FOR OFFICIAL USE

Section B Total Marks

X012/101

NATIONAL QUALIFICATIONS 2002

TUESDAY, 4 JUNE 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 14)

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

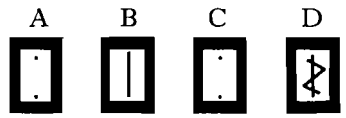
B chromatography

C fractional crystallisation

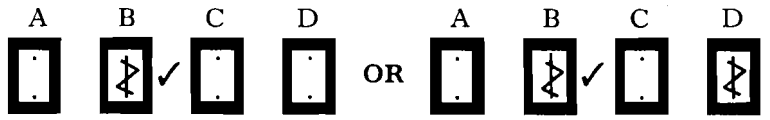
D filtration.

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. Which element shows similar chemical properties to chlorine?

   (You may wish to use page 6 of the data booklet to answer this question.)

   A Argon

   B Iodine

   C Oxygen

   D Sulphur

2. Dissolving chlorine in water

   A kills bacteria

   B makes if fizzy

   C prevents lead poisoning

   D protects against tooth decay.

3. Air is approximately

   A 20% carbon dioxide and 80% oxygen

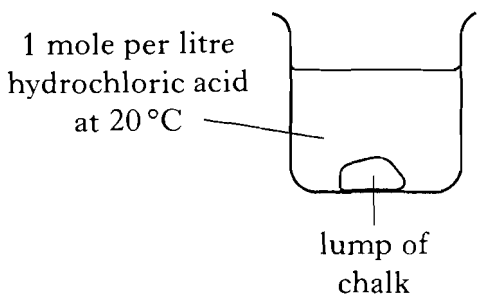
   B 20% oxygen and 80% carbon dioxide

   C 20% nitrogen and 80% oxygen

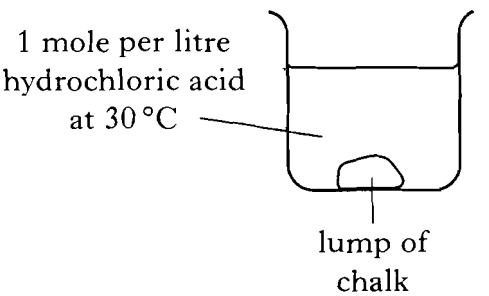
   D 20% oxygen and 80% nitrogen.

4. In which experiment will the reaction be **fastest**?

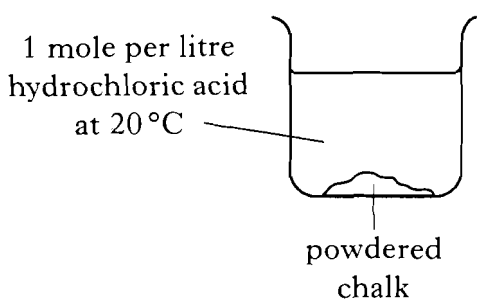
A



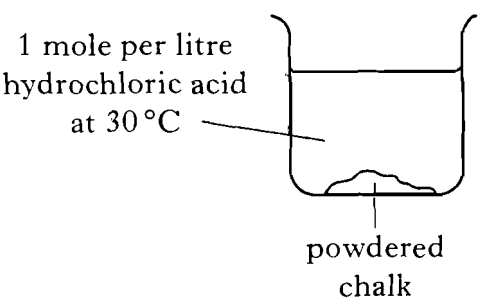
B



C



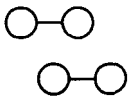
D



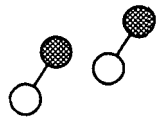
5. The structure of substances can be represented by models.

Which model shows a compound made of ions?

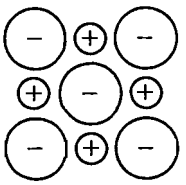
A



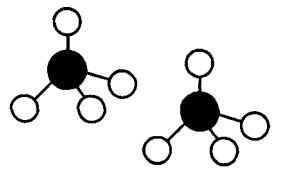
B



C



D



6. Alkalis neutralise acids to form water.

What happens to the pH of the acid and the alkali during neutralisation?

	pH of acid goes	**pH of alkali goes**
A	up	up
B	up	down
C	down	down
D	down	up

7. Which gas is produced when magnesium carbonate is used to neutralise hydrochloric acid?

A Chlorine

B Carbon dioxide

C Hydrogen

D Carbon monoxide

8. Which metal reacts with oxygen but does not react with water?

(You may wish to use page 5 of the data booklet to answer this question.)

A Iron

B Magnesium

C Silver

D Sodium

9. Aluminium metal can be protected from corrosion by increasing the thickness of its oxide layer.

This process is called

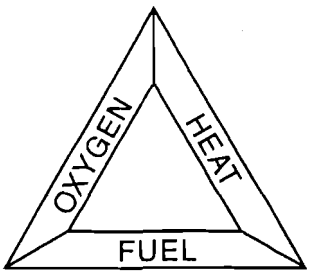
A anodising

B electroplating

C galvanising

D tin-plating.

