

FOR OFFICIAL USE

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Section B Total Marks

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**X012/10/02**

NATIONAL MONDAY, 14 MAY  
QUALIFICATIONS 1.00 PM – 2.30 PM  
2012

CHEMISTRY  
INTERMEDIATE 1

Fill in these boxes and read what is printed below.

Full name of centre

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Town

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Forename(s)

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Surname

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Date of birth

Day Month Year

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Scottish candidate number

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Number of seat

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

**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.



## 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 examination, 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**.



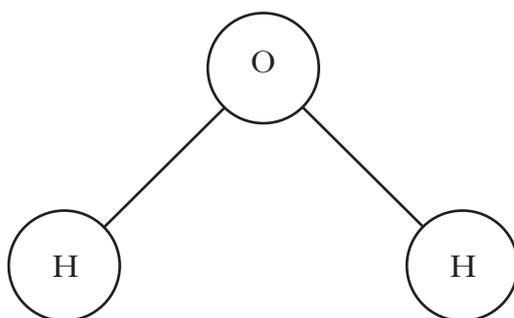
## SECTION A

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

1. Which of the following **always** occurs when a chemical reaction takes place?
- A A gas is produced.
  - B A precipitate is formed.
  - C A colour change takes place.
  - D A new substance is formed.
2. Which line in the table correctly describes what happens if 1 gram of a catalyst is involved in a chemical reaction?

	Speed of reaction	Mass of catalyst left at end in grams
A	faster	1
B	unchanged	1
C	faster	0
D	unchanged	0

3. The diagram below shows a water molecule.



Which of the following statements correctly describes this 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

**[Turn over**

4. The table shows information about four compounds.

Compound	Solubility in water	Conductivity when molten
1	soluble	conducts
2	soluble	does not conduct
3	insoluble	conducts
4	insoluble	does not conduct

Which of the following statements is correct?

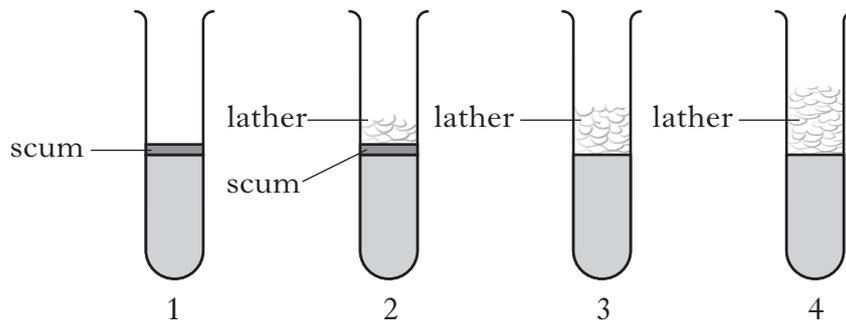
- A Compounds **1** and **2** are ionic.
  - B Compounds **3** and **4** are ionic.
  - C Compounds **1** and **3** are ionic.
  - D Compounds **2** and **4** are ionic.
5. The formula for dinitrogen tetroxide is

- A  $\text{N}_2\text{O}_3$
- B  $\text{N}_2\text{O}$
- C  $\text{NO}_2$
- D  $\text{N}_2\text{O}_4$ .

6. The pH of a solution can be measured using

- A Benedict's solution
- B Universal indicator
- C iodine solution
- D limewater.

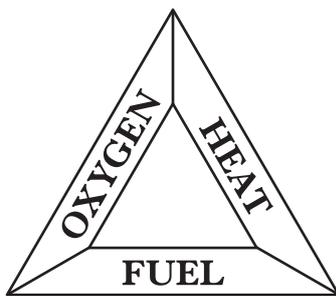
7. A student shook samples of hard water with different cleaning chemicals. The results are shown below.



In which **two** test tubes was soapless detergent used?

- A 1 and 2  
B 2 and 3  
C 3 and 4  
D 1 and 4
8. Cleaning chemicals remove oil and grease stains from clothes by
- A cracking the oil and grease  
B boiling off the oil and grease  
C neutralising the oil and grease  
D breaking the oil and grease into tiny droplets.
9. Which of the following contain only **natural** fibres?
- A Cotton and silk  
B Polyester and silk  
C Cotton and nylon  
D Polyester and nylon
10. For safety reasons, fabrics used to make nightdresses are specially treated. This type of treatment makes the nightdresses
- A stain proof  
B flameproof  
C waterproof  
D hard wearing.

