FOR OFFICIAL USE

Section B Total Marks

X012/101

NATIONAL QUALIFICATIONS 2007

TUESDAY, 29 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 (2007 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.

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

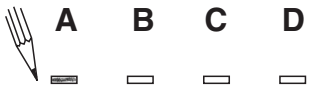
A chromatography

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

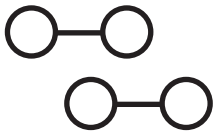
If you decide to change your answer, carefully erase your first answer and using your pencil, fill in the answer you want. The answer below has been changed to **D**.

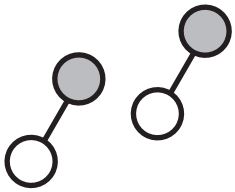
SECTION A

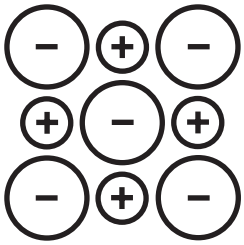
This section of the question paper consists of 20 multiple-choice questions.

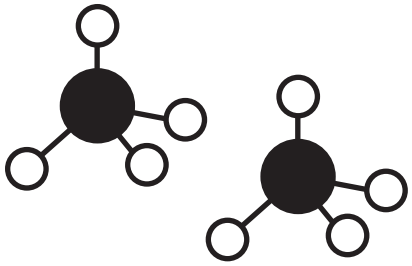
1. The structures of substances can be represented by models.

Which model shows a compound made of ions?

A 

B 

C 

D 

2. Which of the following molecules contains only four atoms?

A Sulphur dioxide

B Sulphur trioxide

C Dinitrogen tetroxide

D Carbon monoxide

3. Calcium carbonate and sodium sulphate are compounds.

Which element is present in **both** compounds?

A Carbon

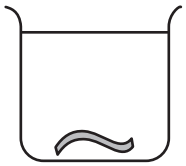
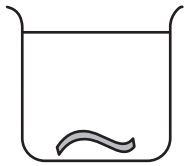
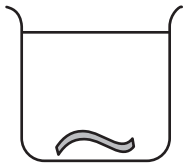
B Oxygen

C Sodium

D Sulphur

[Turn over

4. A student set up three experiments to investigate the speed of the reaction between magnesium and dilute acid.

Factor			
Concentration of the acid in moles per litre	2	1	0·5
Mass of magnesium ribbon	1 g	1 g	1 g
Temperature of the acid	20 °C	20 °C	20 °C
Volume of the acid	50 cm^3	50 cm^3	50 cm^3

Which factor was the student investigating?

A The concentration of the acid.

B Mass of magnesium ribbon in grams.

C Temperature of the acid.

D Volume of the acid.

5. One of the products of the reaction between sulphuric acid and copper oxide is copper sulphate. The other product is water.

The word equation for the reaction is

A copper sulphate + copper oxide → sulphuric acid + water

B copper sulphate + water → sulphuric acid + copper oxide

C sulphuric acid + copper sulphate → copper oxide + water

D sulphuric acid + copper oxide → copper sulphate + water

6.

Sulphur	
Boiling point	445 °C
Melting point	113 °C

When sulphur cools from 120 °C to 100 °C it changes from

A liquid to gas

B gas to liquid

C liquid to solid

D solid to liquid.

