FOR OFFICIAL USE

Section B | Total Marks | |

X012/101

NATIONAL QUALIFICATIONS 2001

THURSDAY, 24 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 (2000 Edition).

Section A (Questions 1 to 20)

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

Section B (Questions 1 to 11)

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, 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.

Additional space for answers and rough work 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

SECTION A

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

Fill in the details required on the answer sheet.

In questions 1 to 20 of this part of the paper, an answer is given by indicating the choice A, B, C or D by a stroke made in INK in the appropriate place of the answer sheet—see the sample question below.

For each question there is only ONE correct answer.

Rough working, if required, should be done only on this question paper, or on the rough working sheet provided—**not** on the answer sheet.

At the end of the examination the answer sheet for Section A **must** be placed **inside** this answer book.

This part of the paper is worth 20 marks.

SAMPLE QUESTION

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

A fractional distillation

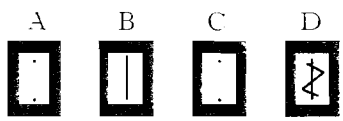
B chromatography

C fractional crystallisation

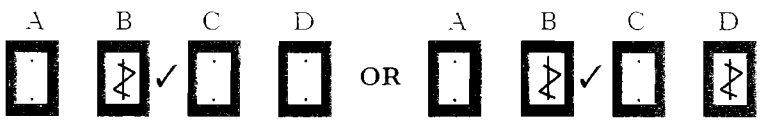
D filtration.

The correct answer is B—chromatography. A **heavy** vertical line should be drawn joining the two dots in the appropriate box in the column headed **B** as shown **in the example on the answer sheet.**

If, after you have recorded your answer, you decide that you have made an error and wish to make a change, you should cancel the original answer and put a vertical stroke in the box you now consider to be correct. Thus, if you want to change an answer **D** to an answer **B**, your answer sheet would look like this:



If you want to change back to an answer which has already been scored out, you should **enter a tick (✓)** to the RIGHT of the box of your choice, thus:



SECTION A

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

1. Mercury and bromine are both elements which are

   A metals

   B non-metals

   C gases at room temperature

   D liquids at room temperature.

2. Which element is missing from this word equation?

   ? + copper oxide ⟶ copper + hydrogen oxide

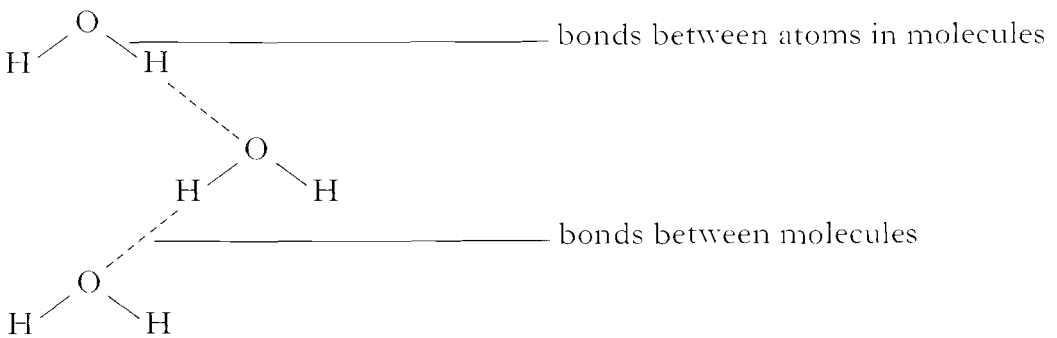
   A Carbon

   B Copper

   C Hydrogen

   D Oxygen

3. The diagram shows two types of bonds in water, bonds between atoms in the molecules and bonds between molecules.



Which line in the table correctly shows how strong these bonds are?

