FOR OFFICIAL USE

Section B | Total Marks |

X012/101

NATIONAL QUALIFICATIONS 2006

TUESDAY, 30 MAY
9.00 AM – 10.30 AM

CHEMISTRY INTERMEDIATE 1

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

Necessary data will be found in the Chemistry Data Booklet for Intermediate 1 and Access 3 (2002 Edition).

Section A – Questions 1–20 (20 marks)

Instructions for completion of **Section A** are given on page two.

For this section of the examination you must use an **HB pencil**.

Section B (40 marks)

All questions should be attempted.

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.**

Rough work, if any should be necessary, should be written in this book, and then scored through when the fair copy has been written. If further space is required, a supplementary sheet for rough work may be obtained from the invigilator.

Additional space for answers will be found at the end of the book. If further space is required, supplementary sheets may be obtained from the invigilator and should be inserted inside the **front** cover of this booklet.

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 QUALIFICATIONS AUTHORITY

Read carefully

1 Check that the answer sheet provided is for **Chemistry Intermediate 1 (Section A)**.

2 For this section of the examination you must use an **HB pencil** and, where necessary, an eraser.

3 Check that the answer sheet you have been given has **your name**, **date of birth**, **SCN** (Scottish Candidate Number) and **Centre Name** printed on it.

Do not change any of these details.

4 If any of this information is wrong, tell the Invigilator immediately.

5 If this information is correct, **print** your name and seat number in the boxes provided.

6 The answer to each question is **either** A, B, C or D. Decide what your answer is, then, using your pencil, put a horizontal line in the space provided (see sample question below).

7 There is **only one correct** answer to each question.

8 Any rough working should be done on the question paper or the rough working sheet, **not** on your answer sheet.

9 At the end of the exam, put the **answer sheet for Section A inside the front cover of this answer book**.

Sample Question

To show that the ink in a ball-pen consists of a mixture of dyes, the method of separation would be

A chromatography

B fractional distillation

C fractional crystallisation

D filtration.

The correct answer is **A**—chromatography. The answer **A** has been clearly marked in **pencil** with a horizontal line (see below).

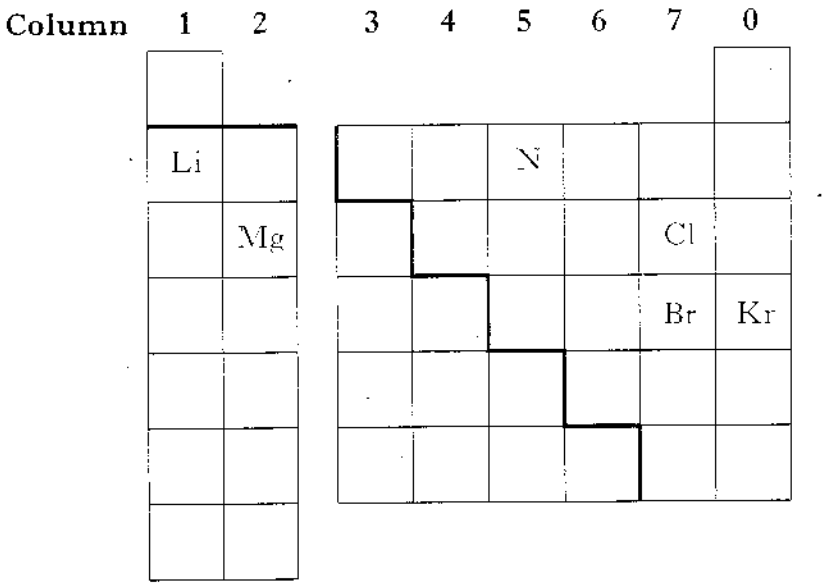
Changing an answer

If you decide to change your answer, carefully erase your first answer and using your pencil, fill in the answer you want. The answer below has been changed to **D**.

SECTION A

This section of the question paper consists of 20 multiple-choice questions.

1. The diagram shows part of the Periodic Table.



Which **two** elements show similar chemical properties?

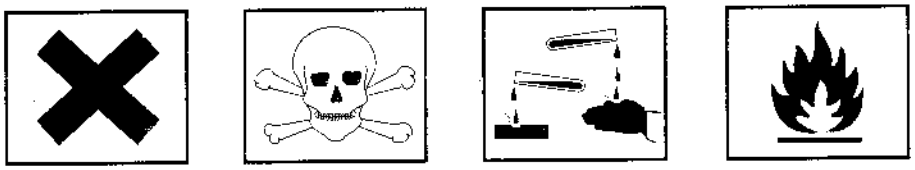
A Cl and Br

B Li and N

C Li and Mg

D Br and Kr

2. Which hazard label would be used to show that a drain cleaner was corrosive?



A B C D

[Turn over

3. Which of the following **always** occurs when a chemical reaction takes place?

A A gas is produced.

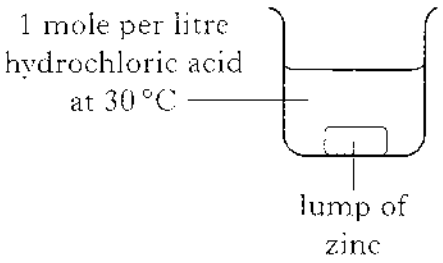
B A precipitate is formed.