10. The fire triangle tells us that a fire needs a fuel, oxygen and a temperature high enough to start the fire and keep it going.



Using a fire blanket puts out fires by

A soaking up the fuel

B stopping oxygen getting to the fuel

C lowering the temperature of the fuel

D providing carbon dioxide to put out the fire.

11. Oil and grease stains can be removed by dry-cleaning.

Dry-cleaning uses

A water

B soapless detergent

C special solvents

D washing powder.

12. In an oil refinery, crude oil is separated into useful fuels and other products by

A cracking

B distillation

C fermentation

D polymerisation.

[Turn over

13. Biogas is a fuel produced from the decomposition of plant material.

Biogas is mainly

A alcohol

B hydrogen

C methane

D oil.

14. Which of the following polymers is **not** a plastic?

A Bakelite

B Kevlar

C Silicone

D Starch

15. In respiration, a carbohydrate reacts with oxygen to produce carbon dioxide and water.

For example:

$$\text{glucose} + \text{oxygen} \rightarrow \text{carbon dioxide} + \text{water}$$

Another name for this type of reaction is

A combustion

B corrosion

C fermentation

D neutralisation.

16. A herbicide is used to

A control plant pests

B kill weeds

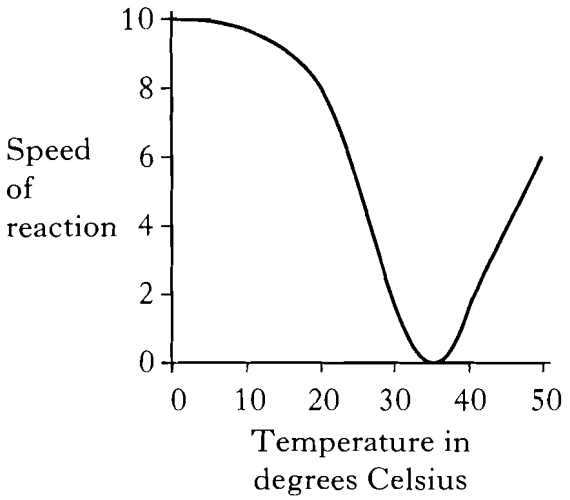
C prevent plant disease

D replace essential elements in the soil.

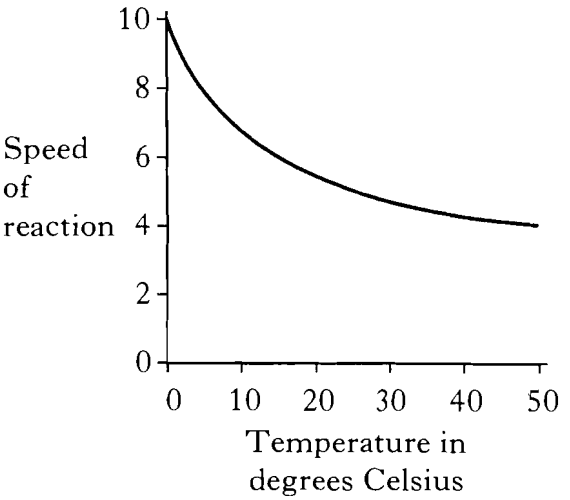
17. When food is digested in the body, proteins are broken down by enzymes.

Which graph shows that the enzymes work fastest at 37 °C?