	Bonds between atoms in molecules	**Bonds between molecules**
A	weak	weak
B	strong	strong
C	strong	weak
D	weak	strong

4. Which of these is a common household alkali?

A Soap

B Lemonade

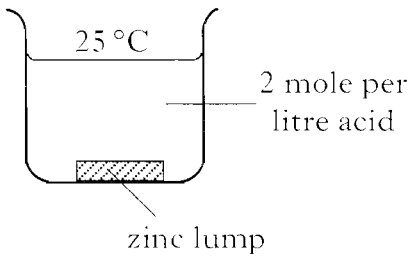
C Soda water

D Vinegar

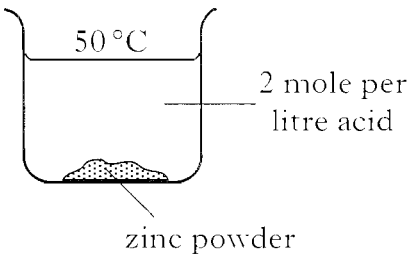
5. A student investigated the reaction between zinc and dilute acid.

Here are diagrams of the experiments he set up.

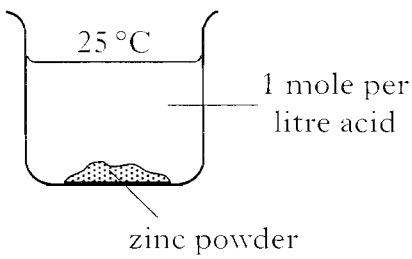
Experiment 1



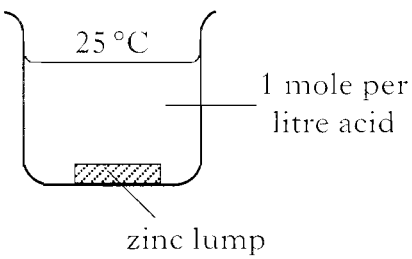
Experiment 2



Experiment 3



Experiment 4



Which **two** experiments show how changing acid concentration affects the rate of the reaction?

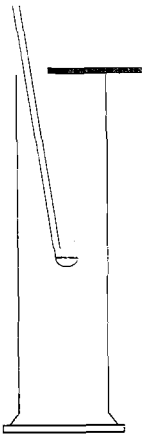
A 1 and 2

B 2 and 3

C 3 and 4

D 1 and 4

6. Sulphur was burned in oxygen. Water was added to the gas jar and the pH of the solution was measured.



The pH was

A 3

B 7

C 9

D 13.

7. Lead metal is malleable. This means that it

A will burn easily

B reacts with acid

C is a good conductor of electricity

D can be beaten into different shapes.

For questions 8 and 9 you may wish to use page 5 of the data booklet.

8. Iron will not rust if attached to

A tin

B zinc

C lead

D copper.

9. Which pair of metals will produce the highest voltage when connected in a cell?

A Iron and copper

B Lead and copper

C Magnesium and copper

D Zinc and copper

10. Which of the following is a synthetic fibre?

A Cotton

B Silk

C Terylene

D Wool

[Turn over

11. Most plastics are made from

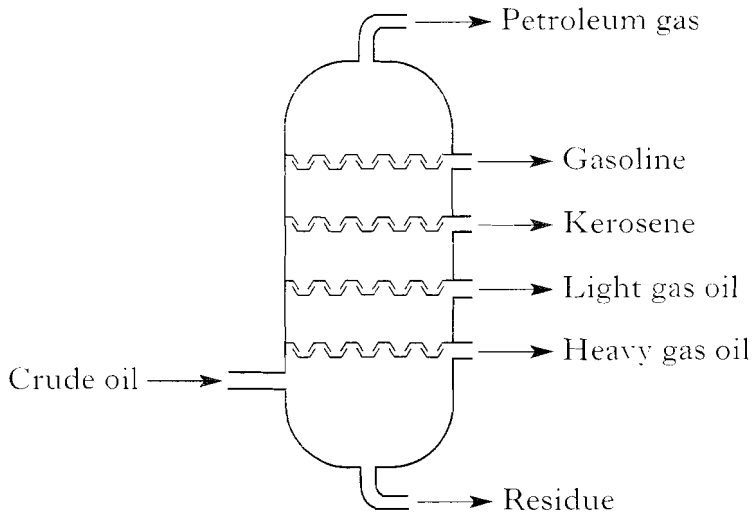
A coal

B crude oil

C animal proteins

D plant carbohydrates.