C A new substance is formed.

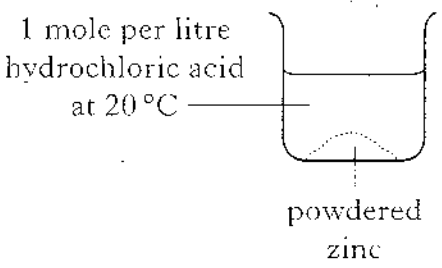
D A colour change takes place.

4. In which of the following experiments will the reaction be **slowest**?

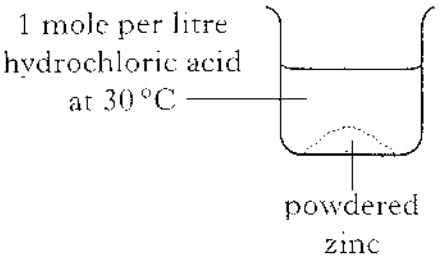
A



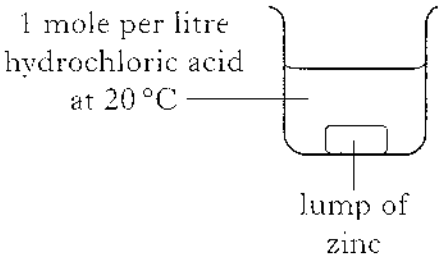
B



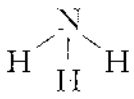
C



D



5. The diagram below shows an ammonia molecule.



Which of the following statements correctly describes an ammonia molecule?

A Atoms held together by weak bonds

B Atoms held together by strong bonds

C Ions held together by weak bonds

D Ions held together by strong bonds

6. The pH value of an acidic solution is always

A 5

B 7

C less than 7

D greater than 7.

7. The pH of a solution can be measured using

A Benedict's solution

B Universal indicator

C iodine solution

D limewater.

8. A bee sting is acidic.

Which of the following substances can neutralise a bee sting?