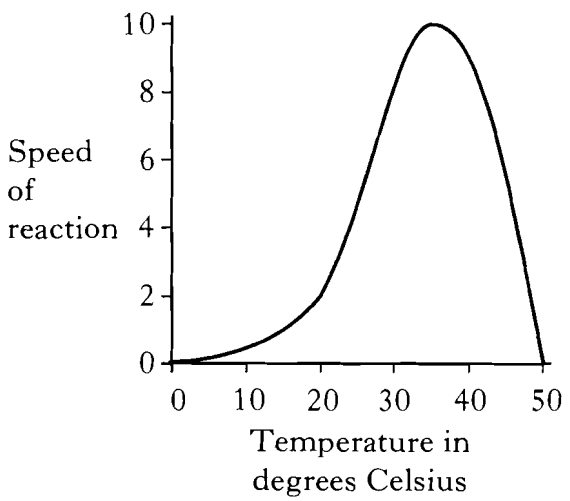
A



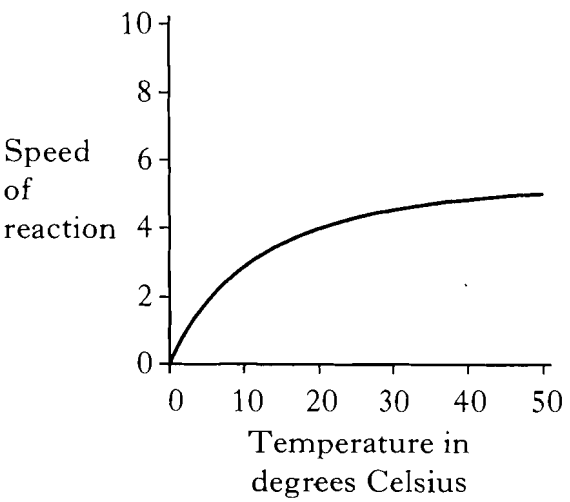
B



C



D



18. Which statement about drugs is correct?

A All drugs alter the way in which the body works.

B All drugs can damage health.

C All drugs can help the body.

D All drugs are illegal.

[Turn over

19. How long does it take the body to break down the alcohol in one pint of beer?

A $\frac{1}{2}$ hour

B 1 hour

C 2 hours

D 4 hours

20. Which statement about methanol is **false**?

A It is very toxic.

B It is an alcohol.

C It can cause blindness and death.

D It is used to make alcoholic drinks.

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

[Turn over for SECTION B on *Page ten*]

WRITE IN THIS MARGIN

Marks

SECTION B

40 marks are available in this section of the paper.

1. **"Smelly feet tamed"**

The bacteria which cause trainers to become smelly can be killed by nitrogen monoxide.

Nitrogen monoxide is a gas. It is made up of molecules.

(*a*) What is a molecule?

_____

_____ **1**

(*b*) Write the formula for nitrogen monoxide.

_____ **1**

(*c*) Nitrogen dioxide is formed when nitrogen monoxide reacts with oxygen.

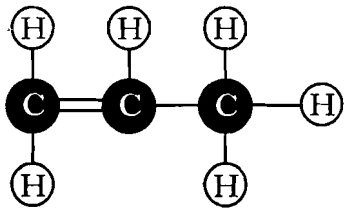
Write a word equation for this reaction

_____ **1**

(3)

Marks

2. The diagram represents a molecule of propene.



(*a*) Write the formula for propene.

_____ **1**

(*b*) Name the **two** products which are formed when propene is burned in a plentiful supply of air.

_____ **1**

(*c*) Small molecules, like propene, are used to make polymers.
What term is used to describe these small molecules?

_____ **1**

(3)

[Turn over

WRITE IN THIS MARGIN

Marks

Intermediate 1 Chemistry	ELECTRICAL CONDUCTIVITY	Unit 2 PPA 1

Name: B Smith Date: 12/2/02	PC(*a*)	PC(*b*)	PC(*c*)	PC(*d*)	Teacher's Initials:

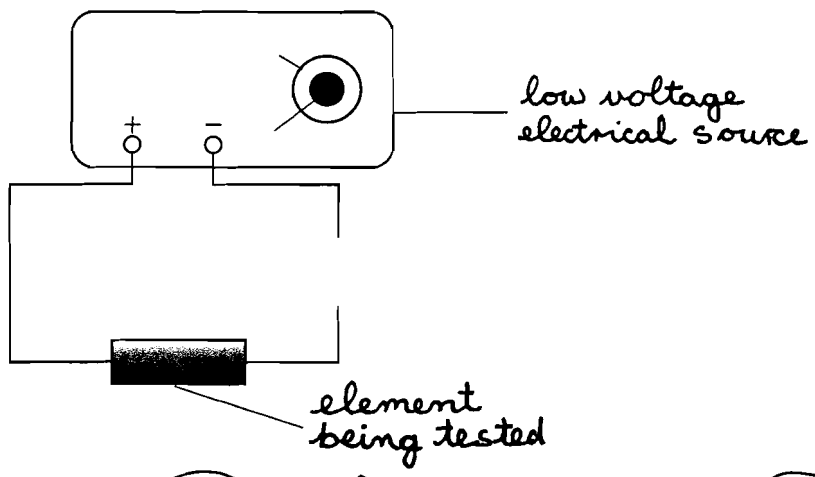
ASSESSMENT SHEET

What was the aim of the experiment?

To test the electrical conductivity of some metals and non-metals and from the results to work out a general rule about the electrical conductivity of elements.

Procedure:

Draw a labelled diagram of the electrical circuit you used.



(*a*) In the diagram, the student has left out the piece of apparatus used to show if the element conducts.

Name the piece of apparatus which has been left out.

_____ 1

(*b*) Complete the results table for the two elements shown.