11. In which of the following reactions is oxygen used up?
- A Combustion
  - B Neutralisation
  - C Photosynthesis
  - D Polymerisation
12. Which **two** substances react together inside a car engine to produce a poisonous gas?
- A Hydrogen and oxygen
  - B Hydrogen and water
  - C Nitrogen and water
  - D Nitrogen and oxygen
13. Which of the following substances is a monomer?
- A Styrene
  - B Perspex
  - C Kevlar
  - D Bakelite
14. The triangle shows that a fuel, oxygen and heat are needed for a fire.



Spraying water on a bonfire puts out the fire by

- A soaking up the fuel
- B preventing oxygen getting to the fuel
- C lowering the temperature of the fuel
- D providing carbon dioxide to put out the fire.

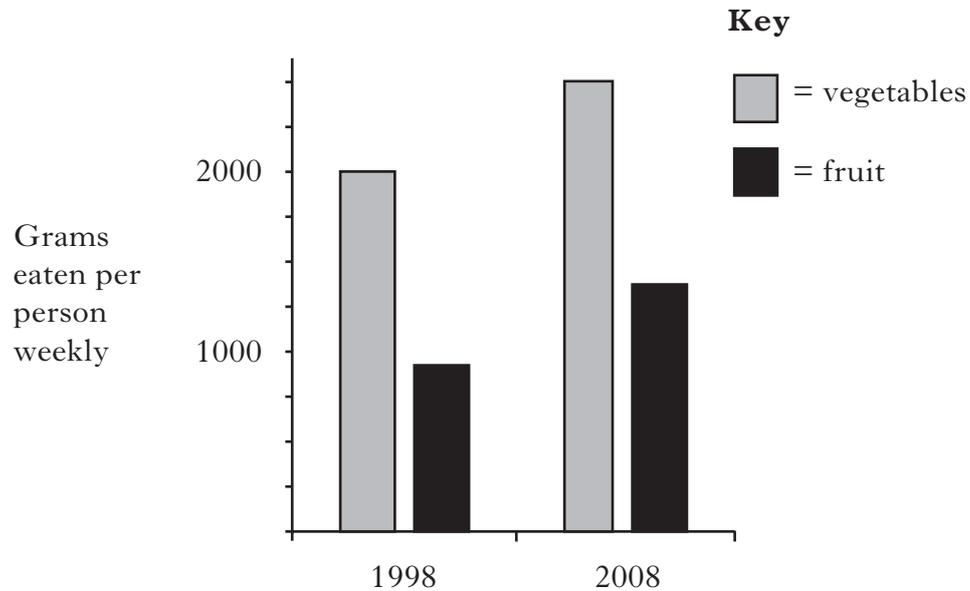
15. Which statement about pesticides is **false**?

- A They are toxic.
- B They kill weeds.
- C They control pests.
- D They improve crop yield.

16. Which of the following plants do **not** have root nodules?

- A Beans
- B Carrots
- C Clover
- D Peas

17.