A Baking soda

B Lemon juice

C Soda water

D Vinegar

9. Which gas is produced when magnesium carbonate reacts with hydrochloric acid?

A Chlorine

B Hydrogen

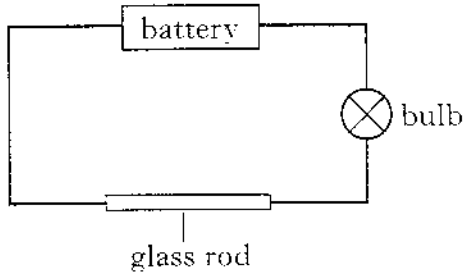
C Carbon dioxide

D Carbon monoxide

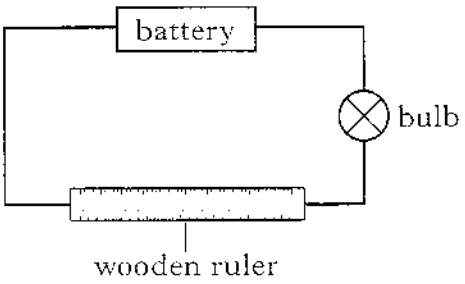
[Turn over

10. In which of the following circuits would the bulb light?

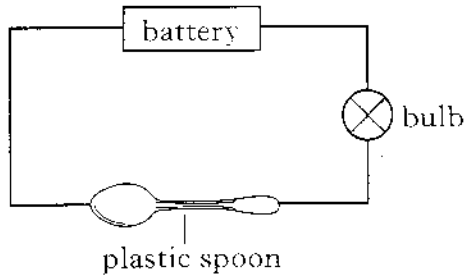
A



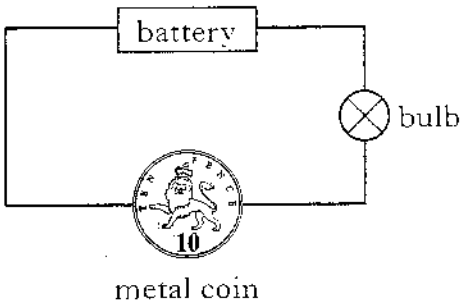
B



C



D



11. Which of the following is an alloy?

A Brass

B Copper

C Gold

D Silver

12. Which of the following substances is **not** a fossil fuel?

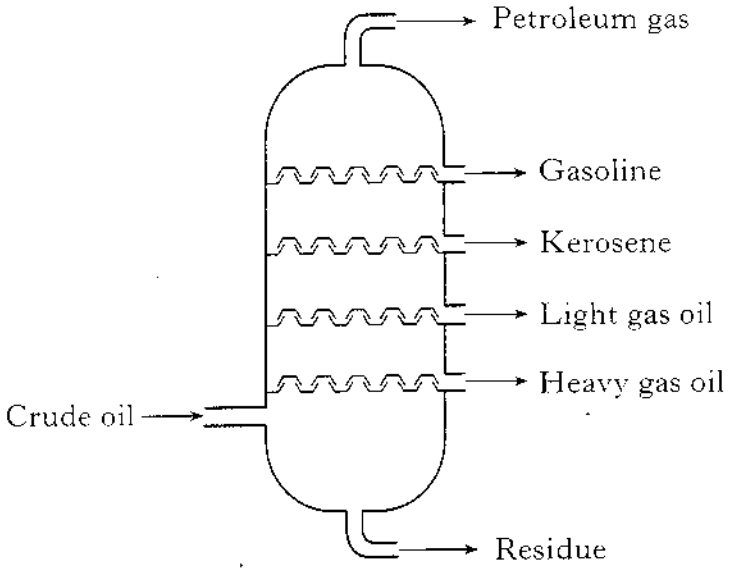
A Coal

B Hydrogen

C Natural gas

D Peat

13. The following diagram shows the fractions obtained by distillation of crude oil in an oil refinery.



Compared with light gas oil

A gasoline has smaller molecules and is more flammable

B gasoline has larger molecules and is more flammable

C gasoline has smaller molecules and is less flammable

D gasoline has larger molecules and is less flammable.

14. Why are fertilisers used by gardeners?

A To control pests

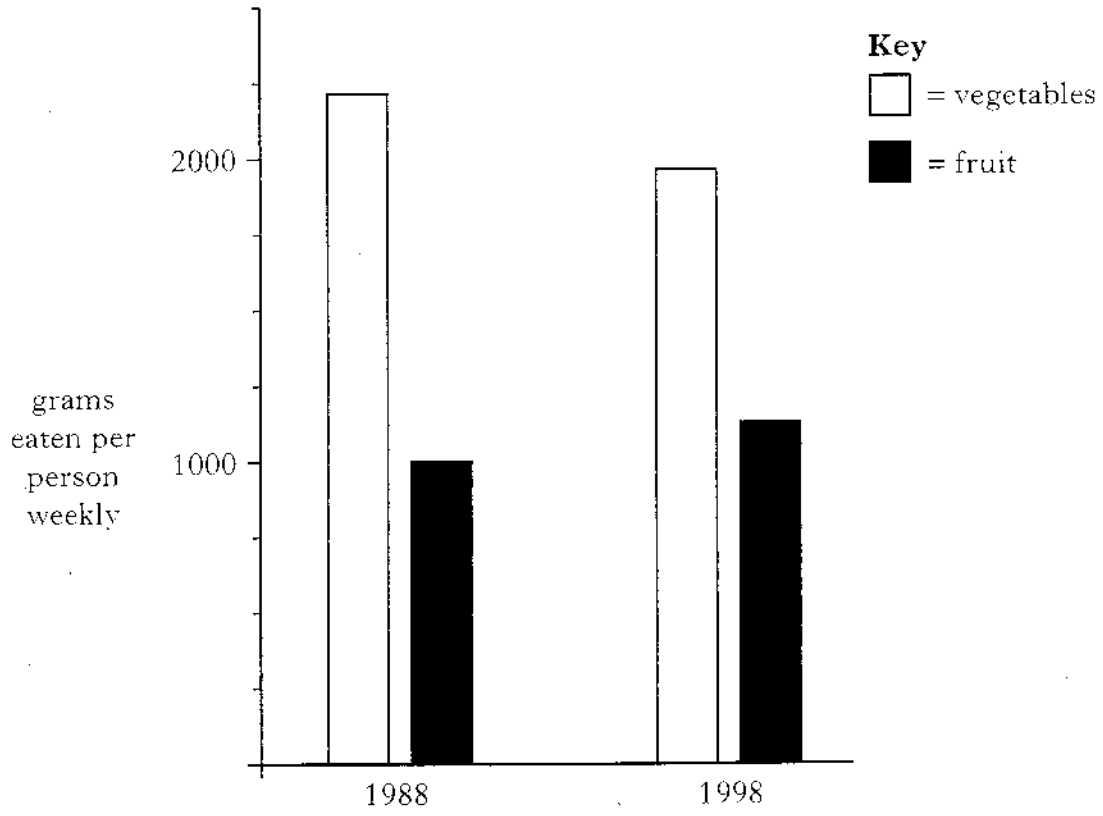
B To kill bacteria and fungi

C To restore essential elements

D To control weeds

[Turn over

15.



Compared with 1988, in 1998 people ate

A more vegetables and less fruit

B more vegetables and more fruit

C less vegetables and less fruit

D less vegetables and more fruit.

16. What percentage of body weight is water?

A Less than 30%

B Approximately 40%

C Approximately 50%

D More than 60%

17. Calcium is required for healthy bones and teeth.

The body gets calcium from

A fats

B proteins

C minerals

D carbohydrates.

18. Fats are a more concentrated source of energy than carbohydrates.

Which of the following foods would provide the most energy?

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

A Bread

B Butter

C Jam

D Milk

19. The results of tests carried out on a piece of food are shown in the table.

Food test	Result
Rubbing food on filter paper	oily mark
Iodine test	stays brown
Benedict's test	stays blue
Heating with soda lime	alkaline gas produced

The food contained

A fat and protein

B fat and glucose

C starch and glucose

D starch and protein.

20. A drug is a substance which

A alters the flavour of food

B alters the way the body works

C provides material for body growth and repair

D provides the body with a source of energy.

Candidates are reminded that the answer sheet MUST be returned INSIDE this answer book.