7. Which of the following is a natural fibre?

A Silk

B Nylon

C Kevlar

D Polyester

8. Which of the following should **not** be used to put out an oil fire?

A

sand

B

fire blanket

C

carbon dioxide

D

water

[Turn over

9. Which gas must be present before a substance will burn?

A Argon

B Oxygen

C Nitrogen

D Carbon dioxide

10. Which of the following compounds is a hydrocarbon?

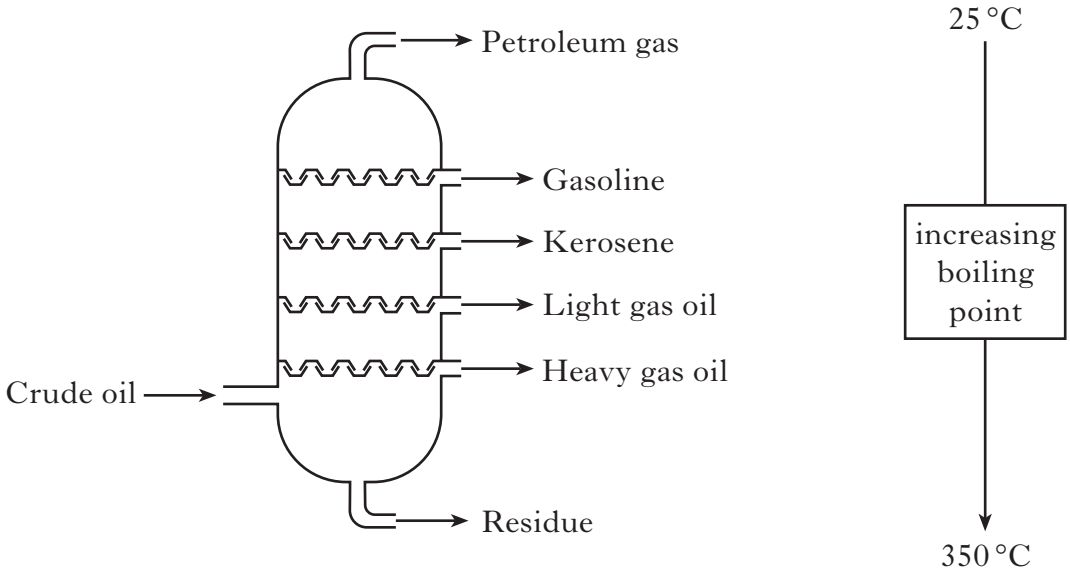
A C_3H_6

B C_3H_7OH

C CO_2

D H_2CO_3

11. The distillation of crude oil produces a number of different fractions.



Compared with gasoline, the hydrocarbons in light gas oil are

A bigger and have a lower boiling point

B bigger and have a higher boiling point

C smaller and have a lower boiling point

D smaller and have a higher boiling point.

12. Which method of disposing of plastics can produce harmful gases?

A Burying

B Crushing

C Recycling

D Incineration

13. Most plastics are made from

A coal

B crude oil

C animal proteins

D plant carbohydrates.

14. Which line in the table shows properties of a plastic which can be used for lemonade bottles?

	Weight	**Effect of water**
A	Light	No effect
B	Light	Dissolves
C	Heavy	No effect
D	Heavy	Dissolves

15. In farming, natural predators are used to

A kill bacteria and fungi

B reduce weed growth

C prevent disease

D control pests.

16. At which temperature do enzymes in the human body work best?

A 0 °C

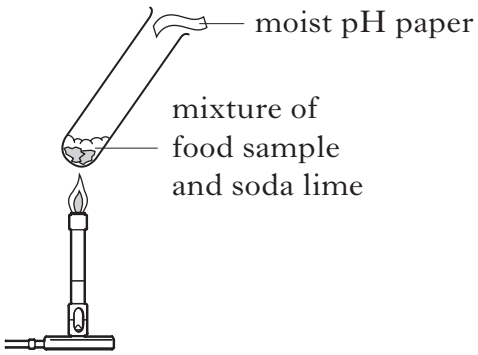
B 22 °C

C 37 °C

D 100 °C

[Turn over

17. A student carried out the following test.



The moist pH paper turned blue.

This showed that the food sample contained

A fats

B proteins

C sugars

D starches.

18. Which of the following foods would be the **best** source of protein?

A Bananas

B Butter

C Carrots

D Cheese

19. The main purpose of fibre in the diet is

A to keep the gut working well

B for healthy teeth and bones

C for growth and repair

D to provide energy.

20. Food can be made to last longer by adding

A colourings

B flavourings

C preservatives

D vitamins.

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

[Turn over for Section B on *Page ten*

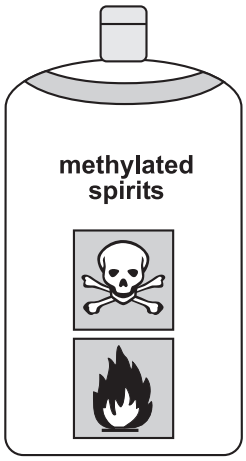
Marks

SECTION B

40 marks are available in this section of the paper.

All answers must be written clearly and legibly in ink.

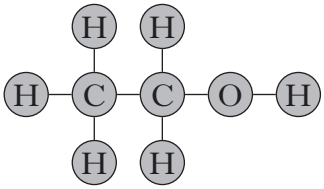
1. A bottle of methylated spirits is labelled with **two** hazard symbols.



(*a*) What does the following symbol tell you about methylated spirits?

_____ **1**

(*b*) Methylated spirits contains mainly ethanol. The diagram represents a molecule of ethanol.