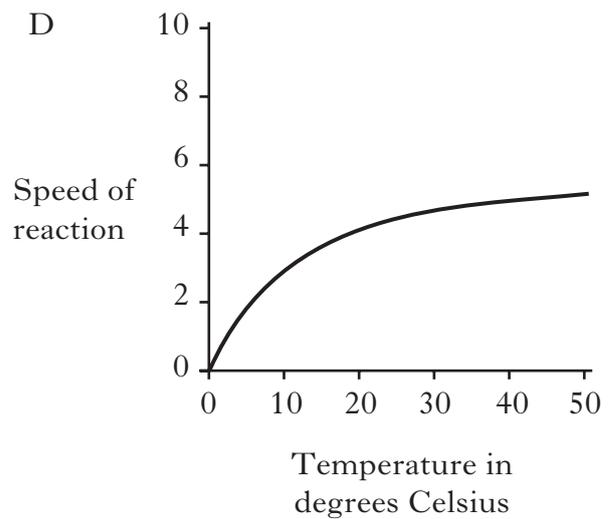
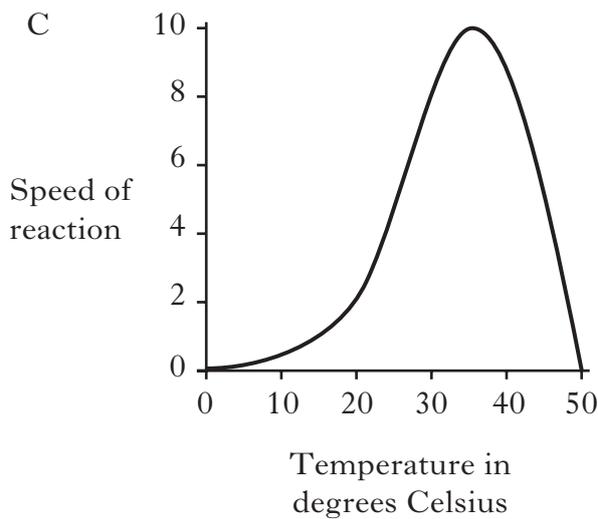
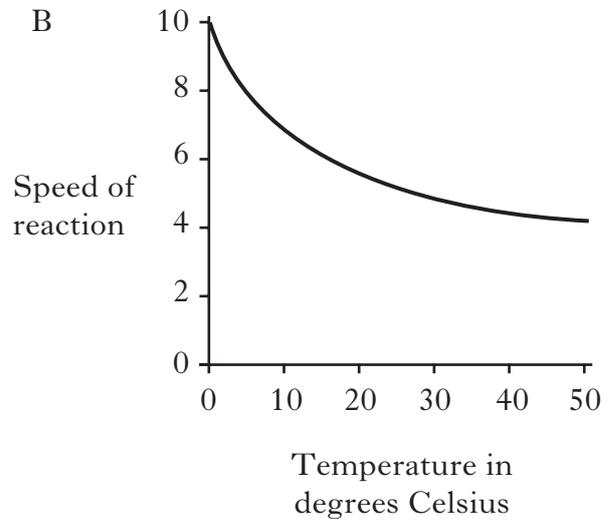
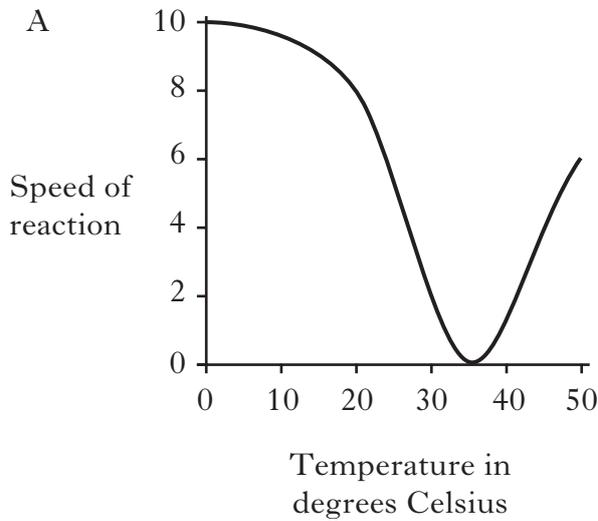


Compared with 1998, in 2008 people ate

- A less vegetables and less fruit
- B less vegetables and more fruit
- C more vegetables and less fruit
- D more vegetables and more fruit.

**[Turn over**

18. When food is digested in the body, proteins are broken down by enzymes.  
Which graph shows that the enzymes work fastest at 37 °C?



19. Which drink is made by fermentation followed by distillation?

- A Beer (5% alcohol)
- B Cider (8% alcohol)
- C Rum (40% alcohol)
- D Wine (11% alcohol)

20. Which statement about all drugs is correct?

- A They alter the way in which the body works.
- B They can damage health.
- C They can help the body.
- D They are illegal.

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

**[Turn over for Section B on *Page ten***

## SECTION B

Marks

40 marks are available in this section of the paper.  
All answers must be written clearly and legibly in ink.

1. Fireworks contain many different chemicals.



- (a) Lithium carbonate is commonly used to give a red colour to fireworks.  
Complete the sentence.

Lithium carbonate contains the elements \_\_\_\_\_,  
\_\_\_\_\_ and \_\_\_\_\_.

1

- (b) Magnesium is added to fireworks as it produces a very bright white light when it reacts with oxygen. Magnesium oxide is made in this reaction.

Complete the word equation to show the reactants and products.

1  
(2)

**[Turn over for Question 2 on *Page twelve***

Marks

2. Energy saving light bulbs contain the element mercury which has the atomic number 80.



- (a) Circle the correct words to complete the sentence.

Mercury is a  $\left\{ \begin{array}{l} \text{metal} \\ \text{non-metal} \end{array} \right\}$  which is a  $\left\{ \begin{array}{l} \text{gas} \\ \text{liquid} \\ \text{solid} \end{array} \right\}$  at room temperature.

1

- (b) The hazard symbol for mercury is:



What does this symbol tell you about mercury?