[Turn over for Section B on *Page ten*

DO NOT WRITE IN THIS MARGIN

Marks

SECTION B

40 marks are available in this section of the paper.

All answers must be written clearly and legibly in ink.

1. The modern Periodic Table lists the known elements.
It is based on a table by the Russian scientist Dmitri Mendeleev.

(*a*) Name an element which is liquid at room temperature.

_____ 1

(*b*) Mendeleev left spaces in his table for elements which had not yet been discovered. He predicted the properties of an unknown element which he named eka-silicon.

This element has atomic number 32.

Part of the modern Periodic Table is shown.

Dmitri Mendeleev, Russian Scientist, 1834–1907

5 **B** 2·34	6 **C** 2·25
13 **Al** 2·7	14 **Si** 2·33
31 **Ga** 5·9	32 **Ge**
49 **In** 7·31	50 **Sn** 7·28
81 **Tl** 11·8	82 **Pb** 11·3

Atomic number

Symbol

Density in density units

(i) What is the modern name for eka-silicon?
(You may wish to use page 1 of the data booklet to help you.)

_____ 1

(ii) Suggest a value for the density of eka-silicon.

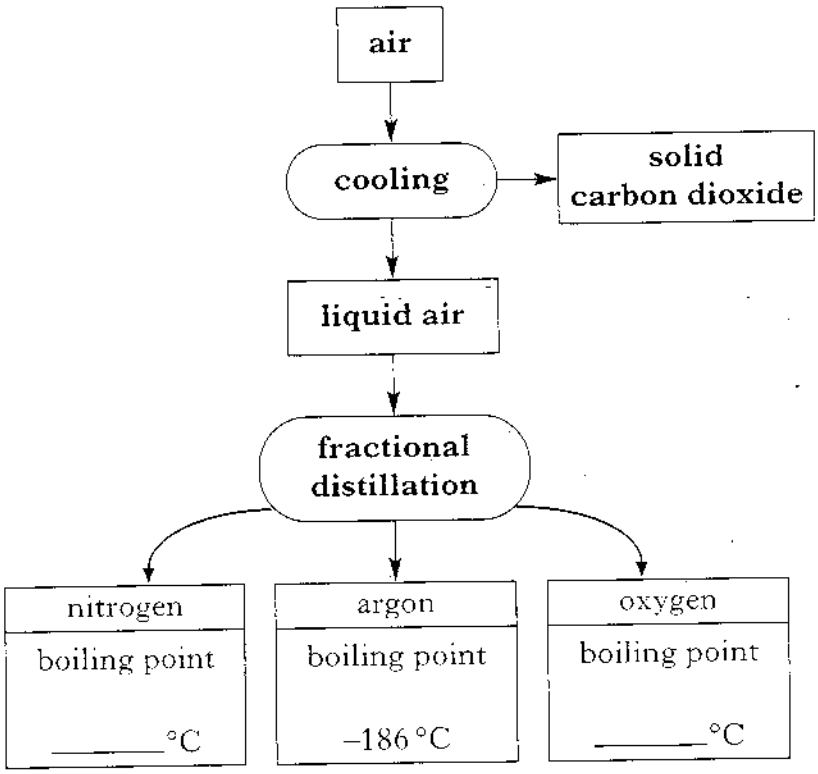
_____ density units 1

(3)

DO NOT WRITE IN THIS MARGIN

Marks

2. Air is a mixture of gases. The flow chart shows how these gases can be separated.



(*a*) (i) Complete the flow chart by writing the boiling points of nitrogen and oxygen.
(You may wish to use page 3 of the data booklet to help you.) **1**

(ii) Why can nitrogen, argon and oxygen be separated by fractional distillation?

_____

_____ **1**

(*b*) What is the symbol for argon?
(You may wish to use page 1 of the data booklet to help you.)

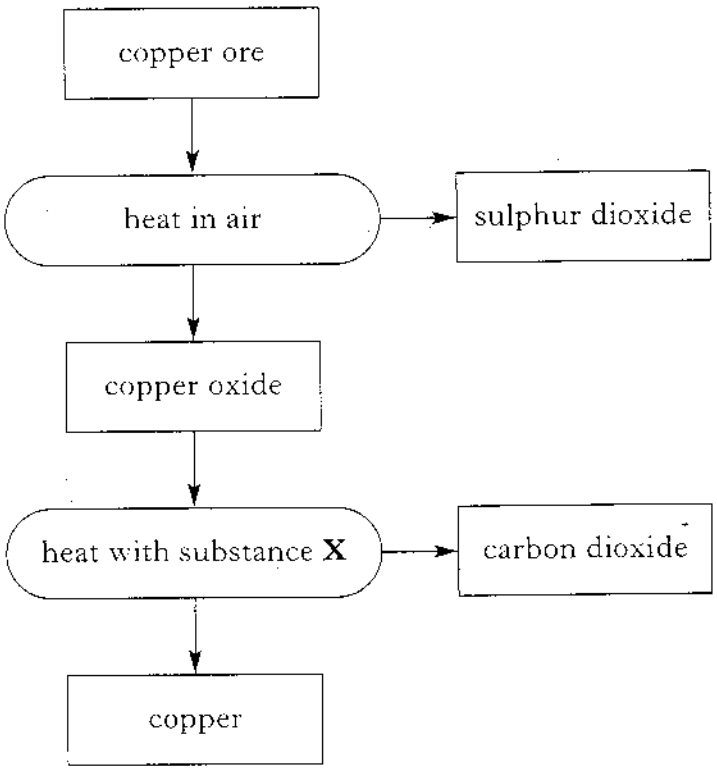
_____ **1**

(3)

[Turn over

Marks

3. The flow chart shows how copper can be extracted from a copper ore.



(*a*) When copper ore is heated, sulphur dioxide is produced.