Questions 12 and 13 refer to the following diagram which shows the fractions obtained by distillation of crude oil in an oil refinery.



12. Which fraction is used as aircraft fuel?

A Gasoline

B Kerosene

C Light gas oil

D Heavy gas oil

13. Compared with heavy gas oil

A kerosene has smaller molecules and is less viscous

B kerosene has larger molecules and is less viscous

C kerosene has smaller molecules and is more viscous

D kerosene has larger molecules and is more viscous.

14. What are the major elements which make up the human body?

A Carbon, hydrogen, nitrogen and oxygen

B Carbon, hydrogen, nitrogen and iron

C Hydrogen, nitrogen, oxygen and calcium

D Hydrogen, nitrogen, iron and calcium

15. Which statement is false?

A Carbon dioxide in the air is a cause of the greenhouse effect.

B Burning fossil fuels increases carbon dioxide levels in the atmosphere.

C Clearing forests causes the carbon dioxide levels in the air to increase.

D Increasing levels of carbon dioxide in the air are causing the atmosphere to cool down.

16. Which process is represented by the following word equation?

glucose + oxygen → carbon dioxide + water

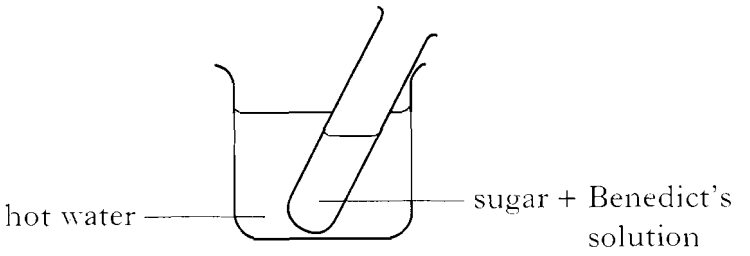
A Respiration

B Fermentation

C Polymerisation

D Photosynthesis

17. Which sugar does **not** give a brick-red colour when tested with Benedict's solution?



A Maltose

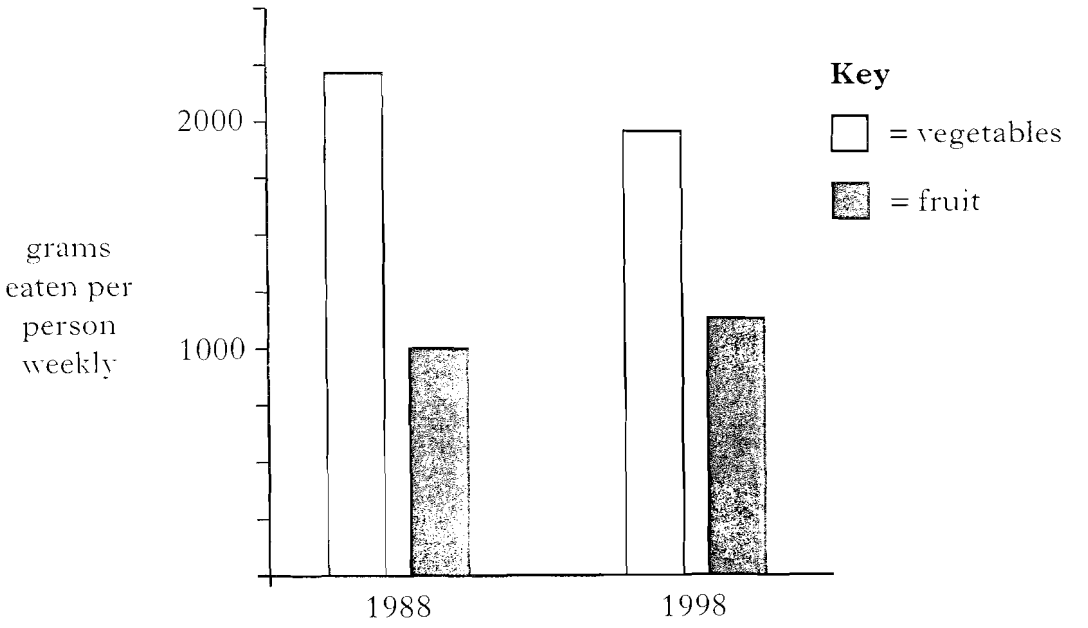
B Glucose

C Fructose

D Sucrose

[Turn over

18.