Element	Metal/Non-metal	Conductor/Non-conductor
Carbon (graphite)		
Gallium		

(You may wish to use page 6 of the data booklet to answer this question.) 2

(3)

Marks

4. The table gives information about some oxides.

Oxide	Type of oxide	Effect on damp pH paper
sulphur dioxide	non-metal	turns red
sodium oxide	metal	turns blue
carbon dioxide	non-metal	turns red
calcium oxide	metal	turns blue

(*a*) From the table, name an oxide which dissolves in water producing an alkaline solution.

_____ **1**

(*b*) Predict the effect lithium oxide would have on damp pH paper.
(You may wish to use page 6 of the data booklet to answer this question.)

_____ **1**

(2)

[Turn over

WRITE IN THIS MARGIN

Marks

5.

Intermediate 1 Chemistry	SOLUBILITY	Unit 3 PPA 1

Name: Mark Young Date: 25th Feb 2002	PC(*a*)	PC(*b*)	PC(*c*)	PC(*d*)	Teacher's Initials: M. McL
	✓	✓	✓	✓	

ASSESSMENT SHEET

What was the aim of the experiment?

To test the solubility in water of some ammonium, potassium, nitrate and phosphate compounds in order to decide if they could be used as fertilisers.

Results

Name of compound	Soluble / Insoluble
ammonium sulphate	soluble
potassium nitrate	soluble
sodium nitrate	soluble
calcium phosphate	insoluble
ammonium phosphate	soluble

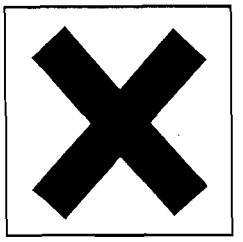
(*a*) Describe briefly how you would show that a compound is soluble in water.

1

Marks

5. (continued)

(*b*) The bottles containing the compounds were all labelled with the following hazard symbol.



What does this hazard symbol mean?

_____ **1**

(*c*) Rivers are polluted if large quantities of fertilisers are washed into them.

What effect will this type of pollution have on rivers?

_____

_____

_____ **1**

(3)

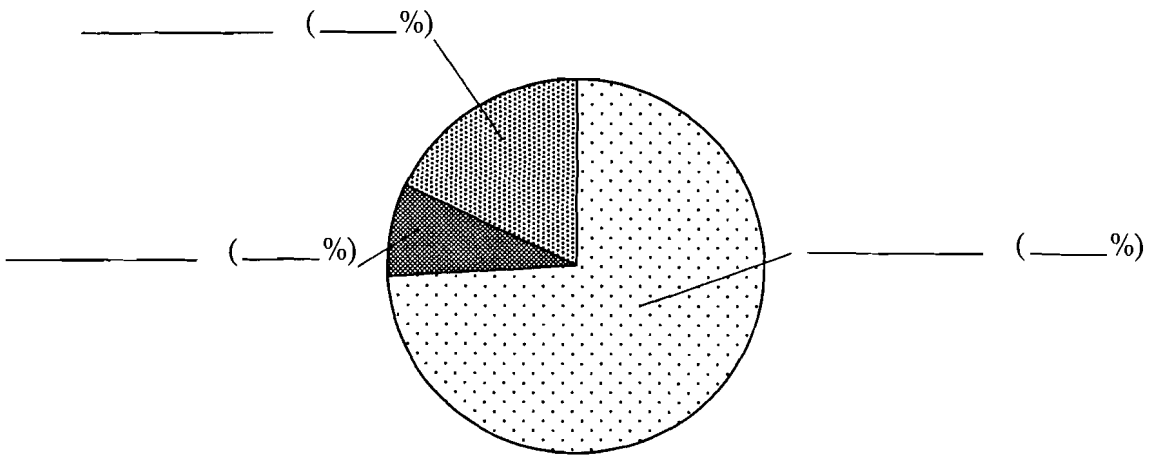
[Turn over

Marks

6. (*a*) Steel is a mixture of metals.
What name is given to a mixture of metals?

_____ **1**

(*b*) Stainless steel contains 8% nickel and 18% chromium. The rest is iron.
Label the pie chart to show the **name** and **percentage** of each metal used to make stainless steel.