Write the formula for ethanol.

_____ **1**

(*c*) Ethanol is also found in alcoholic drinks such as whisky and beer.
Some people become addicted to the ethanol in alcoholic drinks.
What does **addicted** mean?

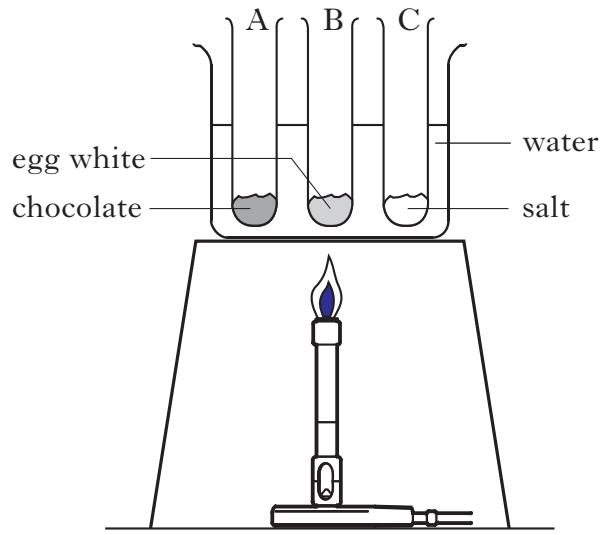
_____

_____ **1**

(3)

Marks

2. This experiment was carried out to investigate what happens when different substances are heated, and then allowed to cool.



Results for the experiment are given in the table.

Test tube	Substance	Observations on heating	Observations on cooling
A	chocolate	**Change** brown solid to brown liquid	**Change** brown liquid to brown solid
B	egg white	**Change** clear liquid to white solid	**No change** white solid remains
C	salt	**No change** white crystals remain	**No change** white crystals remain

(*a*) In which test tube, A, B or C, did a chemical reaction take place on heating?

_____ **1**

(*b*) Salt is made up of ions. On heating, the salt did not melt.
What does this suggest about the strength of the bonds between ions?

_____ **1**

(2)

[Turn over

Marks

3. In the **PPA "Testing the pH of solutions,"** a student used pH paper and a colour chart to find the pH of some household substances.

(*a*) Some of the results from this PPA are given.

Substance	pH	Acidic/alkaline/neutral
vinegar	4	acidic
water		neutral
bicarbonate of soda	9	alkaline

(i) Complete the table for water. **1**

(ii) How was the colour chart used to give a pH value?

_____ **1**

(*b*) The student also tested the pH of sugar.
What was done to the solid sugar before the pH could be measured?

_____ **1**

(3)

Marks

4. Ice cream is made from a mixture of milk, fat and sugar.

The table shows how the freezing point of 100 grams of ice cream changes when the mass of sugar changes.

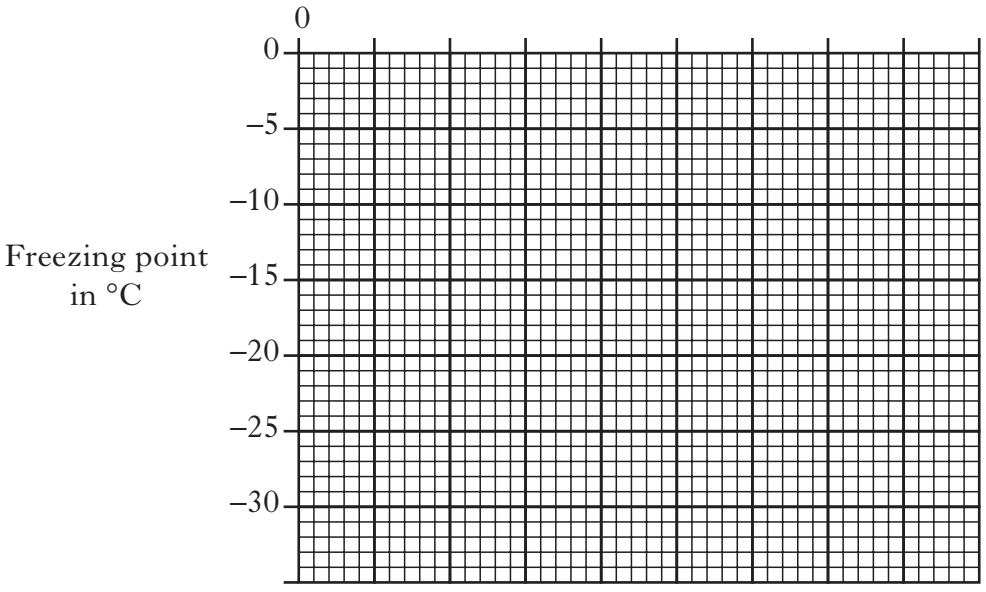
Mass of sugar in grams	10	20	30	40
Freezing point in °C	–1	–4	–11	–23

(*a*) Use the above information to:

(i) label and complete the scale on the horizontal axis;

(ii) draw a line graph of the results.