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.

19. glucose $\xrightarrow{\text{yeast}}$ ethanol + carbon dioxide

What name is given to this chemical reaction?

A Distillation

B Fermentation

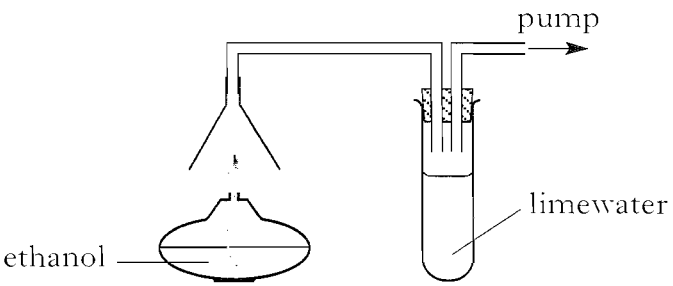
C Polymerisation

D Respiration

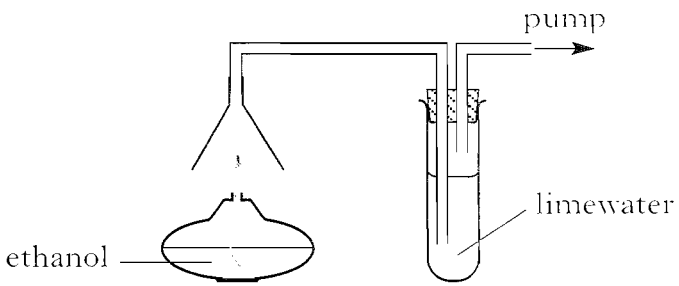
20. Ethanol burns to produce carbon dioxide.

Which apparatus would be used to show that carbon dioxide is formed when ethanol burns?