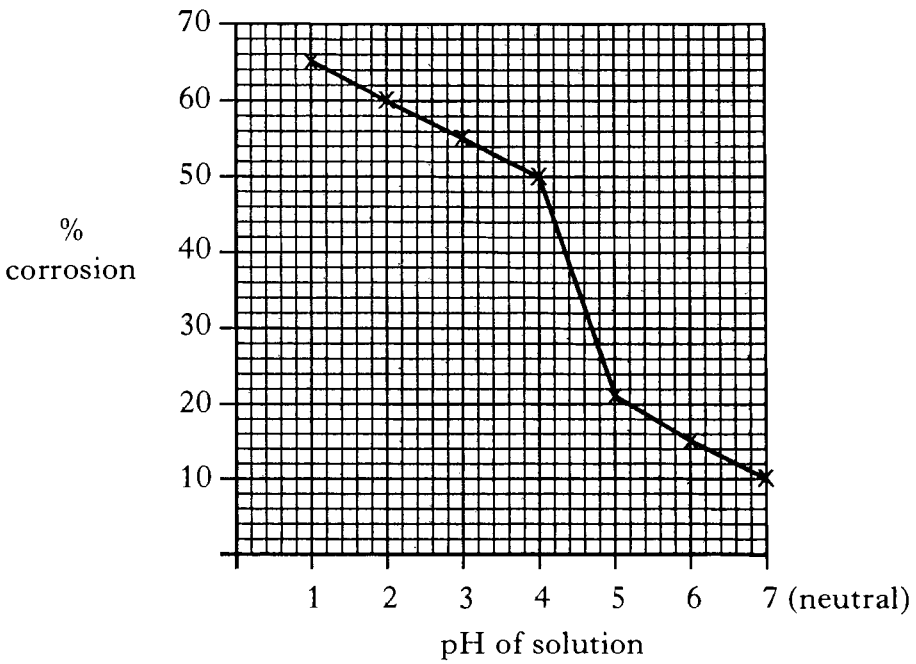


Stainless steel **2**

Marks

6. (continued)

(*c*) The graph shows how pH affects the corrosion of steel bars.



Complete the statement to show how **acidity** affects the corrosion of steel bars.

The more **acidic** the solution _____

_____ **1**

(4)

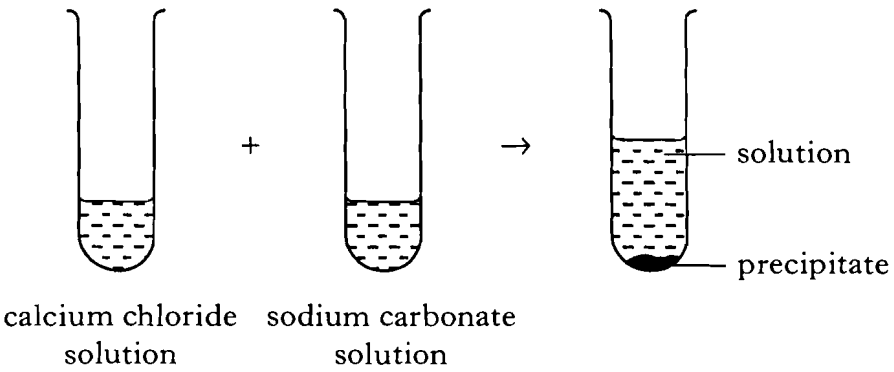
[Turn over

Marks

7. (*a*) Name the elements present in sodium carbonate.

_____ **1**

(*b*) The diagram shows that when calcium chloride solution and sodium carbonate solution are mixed a chemical reaction takes place.



calcium chloride solution

sodium carbonate solution

(i) What evidence is there that a chemical reaction has taken place?

_____

_____ **1**

(ii) **Draw** and **label** a diagram of the apparatus which would be used to separate the precipitate from the solution.
Show on the diagram where the precipitate would collect.

2

(4)

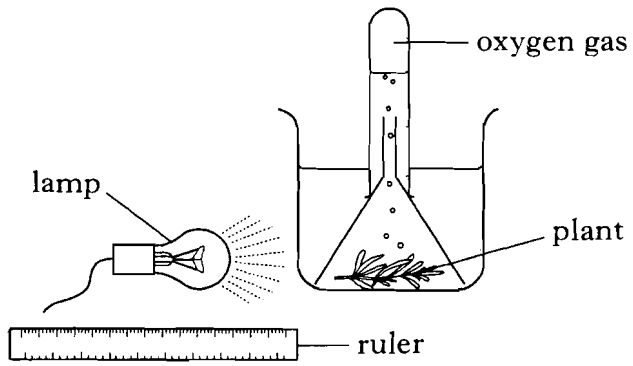
Marks

8. During photosynthesis green plants produce oxygen.

(*a*) Name the substance in green plants which absorbs light during photosynthesis.

_____ **1**

(*b*) A student set up the apparatus below to investigate the rate of photosynthesis. Oxygen gas produced by the plant was collected in the test tube.



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

(i) What effect does the distance of the lamp from the plant have on the number of bubbles of oxygen gas produced?

_____

_____

_____ **1**

(ii) Give **one** variable that needs to be kept the same to make the experiment fair.