1

**2. (continued)**

Marks

- (c) If an energy saving light bulb breaks, mercury vapour escapes into the room. The level of mercury vapour in the room can be calculated using the formula:

$$\text{level of mercury vapour in the room} = \frac{\text{mass of mercury in milligrams}}{\text{volume of room in m}^3}$$

A light bulb containing 4 milligrams of mercury breaks in a room which has a volume of  $40 \text{ m}^3$ . Calculate the level of mercury vapour in this room.

\_\_\_\_\_ milligrams per  $\text{m}^3$       **1**  
**(3)**

**[Turn over**

Marks

3. Many household substances can be classified as acids or alkalis.

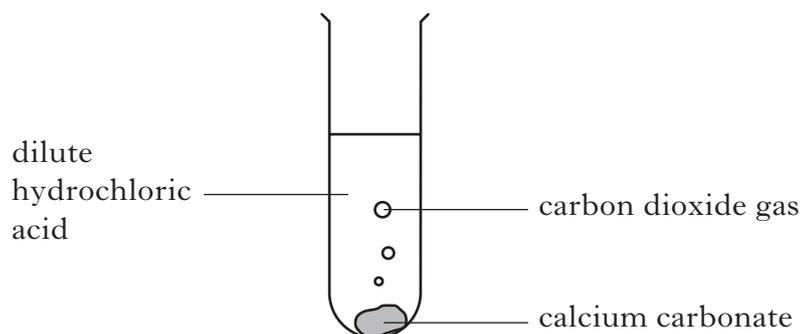
(a) Complete the table to show which of the following substances are acids or alkalis.

baking soda      lemonade      bleach      vinegar

Acid	Alkali

1

(b) (i) Diluted hydrochloric acid solution can be neutralised using calcium carbonate.



In this reaction, a calcium salt, water and carbon dioxide gas are formed.

Name the salt formed in this reaction.

calcium \_\_\_\_\_

1

(ii) Indigestion can be caused by too much hydrochloric acid in the stomach. This can be treated using the neutraliser calcium carbonate.

What would happen to the pH of the acid when calcium carbonate is added?

\_\_\_\_\_

1

(3)

Marks

4. Tents can be made from a plastic called polyester.



- (a) The polyester used is a thermoplastic.

What is meant by a thermoplastic?

\_\_\_\_\_

1

- (b) To make the tent waterproof it is coated with a chemical containing silicon.

Write the symbol for silicon.

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

\_\_\_\_\_

1

- (c) Tent poles are often made from aluminium.

What property of aluminium makes it suitable for use as tent poles?

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

\_\_\_\_\_

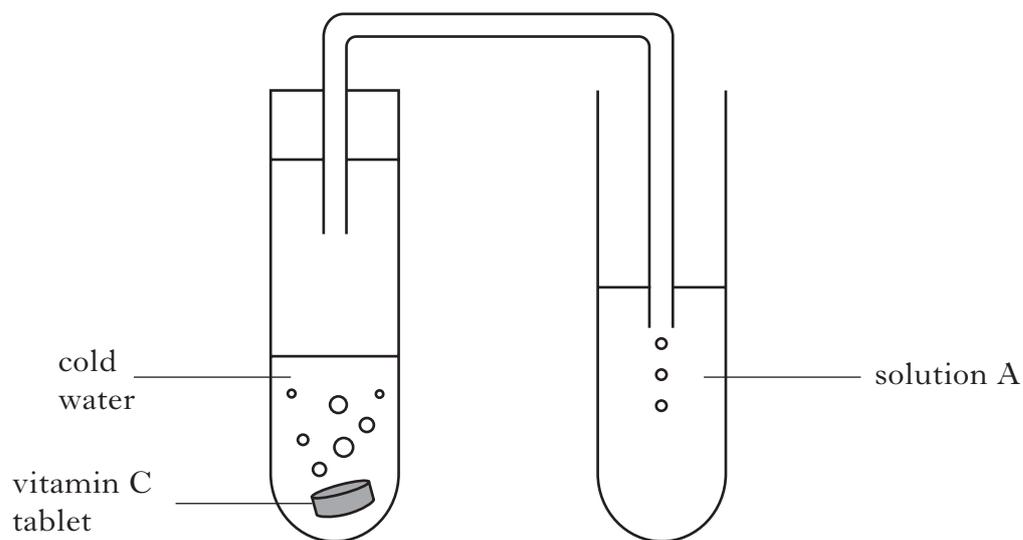
1

(3)

[Turn over

Marks

5. Some types of vitamin C tablets fizz when added to water because carbon dioxide gas is produced. A student set up the following experiment to see how long it would take for solution A to turn milky.