(Additional graph paper, if required, will be found on page 22.)



2

(*b*) Using the graph, find the freezing point of ice cream when the mass of sugar used is 35 grams.

_____ °C **1**

(*c*) Ice cream has a high fat content.

(i) What does fat provide in our diet?

_____ **1**

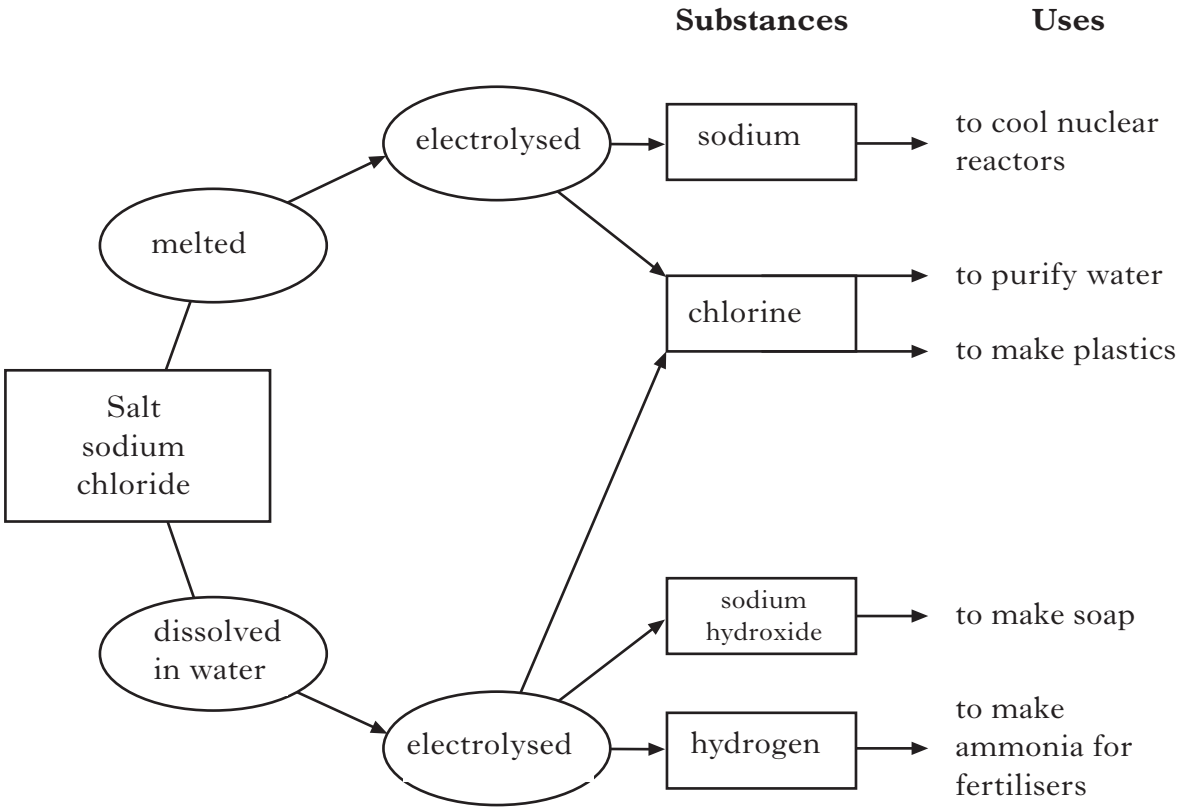
(ii) What health problem is caused by having too much fat in the diet?

_____ **1**

(5)

Marks

5. **Chemicals from Salt**



(*a*) Use the diagram to

(i) state the **two** substances obtained when salt is **melted** and then electrolysed.

_____

_____ **1**

(ii) state a use for hydrogen.

_____ **1**

(*b*) Chlorine is used to purify drinking water.
What does chlorine kill to make drinking water safe?