_____ **1**

(3)

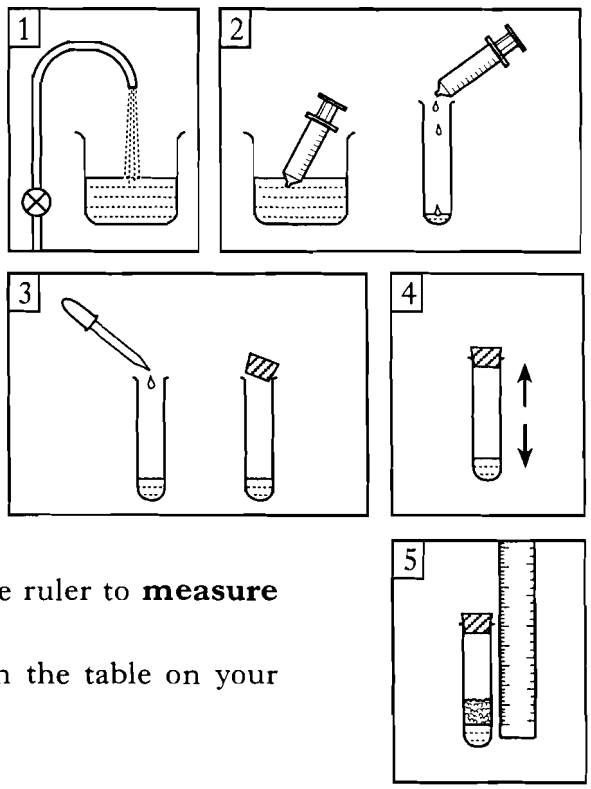
[Turn over

9.

Intermediate 1 Chemistry	Factors which affect Lathering	Unit 2 PPA 3

The aim of this experiment is to investigate whether the **volume of washing-up liquid** used affects the amount of lather produced when the washing-up liquid is shaken with water.

Procedure



1. Fill the beaker half full with water.

2. Using the syringe measure out $3cm^3$ of water into a test tube.

3. Add **one** drop of the solution of washing-up liquid to the water and stopper the tube.

4. With your thumb on the stopper, shake the test tube hard for 15 seconds.

5. ..... and then use the ruler to **measure** the height of the foam.
   Record your result by writing it down in the table on your "assessment" sheet.

6. To obtain a duplicate result, repeat steps 2 to 5 with **one drop** of the solution of washing-up liquid.
   Remember to **measure** and **record** the height of the foam.

7.

WRITE IN THIS MARGIN

Marks

9. (continued)

(*a*) At step 5, what should be done **before** measuring the height of the foam with a ruler?

_____

_____ **1**

(*b*) Instruction 7 should tell you how to continue the investigation.
What should instruction 7 tell you to do?

_____

_____

_____

_____ **1**

(2)

[Turn over

Marks

10. Food additives are chemicals added to food.

Type of food additive	Name of food additive
colouring	anthocyanins
preservative	potassium sorbate
sweetener	aspartame saccharin

The label below shows the ingredients in a fruit juice.

Apple and Blackcurrant Juice

INGREDIENTS: apple juice, blackcurrant juice, citric acid, anthocyanins, flavourings, aspartame, vitamin C, potassium sorbate.

(*a*) Potassium sorbate is added to the fruit juice as a preservative.
Why is a preservative added?

_____

_____ 1

(*b*) Name another additive in the fruit juice and say why it is used.

_____

_____ 1

(2)