- (a) Name solution A.

\_\_\_\_\_ 1

- (b) The experiment was repeated using hot water.

What effect would this have on the time taken for solution A to turn milky?

\_\_\_\_\_ 1

- (c) Why is it important to have vitamins in our diets?

\_\_\_\_\_ 1  
(3)

6. Bridges made from iron need to be protected to stop them from rusting.

Marks



(a) What effect would rusting have on the strength of an iron bridge?

\_\_\_\_\_

1

(b) State **one** method that could be used to protect the iron bridge from rusting.

\_\_\_\_\_

1

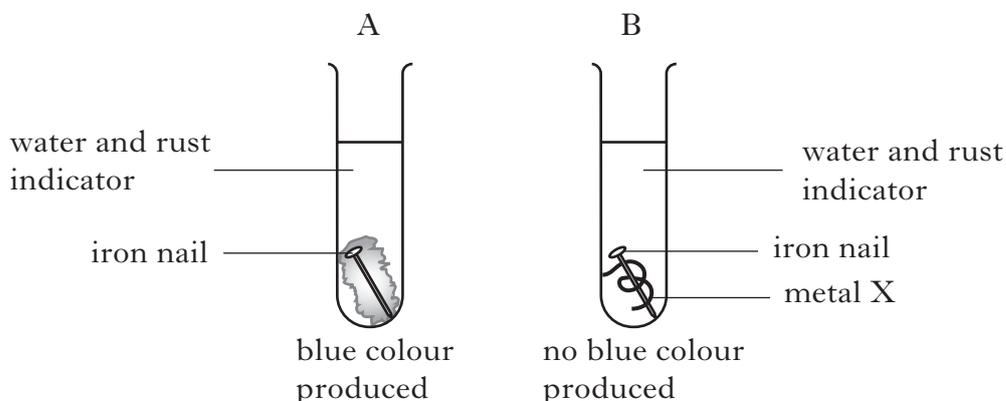
(c) The rate of rusting increases if an iron bridge comes into contact with sea water.

Why does this happen?

\_\_\_\_\_

1

(d) An experiment was set up to investigate how iron rusts when it is joined to other metals. Rust indicator turns blue when iron rusts.



Suggest a name for metal X.

(You may wish to use page 6 of the data booklet to help you.)

\_\_\_\_\_

1

(4)

7. The following is taken from the PPA, "Reactions of Metals with Acid".

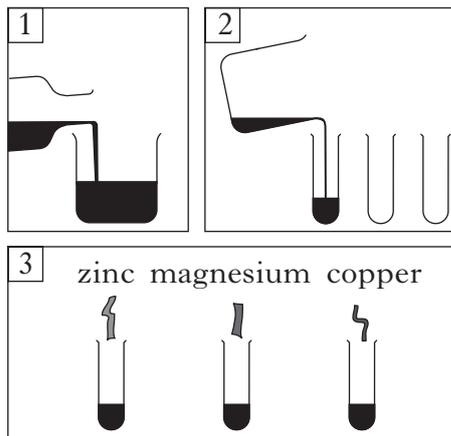
Intermediate 1  
Chemistry

Reactions of Metals with Acid

Unit 2  
PPA 2

**Procedure (what you do)**

1. Add dilute hydrochloric acid to the beaker until it is half full.
2. Put three test tubes in the test tube rack. Pour some of the hydrochloric acid into the first test tube to a depth of about 4 cm. Pour the same volume of acid into the other two test tubes.
3. Add a piece of zinc to the first test tube.  
Add a piece of magnesium to the second test tube.  
Add a piece of copper to the third test tube.



- (a) What is the aim of this experiment?

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1

- (b) During the experiment the volume of the acid must be kept the same.  
State another factor the student must keep the same in each of the three experiments.

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1

- (c) Name the gas produced when zinc reacts with hydrochloric acid.

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1

(3)

8. The 2012 Olympic Flame will burn methane, obtained from biogas.

Marks



- (a) Methane obtained from biogas is a renewable source of energy.

What is meant by a renewable source of energy?

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1

- (b) Methane is a hydrocarbon.

What is made when a hydrocarbon is burned in a plentiful supply of air?