(i) Write the formula for sulphur dioxide.

_____ **1**

(ii) Sulphur dioxide gas will dissolve in water in the air.
What type of solution will be formed?

_____ **1**

(*b*) Name substance **X**.

_____ **1**

(*c*) A copper ore contains 1% copper.
Calculate the mass of copper which can be extracted from 150 tonnes of this ore.

_____ tonnes **1**

(4)

Marks

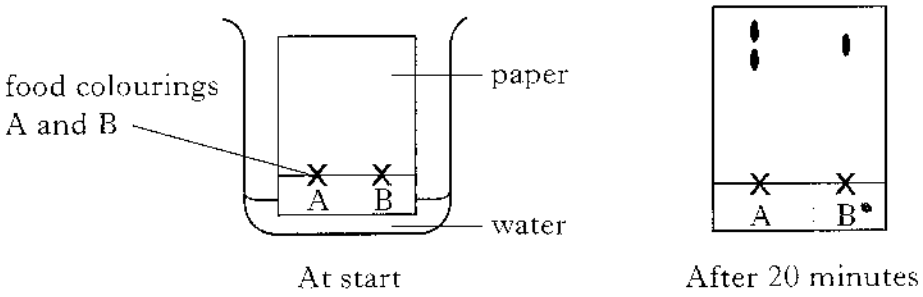
4. Food additives include preservatives and food colourings.

(*a*) Why are preservatives used?

_____

_____ **1**

(*b*) Food colourings can be a single dye or a mixture of dyes. The following experiment was carried out using food colourings A and B.

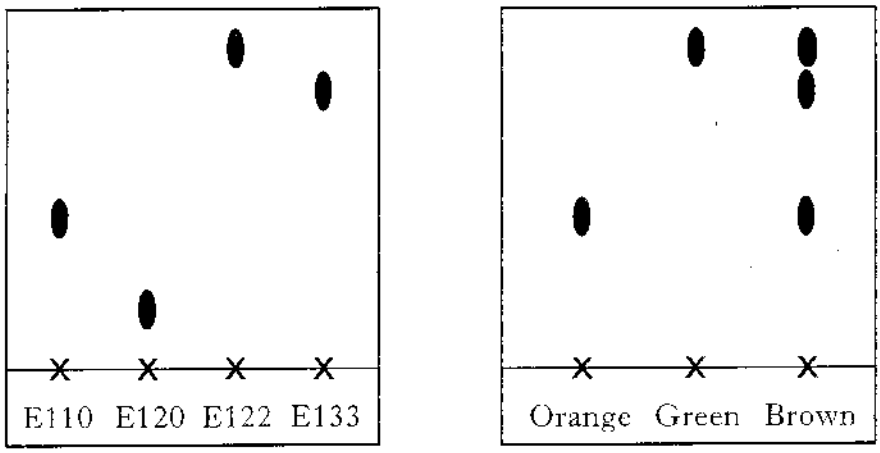


At start After 20 minutes

As the water moved up the paper, the dyes moved up with it.

The experiment showed that food colouring A was a mixture of dyes. Food colouring B was only one dye.

A similar experiment was carried out to identify the E-numbered dyes in three different food colourings.



Dyes Food colours

(i) Which food colouring is a mixture of dyes?

_____ **1**

(ii) Which food colouring contains **only** dye E122?

_____ **1**

(3)

DO NOT WRITE IN THIS MARGIN

Marks

5. In the **PPA "Factors which affect Lathering"** one factor which is investigated is the volume of detergent used.

The table shows the height of lather obtained when different numbers of drops of detergent were used.

Number of drops of detergent	Height of lather in centimetres		
	First experiment	Second experiment	Average
1	0·3	0·1	0·2
2	0·4	0·2	
3	0·5	1·0	0·75

(*a*) Calculate the average height of lather when two drops of detergent are used.

1

(*b*) Complete the conclusion for this experiment.

As the number of drops of detergent increases, the height of lather _____ .

1

(*c*) Write down **one** other factor which could affect lathering.

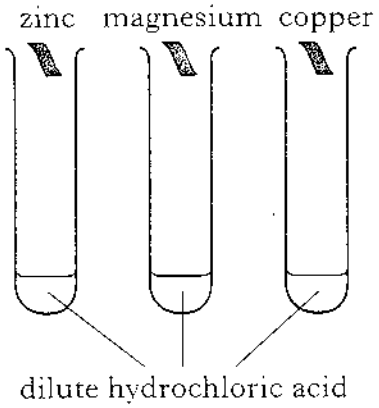
_____

1

(3)

Marks

6. In the **PPA "Reactions of Metals with Acids"** a student added different metals to dilute hydrochloric acid.



(*a*) Name the gas produced when metals react with dilute hydrochloric acid.