_____ **1**

(*c*) Sodium hydroxide is used to make soap.
Grease is insoluble in water. How does soap help grease dissolve in water?

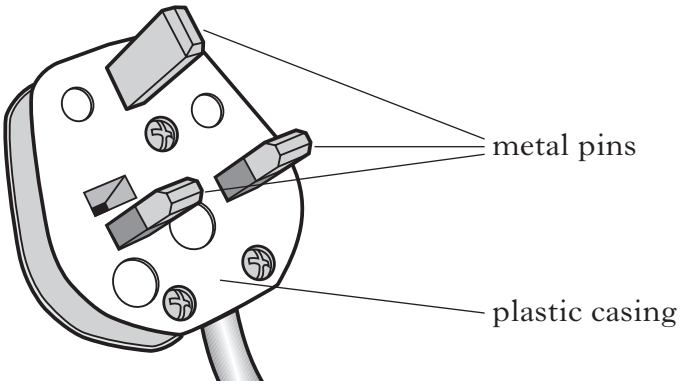
_____

_____ **1**

(4)

Marks

6.



(*a*) (i) The metal pins in a plug contain copper, which is a good conductor of electricity.

Using the equipment below, draw a diagram of the circuit you would use to show that copper conducts electricity.

Power supply — power supply

Bulb

Connecting wires

Copper sample

1

(ii) From this experiment, how would you tell that copper conducts electricity?

_____

1

(*b*) The casing of the plug is made from plastic which cannot be reshaped on heating.

Which type of plastic **cannot** be reshaped on heating?

_____

1

(3)

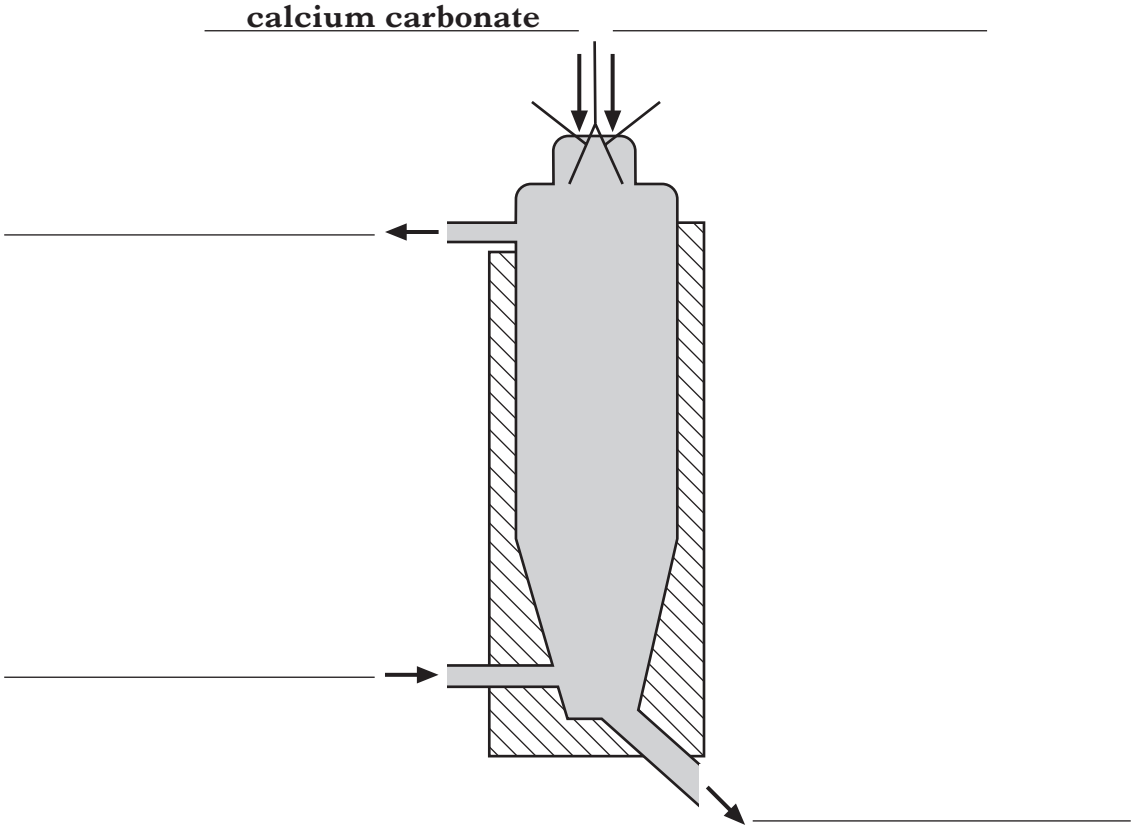
Marks

7. Lime is produced in a furnace known as a Lime Kiln.

The raw materials used are **calcium carbonate** and **coke** which are fed in at the top of the kiln. **Hot air** is blown in near the bottom of the kiln.