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 and 

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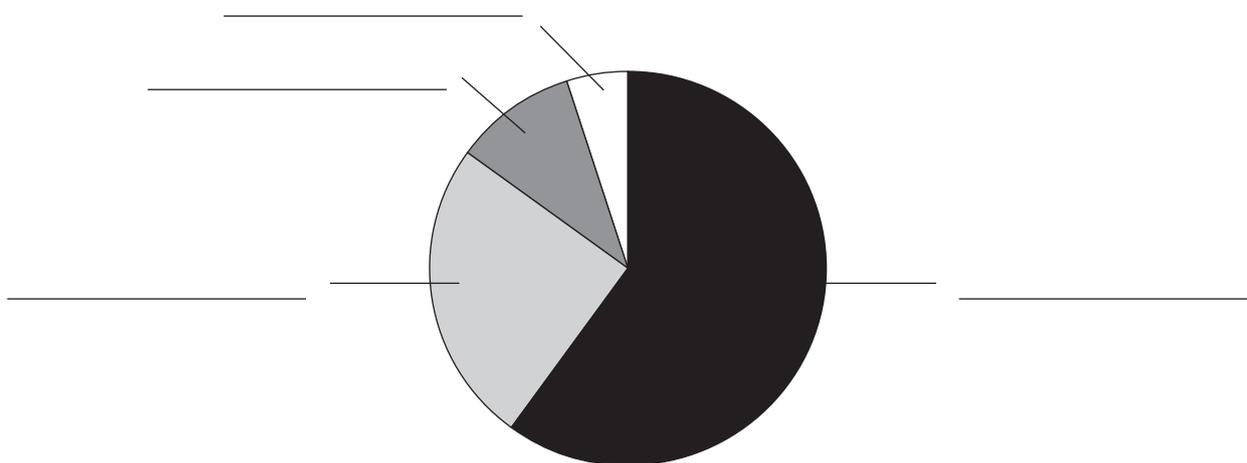
1

- (c) Biogas is a mixture of gases.

Gases in biogas mixture	Percentage (%)
methane	60
carbon dioxide	25
nitrogen	10
other gases	5

Use the information in the table to label the pie chart.

(An additional pie chart, if required, can be found on *Page twenty-six*).



1

(3)

Marks

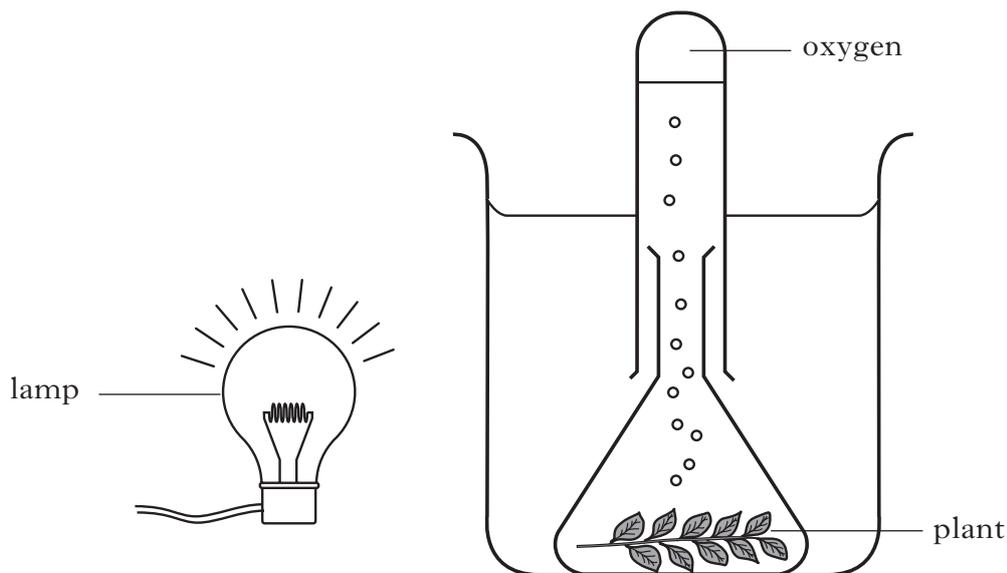
9. During photosynthesis plants take in substances from the environment and, using light energy, make their own food and oxygen.

(a) Name the **two** substances taken in by plants to make their own food.

\_\_\_\_\_ and \_\_\_\_\_

1

(b) An experiment was set up. The number of oxygen bubbles produced by a plant in one minute was counted.



This experiment was repeated with the lamp at different distances from the plant. The results are shown.

Distance of lamp from plant in cm	Number of bubbles of oxygen produced in one minute
30	24
40	19
60	10
100	4

## 9. (b) (continued)

Marks

- (i) **Circle** the correct words to complete the sentence.