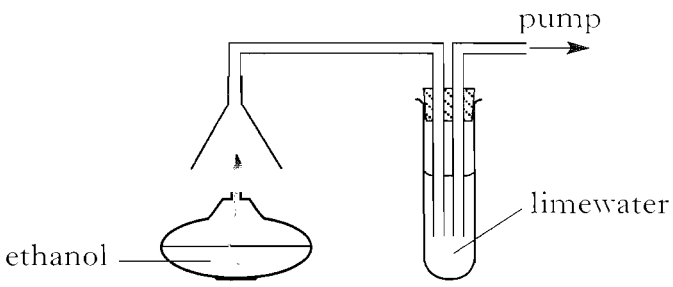
A



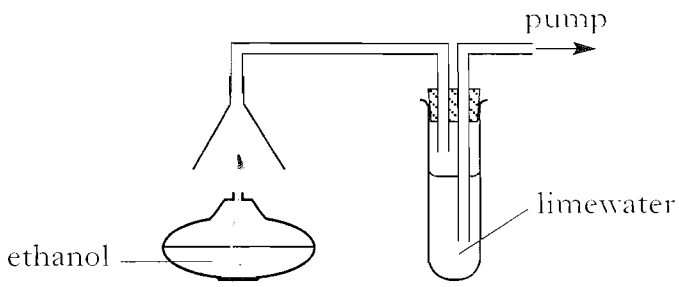
B



C



D



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

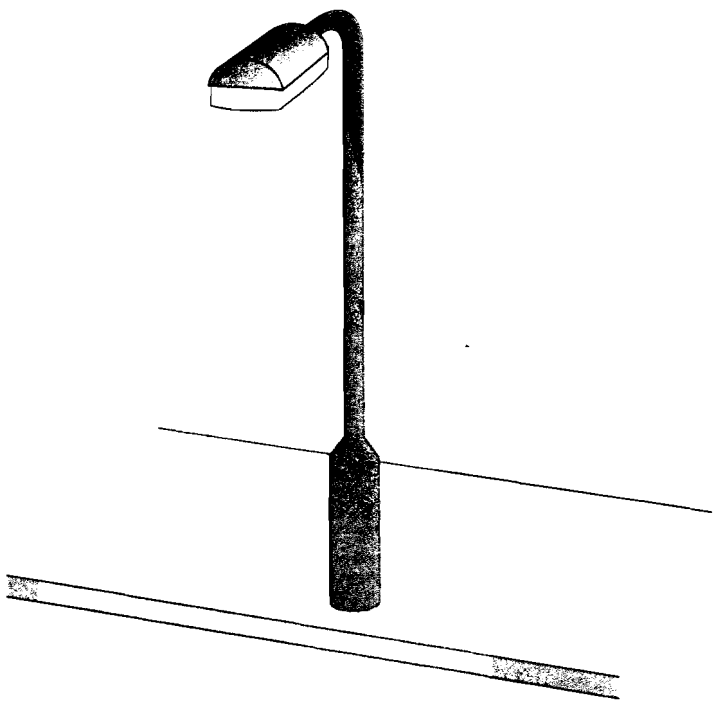
[Turn over

Marks

SECTION B

40 marks are available in this section of the paper.

1. Some street lights glow red when they are warming up.
Once they are warm they give a bright orange light.



(You may wish to refer to your data booklet to answer the following questions.)

(*a*) The red colour is caused by the gas neon.
When was neon discovered?

_____ **1**

(*b*) The orange colour is caused by the element sodium.
Write the symbol for the element sodium.

_____ **1**

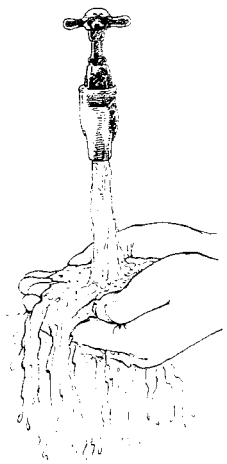
(*c*) An element with similar properties to neon is used in light bulbs.
Suggest an element which could be used.

_____ **1**

(3)

Marks

2. Grease cannot be removed from our skin using only water. We need to use soap as well.



(*a*) How does using soap help to remove grease from our skin?

_____

_____

_____

_____ **1**

(*b*) In hard water areas, using soap does not give a good lather.
What forms instead?

_____ **1**

(*c*) (i) In some areas the chemical sodium fluoride is added to the water.
Why is sodium fluoride added to water?

_____

_____ **1**

(ii) Name the elements present in sodium fluoride.

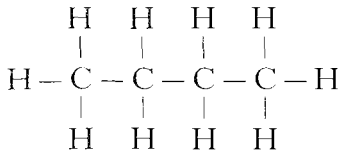
_____ **1**

(4)

[Turn over

Marks

3.



The diagram represents a molecule of **butane**.

(*a*) Write the formula for butane.

_____ **1**

(*b*) Butane contains only carbon and hydrogen.

What name is used to describe compounds containing only carbon and hydrogen?

_____ **1**

(*c*) When butane burns it combines with oxygen to produce carbon dioxide and water.

Write a word equation for the reaction taking place.

_____ **1**

(3)

Marks

4. The smoke from cigarettes contains many dangerous chemicals.

Tar	increases cancer risk
Nicotine	causes addiction
Carbon monoxide	lowers oxygen levels in blood
Hydrogen cyanide	irritates lungs
Nitrosamines	increases cancer risk

(*a*) Complete the table by adding **two** suitable headings. 1

(*b*) Nicotine causes addiction. What does the term "addiction" mean?