Lime is removed from the bottom of the kiln. **Waste gases** are removed near the top of the kiln and recycled.

(*a*) Use the words in **bold** type to label the diagram of the Lime Kiln.



2

(*b*) The chemical name for lime is calcium oxide.

What is the melting point of calcium oxide?

(You may wish to use page 4 of the data booklet to help you.)

_____ °C **1**

(*c*) The calcium oxide from the Lime Kiln is used to remove the sulphur dioxide gas produced by power stations.

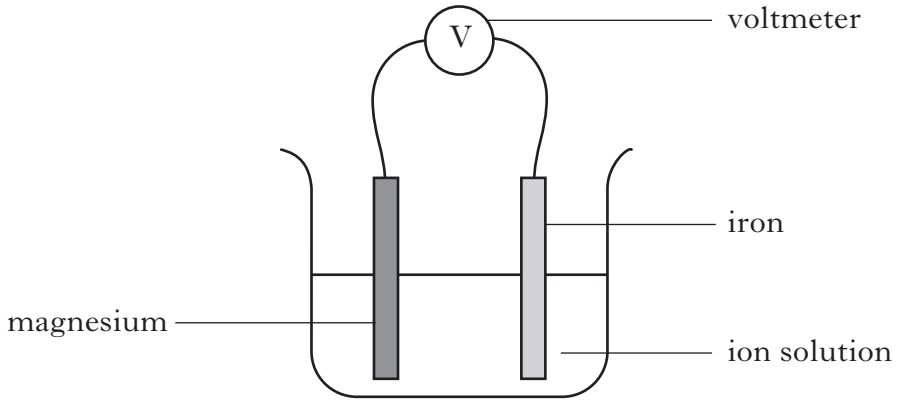
What would form if sulphur dioxide gas dissolves in water in the atmosphere?

_____ **1**

(4)

Marks

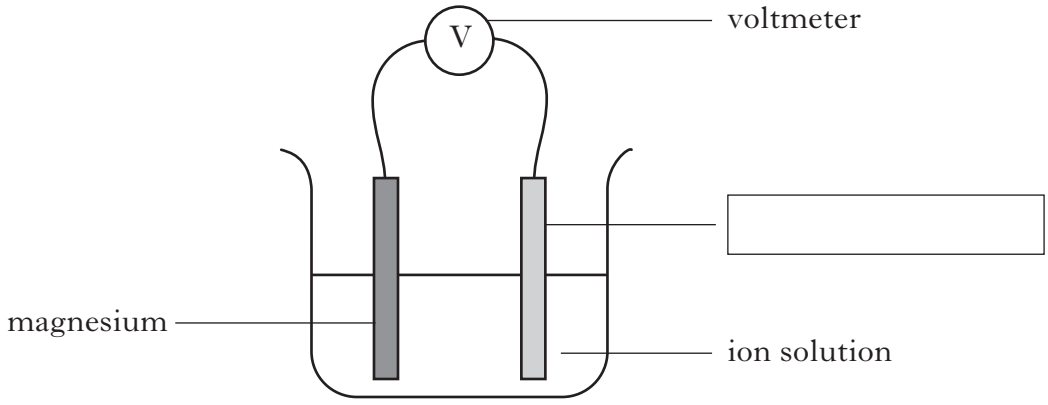
8. The diagram below shows a cell.



(*a*) What is the purpose of the ion solution?

_____ **1**

(*b*) The voltage of the cell shown above was 0·97 V.
Label the diagram below with a suitable metal which would give a voltage **greater** than 0·97 V.
(You may wish to use page 6 of the data booklet to help you.)



1

(*c*) After some time, the voltages of cells and batteries decrease.
Suggest a reason for this.