_____ **1**

(*b*) During the experiment the student made the following notes:

Zinc—the acid started to fizz.
Magnesium—more bubbles than with zinc.
Copper—nothing happened.

Use these notes to complete the table by identifying each metal.

Metal	Bubbles of gas produced?	Reaction speed
	no	no reaction
	yes	fast
	yes	medium

1

(*c*) Why can metals be placed in order of reactivity by comparing the speed at which they react with acid?

_____

_____

_____ **1**

(*d*) What hazard does wearing safety glasses protect the students from in this PPA?

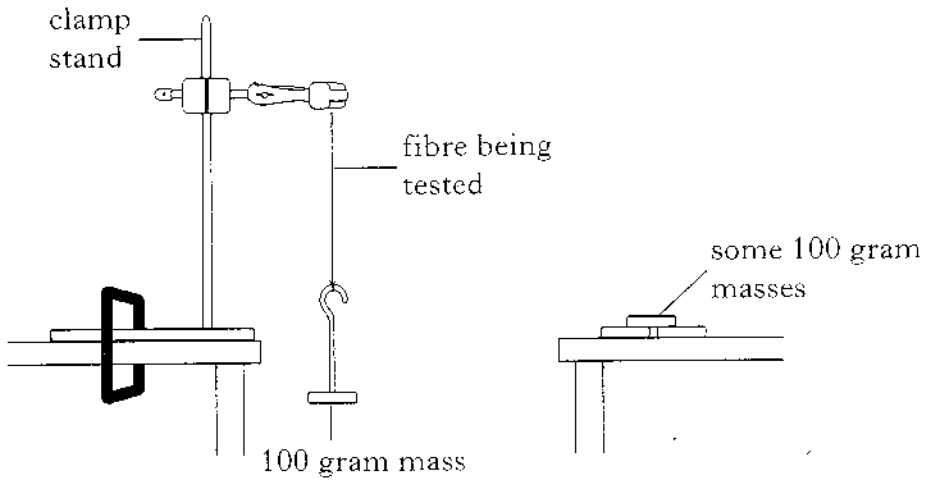
_____

_____ **1**

(4)

Marks

7. A student used the apparatus shown to investigate the strength of some fibres.



(*a*) Describe how the experiment could be carried out to find the mass needed to break a fibre. 1

(*b*) The table shows the mass needed to break each fibre.

Fibre	Natural or synthetic	Mass held in grams
silk		700
polyester	synthetic	1200
cotton	natural	600
wool	natural	200
nylon	synthetic	1400

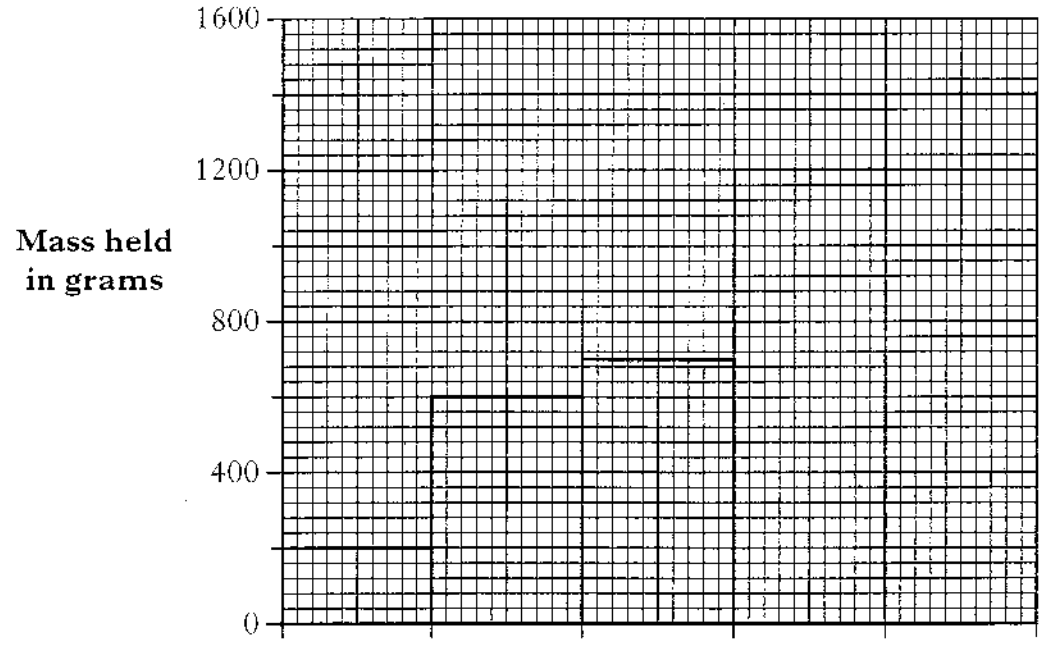
(i) Complete the table for silk. 1

DO NOT WRITE IN THIS MARGIN

Marks

7. (*b*) (continued)

(ii) Use the table to complete the labelling of the bar chart below by naming each fibre.



