FOR OFFICIAL USE

G

	KU	PS
Total Marks		

0500/401

NATIONAL QUALIFICATIONS 2009

MONDAY, 11 MAY
9.00 AM – 10.30 AM

CHEMISTRY
STANDARD GRADE
General Level

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

1 All questions should be attempted.

2 Necessary data will be found in the Data Booklet provided for Chemistry at Standard Grade and Intermediate 2.

3 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.

4 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.

5 Additional space for answers and rough work will be found at the end of the book.

6 The size of the space provided for an answer should not be taken as an indication of how much to write. It is not necessary to use all the space.

7 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.

PART 1

In Questions 1 to 8 of this part of the paper, an answer is given by circling the appropriate letter (or letters) in the answer grid provided.

In some questions, two letters are required for full marks.

If more than the correct number of answers is given, marks will be deducted.

A total of 20 marks is available in this part of the paper.

SAMPLE QUESTION

A CH_4	B H_2	C CO_2
D CO	E C_2H_5OH	F C

(*a*) Identify the hydrocarbon.

(A)	B	C
D	E	F

The one correct answer to part (*a*) is A. This should be circled.

(*b*) Identify the **two** elements.

A	(B)	C
D	E	(F)

As indicated in this question, there are **two** correct answers to part (*b*). These are B and F. Both answers are circled.

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 circle the answer you now consider to be correct. Thus, in part (*a*), if you want to change an answer A to an answer D, your answer sheet would look like this:

~~(A)~~	B	C
(D)	E	F

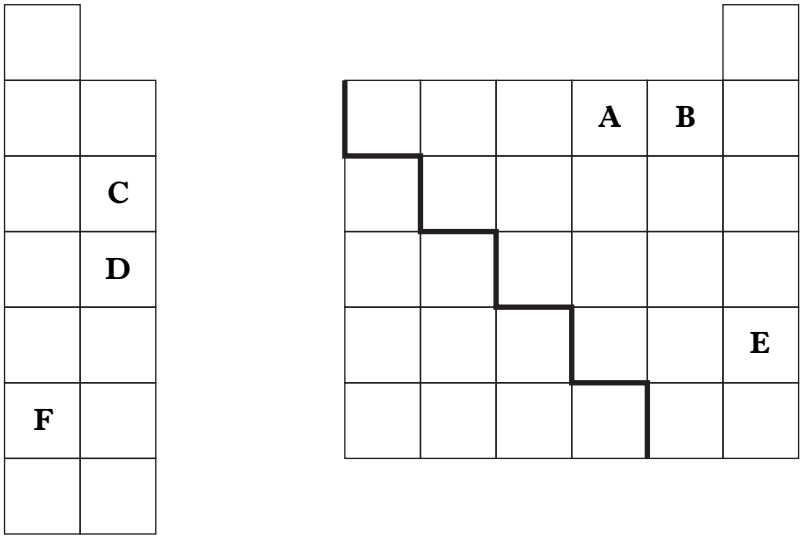
If you want to change back to an answer which has already been scored out, you should enter a tick (✓) in the box of the answer of your choice, thus:

✓~~(A)~~	B	C
~~(D)~~	E	F

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

1. The diagram shows part of the Periodic Table.
The letters do **not** represent the symbols for the elements.



(*a*) Identify the element which has the electron arrangement 2, 7.
You may wish to use page 1 of the data booklet to help you.

A	B	C	D	E	F

1

(*b*) Identify the unreactive element.

A	B	C	D	E	F

1

(*c*) Identify the **two** elements which are in the same group.

A	B	C	D	E	F

1

(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

2. The grid contains the names of some metals.

A mercury	B magnesium	C copper
D iron	E silver	F sodium

(*a*) Identify the metal used as the catalyst in the Haber Process.

A	B	C
D	E	F

1

(*b*) Identify the metal with the highest density.
You may wish to use page 2 of the data booklet to help you.

A	B	C
D	E	F

1

(*c*) Identify the metal which was discovered after 1790.
You may wish to use page 8 of the data booklet to help you.