As the distance of the lamp from the plant  $\left\{ \begin{array}{l} \text{increases} \\ \text{decreases} \end{array} \right\}$  the number  
of bubbles of oxygen gas produced in one minute  $\left\{ \begin{array}{l} \text{increases} \\ \text{decreases} \end{array} \right\}$ .

1

- (ii) Predict the number of bubbles of oxygen produced if the lamp was 120 cm from the plant.

\_\_\_\_\_ bubbles

1

- (iii) The experiment was repeated to record the volume of oxygen produced.

Name a piece of equipment that could be used to measure the volume of oxygen.

\_\_\_\_\_

1

- (c) What is the chemical test for oxygen?

\_\_\_\_\_

1

(5)

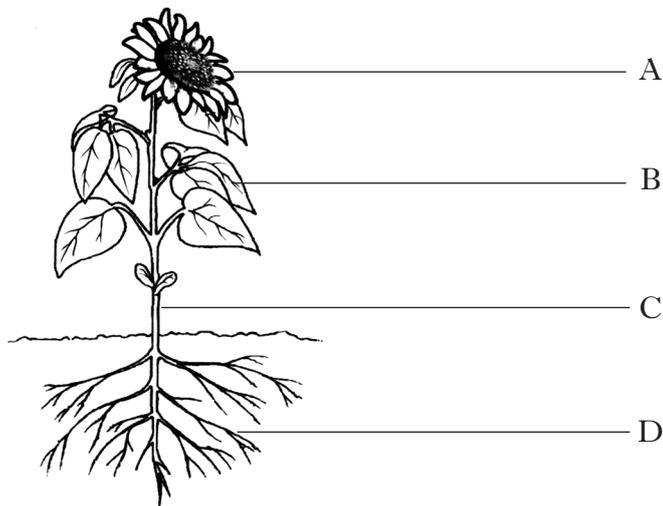
**[Turn over**

Marks

10. Nitrogen is an important element in many fertilisers.

It is often in the form of nitrate compounds.

- (a) Circle the letter on the diagram to show where the plant takes in nitrate compounds.



1

- (b) What effect would harvesting crops have on the levels of nitrogen in the soil?

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1

- (c) A student carried out a PPA to find out which compounds are suitable for use as fertilisers.

The results are shown.

Name of compound	Suitable for use as fertiliser
ammonium sulphate	yes
ammonium nitrate	yes
calcium phosphate	no
ammonium phosphate	yes

Why is calcium phosphate **not** suitable for use as a fertiliser?

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1

*Marks*

**10. (continued)**

- (d) Overuse of nitrate fertilisers can lead to environmental problems.  
Give an example of this.

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**1**  
**(4)**

**[Turn over**

11. Canoe slalom is an event taking place at this year's Olympics.

Marks



- (a) As canoe slalom is a power sport, the canoeist needs to ensure he eats enough protein.

What are proteins used for in the body?

1

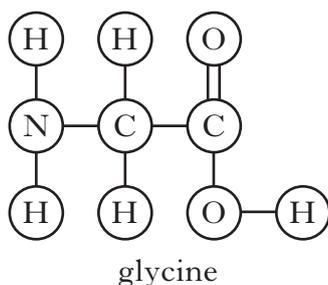
- (b) The protein content of some foods is shown in the table.

Food	Protein per portion in grams
Protein shake	30
Tuna	14
Bagel	9
Milk	9

After a training session the canoeist has a tuna bagel and a glass of milk.  
Why is this more beneficial than a protein shake?

1

- (c) Proteins are formed from amino acids such as glycine, which is shown.



Complete the formula for this amino acid.



1

(3)

Marks

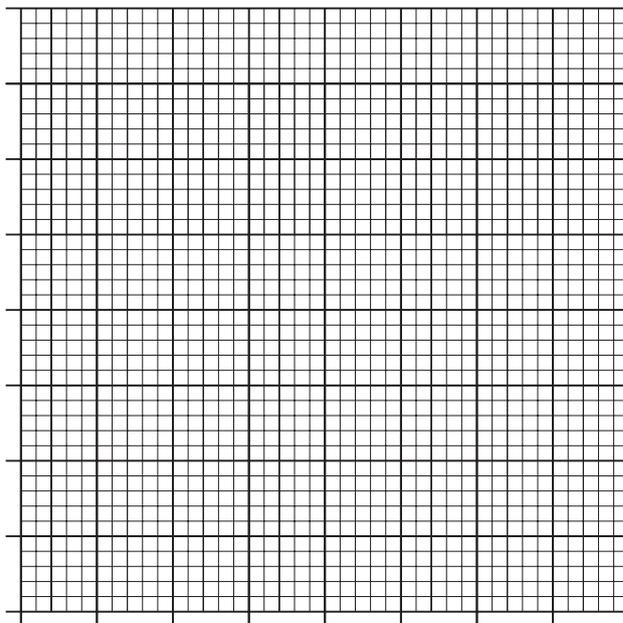
12. The alcohol, ethanol, is added to some mouthwashes to kill bacteria in the mouth.