THIS MARGIN

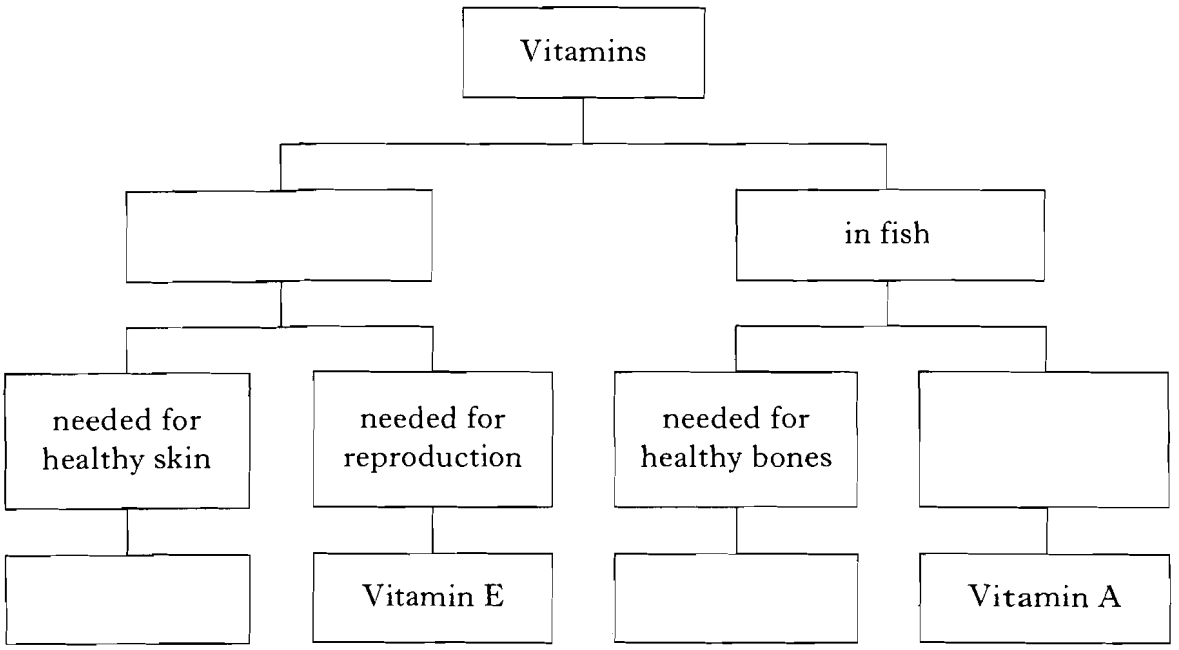
Marks

11. Vitamins are needed by the body to keep it healthy.

Vitamin C and Vitamin E are both found **in green vegetables**.

Vitamin A is **needed to fight disease**, while the body needs **Vitamin D** to help our bones develop properly.

Use this information to complete the key below.



(2)

[Turn over

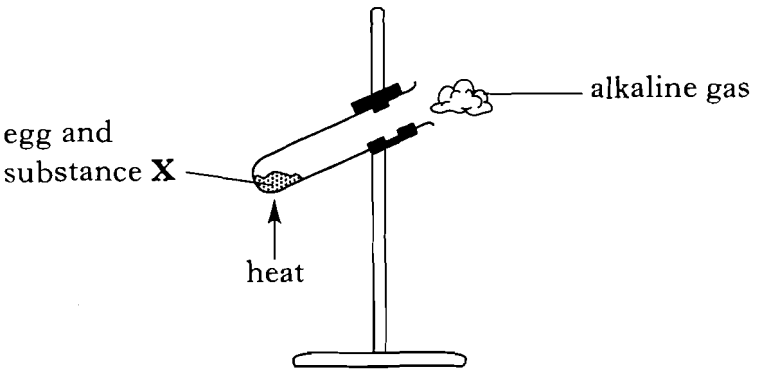
THIS MARGIN

Marks

12. (*a*) Complete the statement.

All protein molecules contain atoms of carbon, hydrogen, oxygen and _____ . **1**

(*b*) Eggs are a source of protein.
A student tested eggs to show that they contain protein.



Substance **X** reacts with the protein in the egg to produce the alkaline gas.
Name substance **X**.

_____ **1**

(*c*) Why is it important that our diet contains protein?

_____

_____ **1**

(3)

Marks

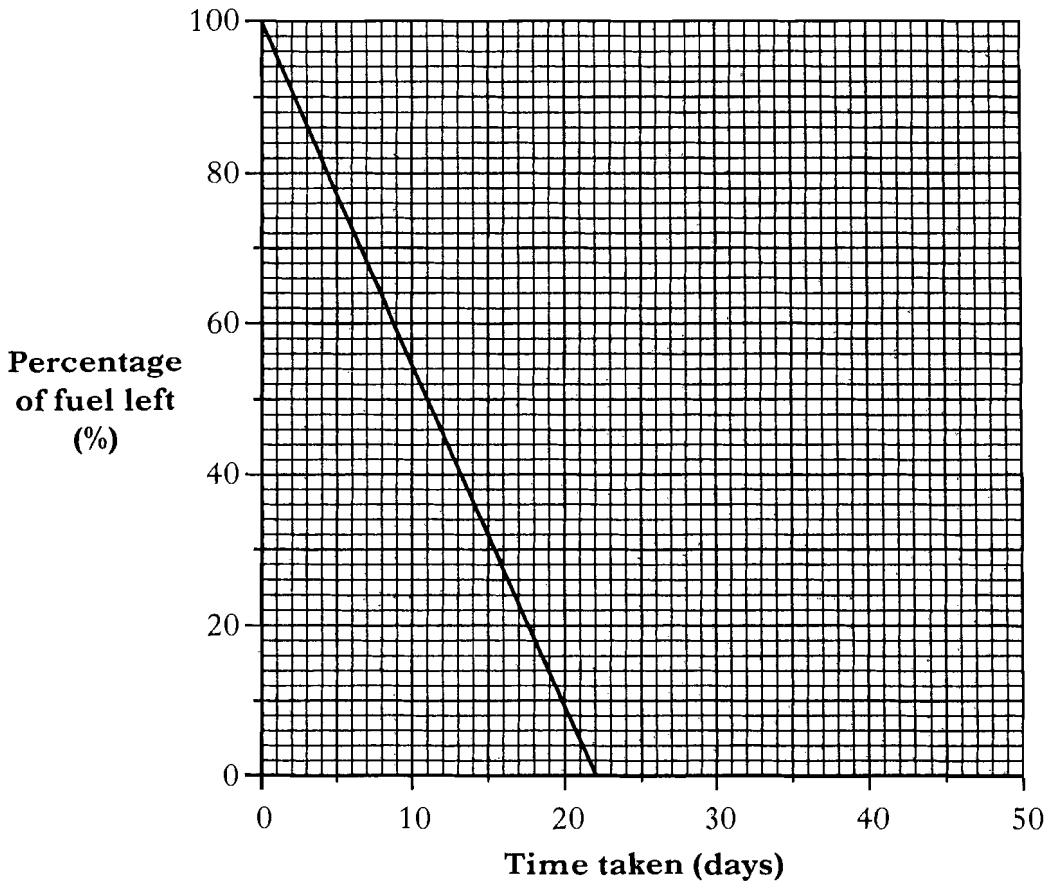
13. A renewable fuel called biodiesel can be made from vegetable oil.