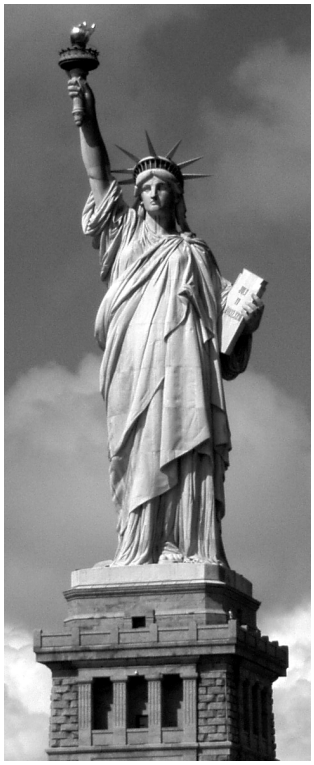
_____ **1**

(3)

[Turn over

Marks

9. The Statue of Liberty is built onto an iron frame. A block of magnesium is attached to the iron frame to prevent it from rusting.



(*a*) Which **two** substances, in addition to iron, **must** be present for the iron to rust?

_____ **1**

(*b*) Why does attaching magnesium to the iron frame prevent it from rusting?
(You may wish to use page 6 of the data booklet to help you.)

_____

_____

_____ **1**

(*c*) Suggest another method which could be used to protect the iron frame from rusting.

_____ **1**

(3)

Marks

10. Some fertilisers contain compounds of the metals calcium, copper and iron.

(*a*) Which of these metals is **not** a transition metal?
(You may wish to use page 8 of the data booklet to help you.)

_____ **1**

(*b*) These compounds must be soluble in water to be good fertilisers.
The table shows the effect of soil pH on the solubility of these compounds.

Metal in compound	**Soil pH**						
	3	4	5	6	7	8	9
calcium							
iron							
copper							

Key soluble insoluble

(i) At what pH are all of the compounds soluble?

_____ **1**

(ii) Why is it important that fertilisers are soluble in water?

_____

_____ **1**

(3)

[Turn over

Marks

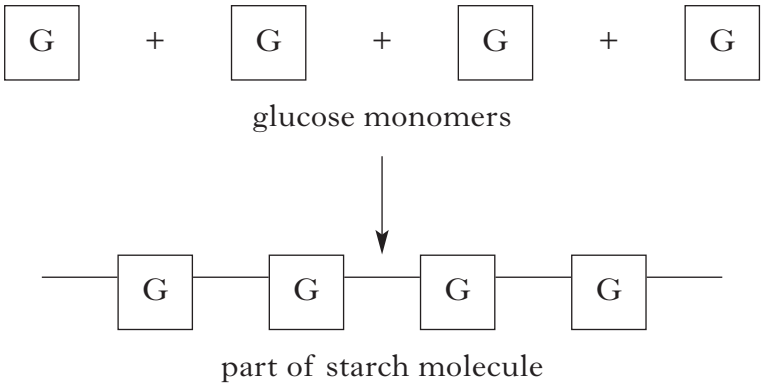
11. The word equation for photosynthesis is shown.

carbon dioxide + water ⟶ glucose + oxygen

(*a*) What else is needed by plants for photosynthesis to happen?

_____ **1**

(*b*) Plants make starch from glucose. The diagram shows the small glucose monomers joining to form a large starch molecule.



(i) Name the type of chemical reaction taking place when starch is made from glucose.

_____ **1**

(ii) Why do plants change glucose into starch?

_____

_____ **1**

(iii) Iodine solution can be used to test for starch in plants.
Complete the following to show the colour change in the iodine solution if starch is present.