_____

_____ 1

(2)

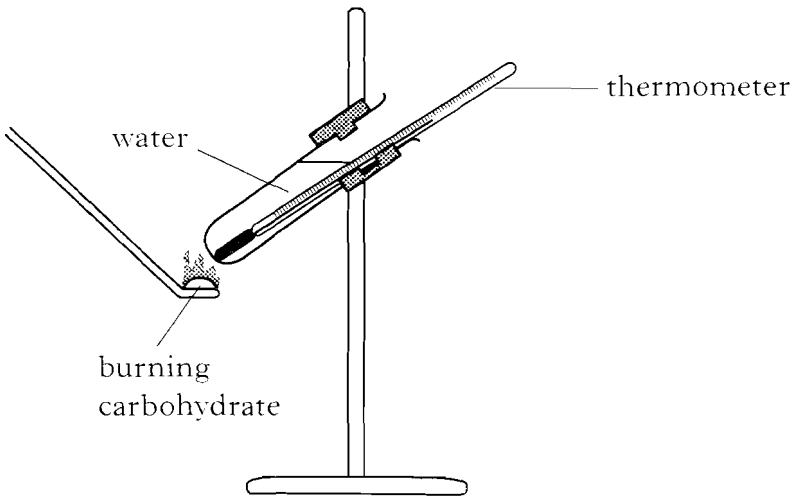
[Turn over

5. Part of a student's PPA write up is shown below.

INTERMEDIATE 1 CHEMISTRY	BURNING CARBOHYDRATES	Unit 3 PPA 2

Name: P. Darwin	PC(a)	PC(b)	PC(c)	PC(d)	Teacher's/Lecturer's Initials:	
Date: 26/4/01						

Procedure



Results

Carbohydrate	Starting temperature of water in °C	Final temperature of water in °C	Rise in temperature in °C
Starch	18	38	20
Icing sugar	18	52	34

Marks

5. (continued)

(*a*) State an aim of this PPA.

_____

_____ **1**

(*b*) (i) During this experiment, both burning carbohydrates must be kept the same distance from the test tube of water.

What effect would changing the distance have on the temperature rise?

_____

_____ **1**

(ii) State another variable which the student would need to keep the same in both experiments.

_____ **1**

(*c*) State the test for starch.

_____

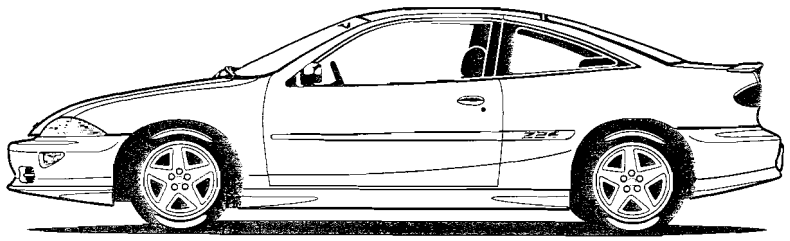
_____ **1**

(4)

[Turn over

Marks

6.



Scientists are researching a new catalytic convertor for cars.
It contains silver to help reduce the nitrogen dioxide emissions from the exhausts.

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

_____ **1**

(*b*) What causes nitrogen and oxygen to form nitrogen dioxide in a car engine?

_____

_____ **1**

(*c*) Nitrogen dioxide gas produces acid rain.
Describe **one** damaging effect of acid rain.

_____

_____ **1**

(*d*) The silver in the catalyst is divided into small particles.
Why are small particles used?

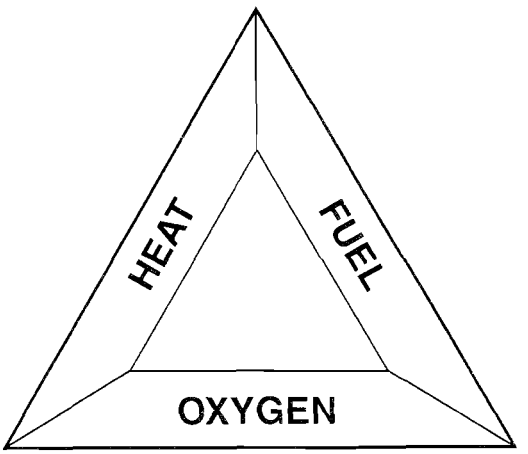
_____

_____ **1**

(4)

Marks

7. The fire triangle shows the three things needed for a fire.



Fire triangle

(*a*) Why does putting a fire blanket over a burning chip pan put out the fire?

