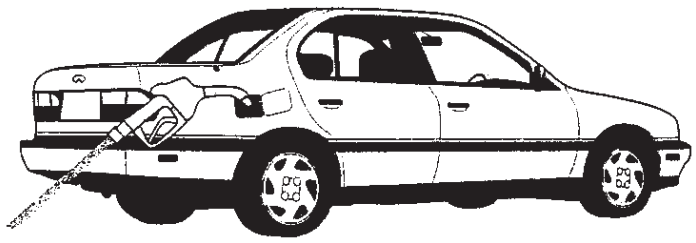
(4)

[Turn over

WRITE IN THIS MARGIN

Marks	KU	PS

17. Petrol and lubricating oil are mixtures of hydrocarbons which are used in cars.



(*a*) Name the process used to separate the hydrocarbons in crude oil.

_____

_____ **1**

(*b*) Petrol has a lower viscosity (it flows more easily) than lubricating oil. Which has the lower boiling point, petrol or lubricating oil?

_____

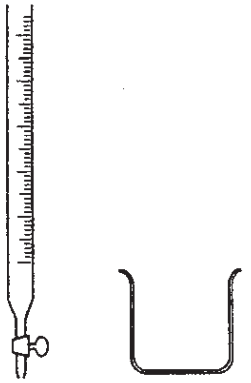
_____ **1**

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

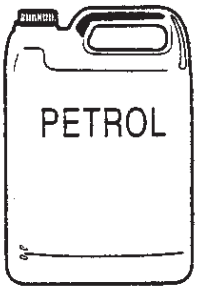
17. (continued)

(*c*) Using the apparatus shown below, describe how you would compare the viscosity of petrol with the viscosity of lubricating oil.



burette

beaker



timer

2		
(4)		

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

18. (*a*) The elements in group 7 exist as **diatomic** molecules.

(i) What is meant by diatomic?

_____

_____

_____ **1**

(ii) What type of bonding is present in a diatomic molecule?

_____ **1**

(*b*) Information on group 7 elements is shown in the table.

Name	Atomic number	Boiling point/°C
fluorine	9	−188
chlorine	17	−35
bromine	35	59
iodine	53	184
astatine	85	

(i) What happens to the boiling point as the atomic number increases?

_____

_____

_____ **1**

(ii) Predict the boiling point of astatine.

_____ °C **1**

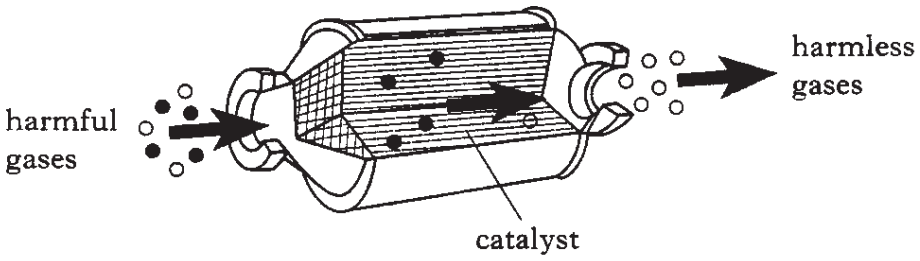
(4)

[END OF QUESTION PAPER]

DO NOT WRITE IN THIS MARGIN

	Marks	KU	PS

19. Many cars are fitted with catalytic converters. They change harmful gases produced in the engine into harmless gases.



(*a*) Oxides of nitrogen react with carbon monoxide in the converter.
Name the **two** harmless gases produced.

_____ **1**

(*b*) Name a metal which is used as a catalyst in a catalytic converter.

_____ **1**

(*c*) State another way of reducing pollution from a petrol engine.

_____

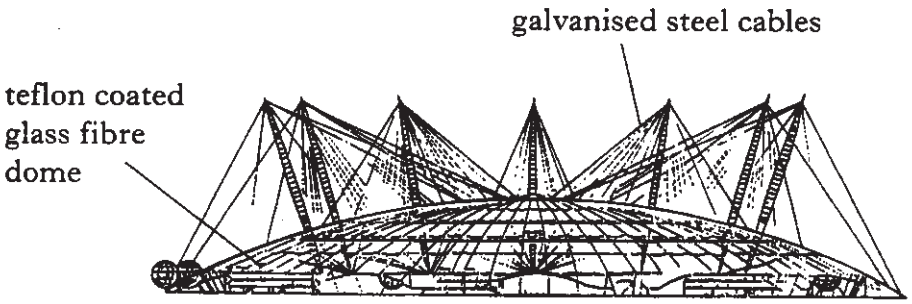
_____ **1**

(3)

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

20. The Millennium Dome is one of the largest exhibition centres in the world. The diagram shows some of the materials used in its construction.



(*a*) Which metal is used to galvanise the steel cables?

_____ **1**

(*b*) Teflon is a brand name for the plastic poly(tetrafluoroethene).

(i) Name the type of chemical reaction used to make plastics.

_____ **1**

(ii) Name the monomer used to make poly(tetrafluoroethene).

_____ **1**

(3)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

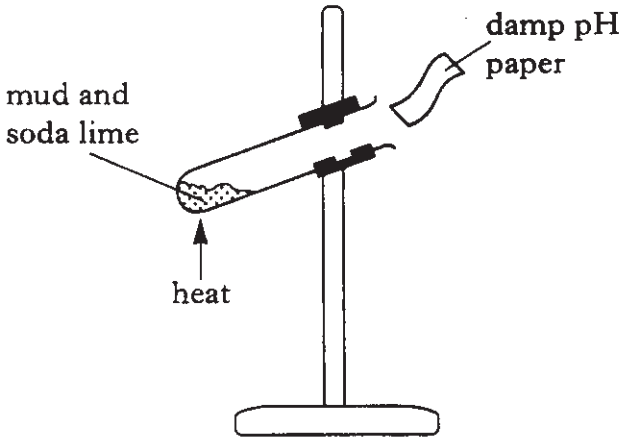
21. The analysis of salts is important in forensic science.
Salts connected with certain occupations are shown below.

Occupation	Salt(s)
plasterer	calcium sulphate
farmer	ammonium nitrate ammonium sulphate

(*a*) A forensic scientist carried out a flame test on some powder scraped from a plasterer's work clothes.
What colour of flame would have been seen?
You may wish to use page 4 of your data booklet.

_____ **1**

(*b*) A crime suspect was thought to have been in a field on which a farmer had recently sprayed ammonium fertiliser.
The forensic scientist heated mud from the suspect's shoe with an alkali called soda lime. She tested to see if ammonia gas was given off.



How would she know if ammonia gas was produced?

_____

_____ **1**

(2)

[*END OF QUESTION PAPER*]