(*a*) What is meant by saying that a fuel is renewable?

_____

_____ **1**

(*b*) The graph shows how quickly biodiesel breaks down after it has been spilt on soil.



(i) What term is used to describe chemicals which are broken down by bacteria in the soil?

_____ **1**

(ii) Diesel obtained from crude oil breaks down **less quickly** in soil than biodiesel.

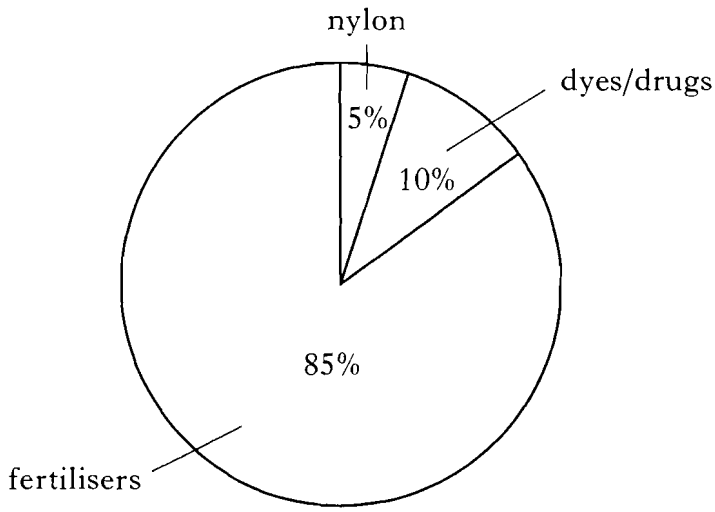
Draw another line on the graph to show how quickly **diesel** breaks down. **1**

(3)

[Turn over for Question 14 on *Page twenty-six*

Marks

14. The pie chart shows the percentage of nitric used to make other substances.



(*a*) Why is nylon described as synthetic?

_____

_____ **1**

(*b*) 20 million tonnes of nitric acid are produced in Europe each year.
How many million tonnes of nitric acid are used to make dyes/drugs?

_____ million tonnes **1**

(*c*) Nitric acid is used to make ammonium nitrate fertiliser.
Name the element provided by ammonium nitrate which is essential for healthy plant growth.

_____ **1**

(3)

[END OF QUESTION PAPER]

Scottish Qualifications Authority

Intermediate 1 Chemistry - 2002 Examination

Paper 1A

Statistical Data from Sample of Candidates

Item	Syllabus Section	Ability	Facility	r	Percentage Choosing Option A	B	C	D	Omit
1	2c	PS	0.63	0.16	20	63*	6	11	1
2	1	KU	0.90	0.15	90*	2	2	5	0
3	1	KU	0.34	0.33	30	20	16	34*	0
4	2c	PS	0.86	0.21	0	5	8	86*	0
5	1	KU	0.40	0.27	15	17	40*	27	0
6	1	KU	0.48	-0.03	4	48*	10	37	0
7	1	KU	0.29	0.04	8	29*	33	28	1
8	2b	PS	0.66	0.18	66*	12	12	11	0
9	2	KU	0.29	0.19	29*	14	47	9	0
10	2	KU	0.84	0.20	5	84*	4	6	1
11	2	KU	0.54	-0.02	3	28	54*	15	0
12	2	KU	0.46	0.04	35	46*	12	7	0
13	2	KU	0.40	0.20	8	26	40*	24	2
14	2	KU	0.89	0.19	3	4	4	89*	0
15	2c	PS	0.34	0.07	34*	6	40	20	1
16	3	KU	0.60	0.20	15	60*	11	13	0
17	2c	PS	0.67	0.17	20	6	67*	6	0
18	3	KU	0.77	0.28	77*	16	2	5	0
19	2b	PS	0.29	-0.03	8	52	29*	11	0
20	3	KU	0.40	0.07	22	11	26	40*	1