_____

_____

_____ **1**

(*b*) Water must **not** be used on a chip pan fire.
Why would it be dangerous to use water on a chip pan fire?

_____

_____

_____ **1**

(*c*) Why are some gases given off by burning plastics dangerous?

_____

_____ **1**

(3)

[Turn over

Marks

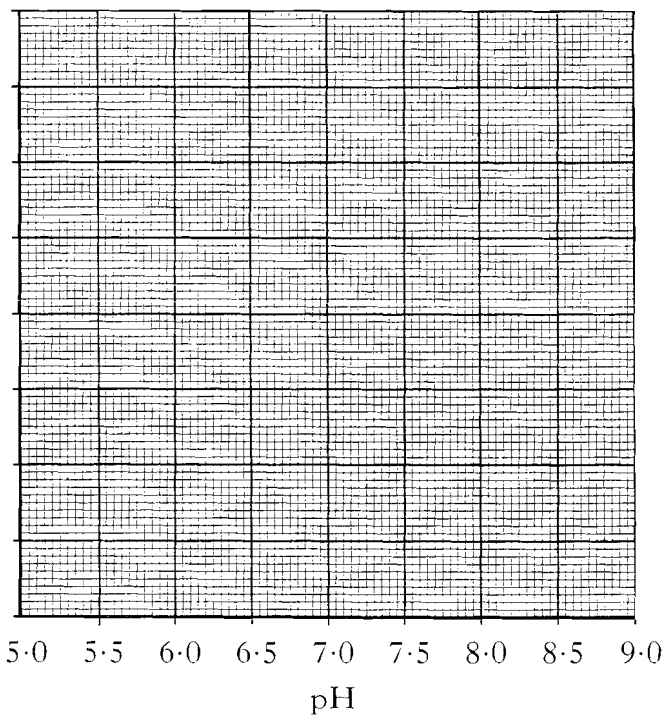
8. A chemistry class was investigating the breakdown of starch using the enzyme amylase.

They carried out experiments at different pH values and timed how long it took for the starch to be completely broken down.

pH	**5·0**	**5·5**	**6·0**	**6·5**	**7·0**	**7·5**	**8·0**
Time taken for starch to break down (mins)	6·0	5·5	4·0	1·8	1·5	2·5	3·5

(*a*) Plot these results as a line graph using the axes provided; one axis has been labelled and scaled for you.

(Additional graph paper, if required, will be found on page 23.)



2

Marks

8. (continued)

(*b*) Predict how many minutes it will take for the starch to break down when the pH is 8·5.

_____ **1**

(*c*) Does the enzyme amylase work best in acidic, alkaline or neutral conditions?

_____ **1**

(*d*) The enzyme amylase is a natural catalyst.
What is a catalyst?

_____

_____

_____ **1**

(5)