(a) The table shows the ethanol content of different mouthwashes.

Mouthwash	Ethanol content (%)
Ice	7
Zing	14
Gleam	19
Sparkle	27

Use the information in the table to draw a bar graph.

(Additional graph paper, if required, can be found on *Page twenty-six*.)



2

(b) All alcohols kill bacteria.

Why must the alcohol, methanol, **not** be used in mouthwash?

1

(c) Some mouthwashes also contain sodium fluoride.

Suggest a reason for this.

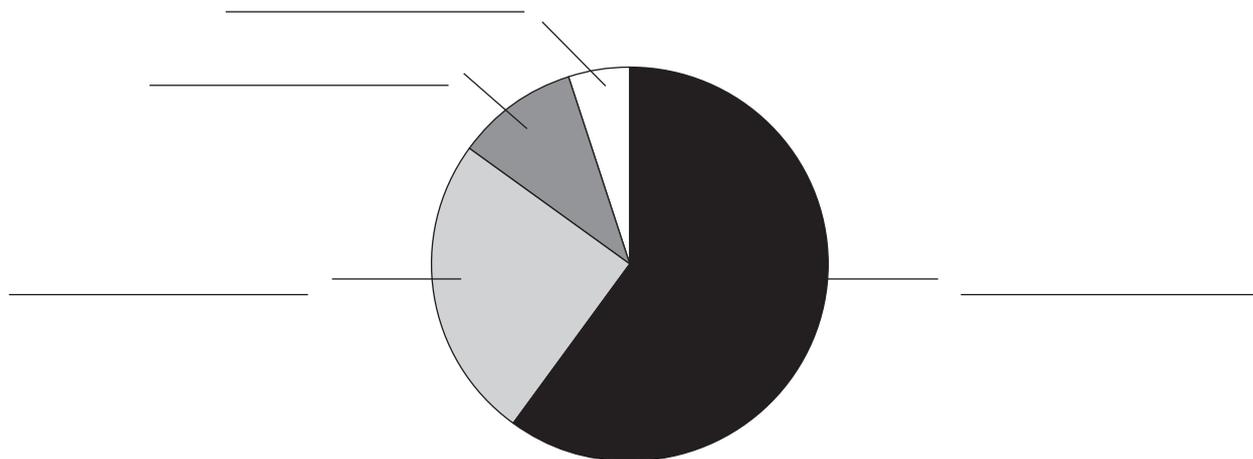
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(4)

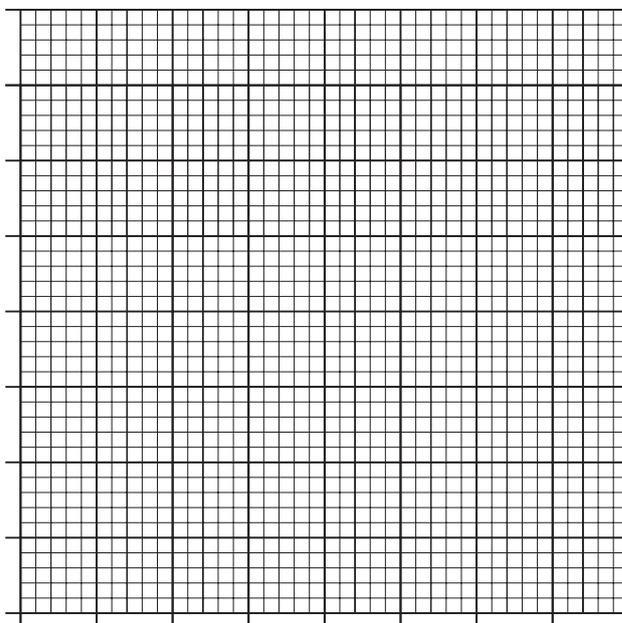
[END OF QUESTION PAPER]

**ADDITIONAL SPACE FOR ANSWERS**

ADDITIONAL PIE CHART FOR QUESTION 8(c).



ADDITIONAL GRAPH PAPER FOR QUESTION 12(a).



**ADDITIONAL SPACE FOR ANSWERS**

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**ADDITIONAL SPACE FOR ANSWERS**

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