1

(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks

8. The table gives the word equations for some chemical reactions.

Word equation	**Type of chemical reaction**
hydrocarbon + oxygen → carbon dioxide + water	_____
starch + water → glucose	hydrolysis
glucose → _____ + carbon dioxide	fermentation

(*a*) In the table:

(i) name the type of chemical reaction which occurs when a hydrocarbon reacts with oxygen; **1**

(ii) complete the word equation for fermentation. **1**

(*b*) Which chemical test would show that glucose is formed in the hydrolysis reaction?

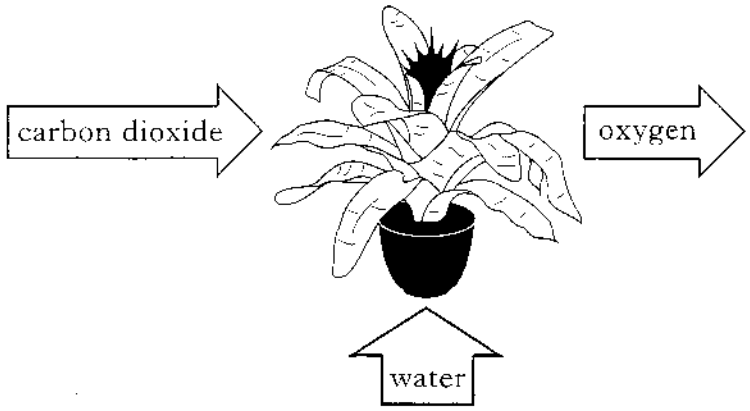
_____ **1**

(3)

DO NOT WRITE IN THIS MARGIN

Marks

9. In daylight plants give off oxygen gas.



(*a*) Name the process that takes place in green plants in daylight.

_____ 1

(*b*) State the test for oxygen gas.

_____

_____ 1

(*c*) Plants contain a green substance which absorbs light energy. Name the green substance.

_____ 1

(3)

[Turn over

Marks

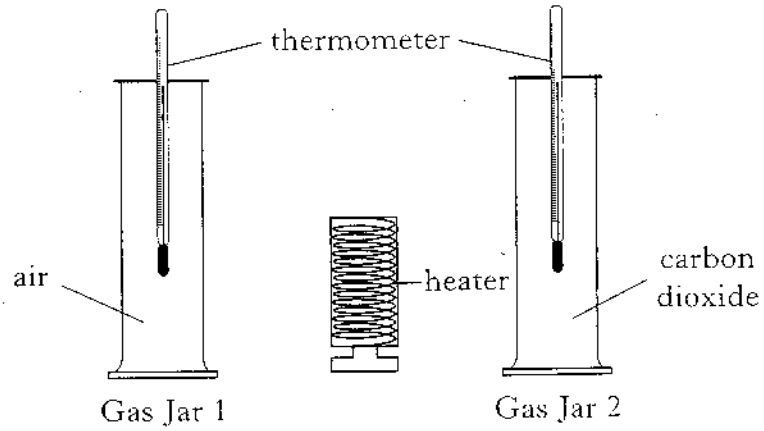
10. The level of carbon dioxide in the atmosphere has increased in recent years.

(*a*) Give a reason why the level of carbon dioxide has increased.

_____

_____ 1

(*b*) It is suggested that increased levels of carbon dioxide in the atmosphere are linked to global warming. An experiment to show the effect of carbon dioxide was set up.



(i) State **one** factor which must be kept the same to keep the experiment fair.