[Turn over

Marks

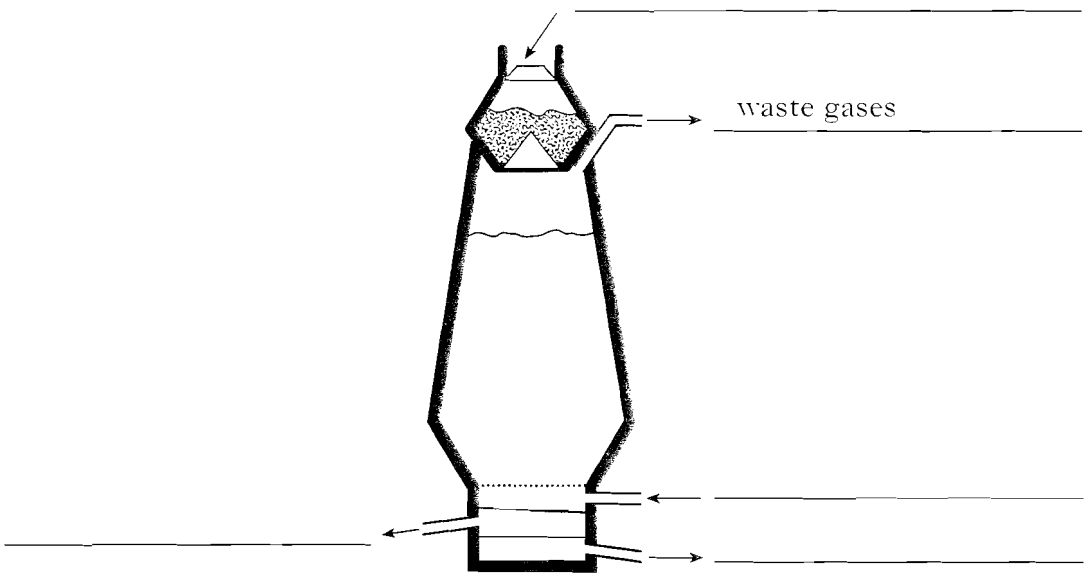
9. (*a*) Name a metal which can be found uncombined in the Earth's crust.

_____ **1**

(*b*) Iron can be extracted from iron ore by heating the ore in a blast furnace with carbon monoxide gas.

The raw materials are **iron ore**, **limestone and coke**. They are fed in at the top of the blast furnace. **Hot air** is blown in near the bottom of the furnace. **Melted iron** is removed from the bottom of the furnace. Floating on top of the iron is **melted slag impurity**. This is removed through its own pipe.

Use the words in **bold** type to label the diagram of the blast furnace.



2

(*c*) (i) Aluminium cannot be extracted from its ore using a blast furnace. How is aluminium extracted from its ore?

_____ **1**

(ii) Why is aluminium used to make aircraft bodies?

(You may wish to refer to page 2 of your data booklet to answer this question.)

_____

_____ **1**

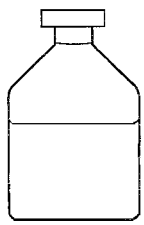
(5)

Marks

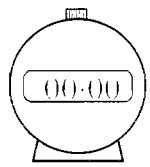
10. Unit 1 PPA 2—The Effect of Concentration Changes on Reaction Speed.

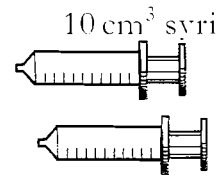
A chemistry class investigated the reaction of sulphuric acid with magnesium ribbon. They investigated how changing the concentration of the acid changed the speed of reaction with magnesium.

They used this equipment:



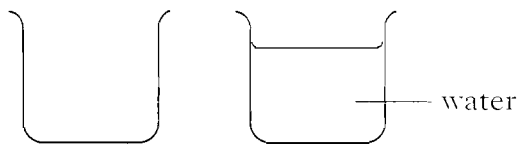
2 mole per litre sulphuric acid





10 cm^3 syringes

strips of magnesium metal



(*a*) The different concentrations of acid were prepared by diluting the 2 mole per litre acid with water.
How would you prepare 20 cm^3 of 1 mole per litre sulphuric acid?

_____

_____

_____

_____ **1**

(*b*) During the experiment, what was timed to show how quickly the magnesium reacted with the acid?

_____

_____ **1**

(*c*) Name the salt formed during the reaction.

_____ **1**

(3)

[Turn over for Question 11 on Page *twenty-two*

Marks

11. (*a*) Why do farmers spread fertilisers on fields after harvesting crops?

_____

_____

_____ **1**

(*b*) Peas and clover are plants which have root nodules.
What do these enable the plants to do?

_____

_____

_____ **1**

(*c*) A 20 kg bag of fertiliser contains 7 kg of nitrogen.
What is the percentage of nitrogen in the fertiliser?

Answer _____ % **1**

(*d*) The plastic for the bag is made from a monomer called ethene.
Name the **process** used to make the plastic.

_____ **1**

(4)

[END OF QUESTION PAPER]