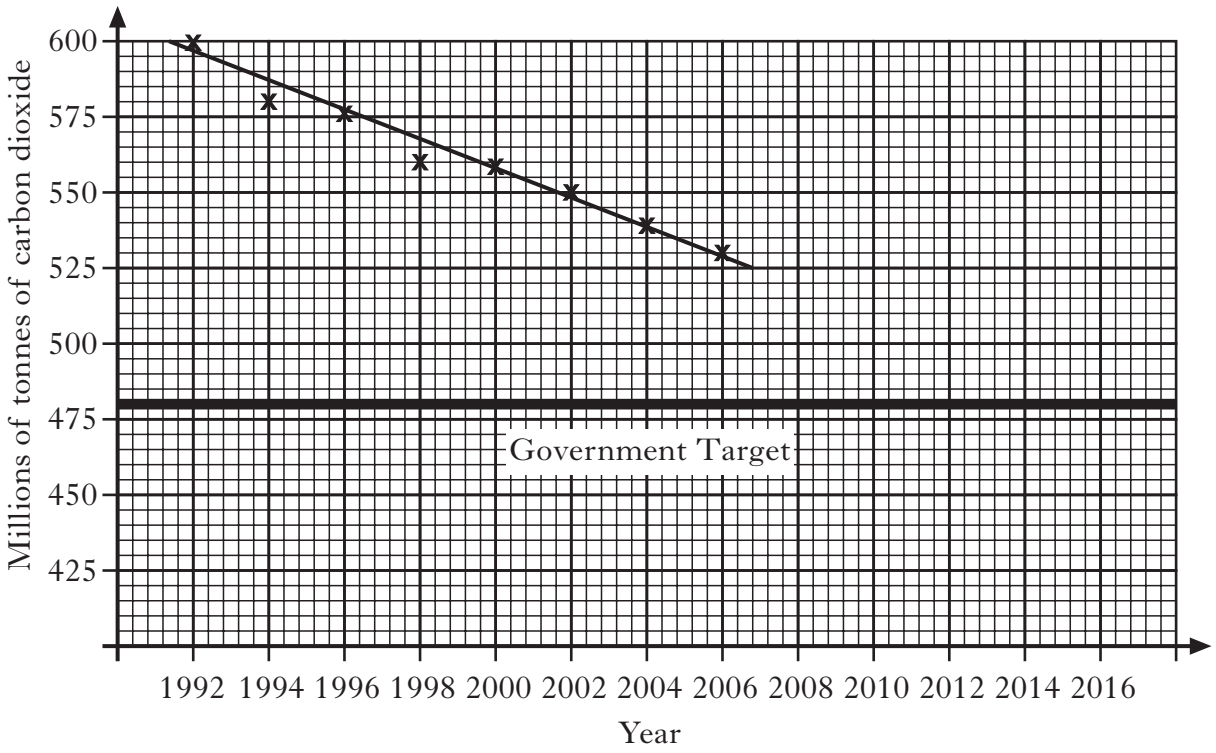
Brown to _____ **1**

(4)

Marks

12. When petrol is burnt, carbon dioxide is produced.

The graph shows that the level of carbon dioxide in the atmosphere is falling.



The government has set targets to reduce carbon dioxide levels.

(*a*) Why is it important to reduce carbon dioxide levels in the atmosphere?

_____ **1**

(*b*) In what year will the UK reach the government target?

_____

_____ **1**

(*c*) Rather than using petrol, some cars are using hydrogen as a fuel.
Why is burning hydrogen less harmful to the environment?

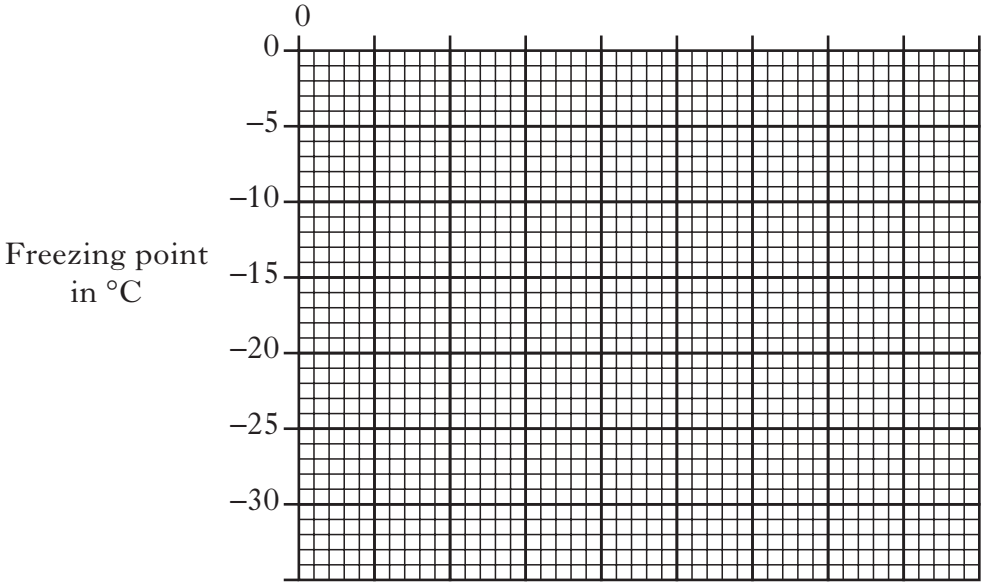
_____ **1**

(3)

[*END OF QUESTION PAPER*]

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 4(*a*).



ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL SPACE FOR ANSWERS