_____

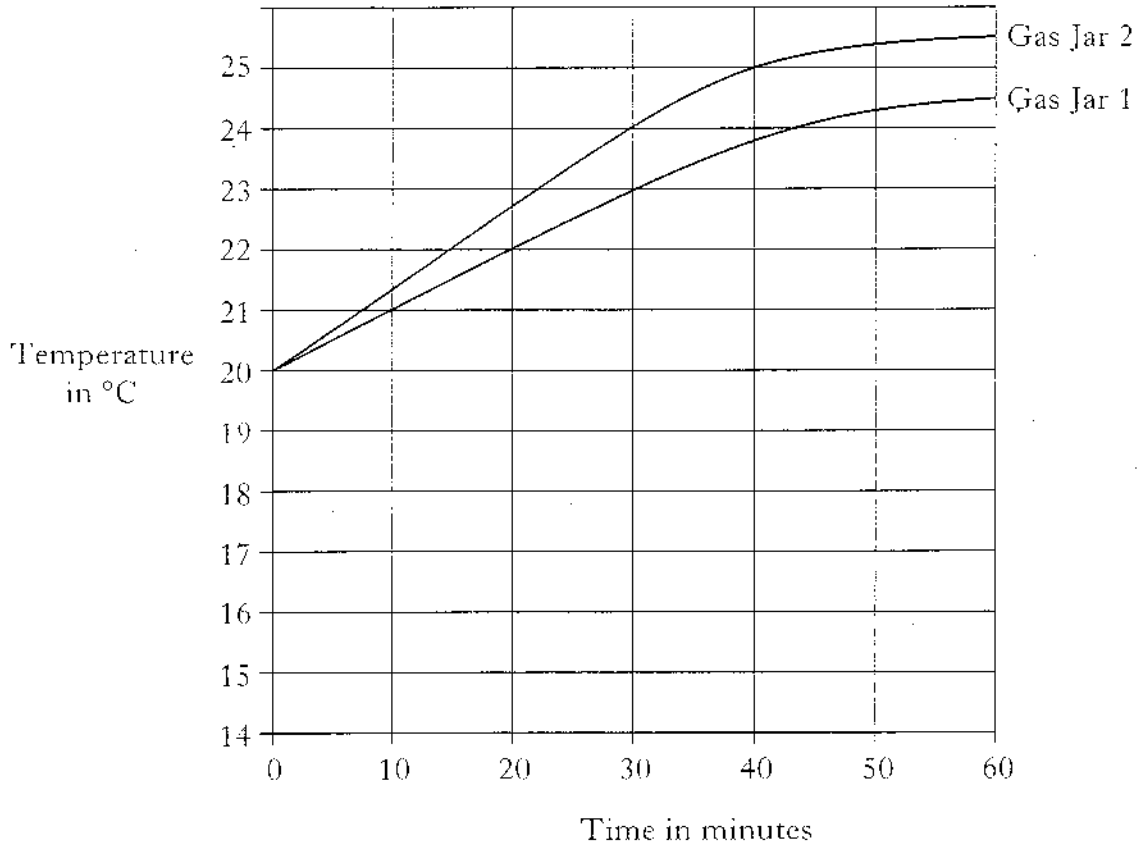
_____

_____ 1

Marks

10. (*b*) (continued)

(ii) The results from the experiment are shown on the following graph.



What is the temperature rise in the gas jar containing carbon dioxide at 40 minutes?

_____ °C 1

(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks

11. Large unwanted hydrocarbon molecules from crude oil are changed into smaller more useful molecules.

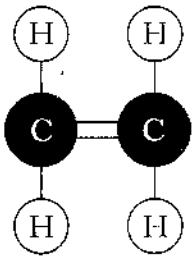
(*a*) (i) Name the process used to do this.

_____ **1**

(ii) Aluminium oxide can be used to speed up the reaction.
What do we call a substance which speeds up a chemical reaction?

_____ **1**

(*b*) A molecule of ethene is shown below.



What is the formula for ethene?

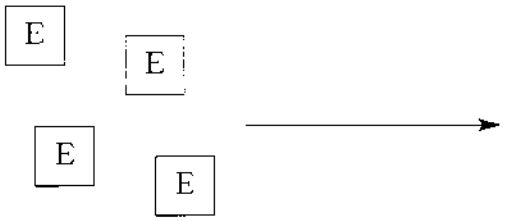
_____ **1**

(*c*) Ethene can be used to make the polymer, poly(ethene).

(i) What term can be used to describe small molecules, such as ethene, which are used to make polymers?

_____ **1**

(ii) Complete the diagram to show how ethene molecules form poly(ethene).



ethene molecules part of a poly(ethene) molecule **1**

(5)

DO NOT WRITE IN THIS MARGIN

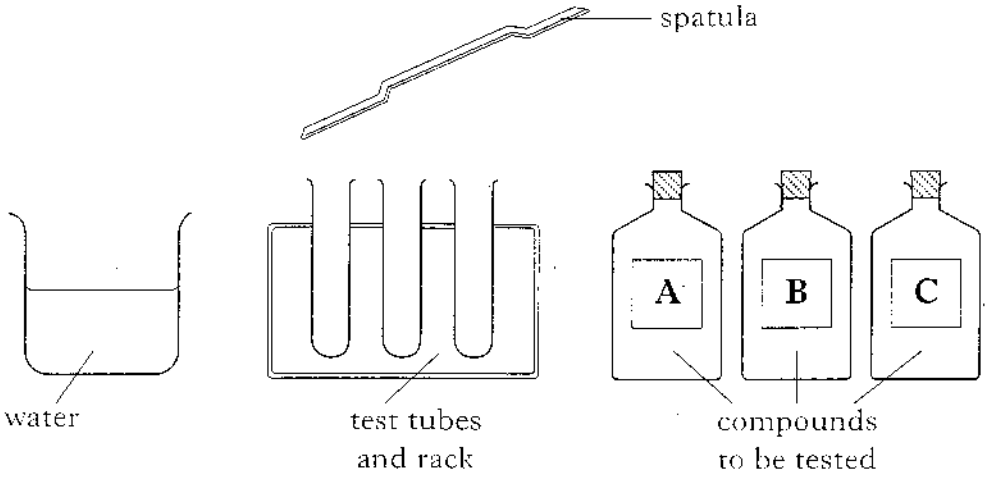
Marks

12. Nitrogen and phosphorus are two of the elements essential for healthy plant growth.

(*a*) Name another element essential for healthy plant growth.

_____ **1**

(*b*) In a **PPA** compounds are tested to see if they are suitable for use as fertilisers. The equipment below is used.



(i) Describe an experiment you would carry out to show if compounds A, B and C are suitable as fertilisers.

_____

_____

_____

_____ **1**

(ii) How would you know from the results of your experiment, if a compound is suitable as a fertiliser?

_____

_____

_____ **1**

(3)

[END OF QUESTION PAPER]

[Turn over