A	B	C
D	E	F

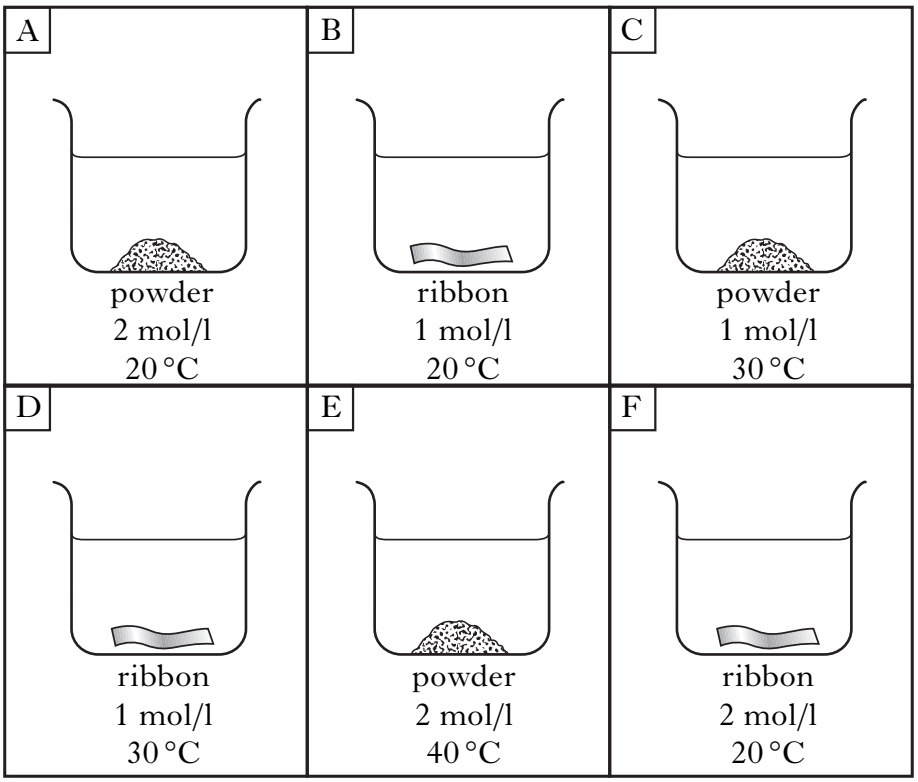
1

(3)

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

3. Two students investigated the reaction between magnesium and dilute hydrochloric acid.



(*a*) Identify the **two** experiments which could be used to show the effect of concentration on the speed of reaction.

A	B	C
D	E	F

1

(*b*) Identify the experiment with the fastest speed of reaction.

A	B	C
D	E	F

1

(2)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

4. The grid contains the names of some gases.

A argon	B hydrogen	C oxygen
D nitrogen	E carbon dioxide	F ammonia

(*a*) Identify the gas which makes up approximately 20% of air.

A	B	C
D	E	F

1

(*b*) Identify the gas which burns with a pop.

A	B	C
D	E	F

1

(*c*) Identify the gas produced during respiration.

A	B	C
D	E	F

1

(*d*) Identify the gas produced when a metal reacts with dilute acid.

A	B	C
D	E	F

1

(4)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

5. The grid contains the names of some elements.

A hydrogen	B carbon	C copper
D zinc	E nitrogen	F iron

(*a*) Identify the element produced in a blast furnace.

A	B	C
D	E	F

1

(*b*) Identify the element used to galvanise steel objects.

A	B	C
D	E	F

1

(2)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

6. The grid shows the names of some compounds.

A lead sulphate	B sodium chloride
C calcium hydroxide	D potassium phosphate

(*a*) Identify the compound which contains only **two** elements.

A	B
C	D

1

(*b*) Identify the compound which will neutralise an acid.

A	B
C	D

1

(2)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

7. A student made some statements about glucose.

A	Glucose is a carbohydrate.
B	Glucose is insoluble in water.
C	Glucose is made during photosynthesis.
D	Iodine solution can be used to test for glucose.
E	Glucose molecules are too large to pass through the gut wall.

Identify the **two** correct statements.

A
B
C
D
E

(2)

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

8. Silver and gold are used to make jewellery.

Identify the **two** statements which are true for **both** silver and gold.
You may wish to use the data booklet to help you.

A	They are transition metals.
B	They do **not** conduct electricity.
C	They are more reactive than lead.
D	They react with hydrochloric acid.
E	They are found uncombined in the Earth's crust.

A
B
C
D
E

(2)

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PART 2

A total of 40 marks is available in this part of the paper.

9. Coal is a fossil fuel which burns, releasing heat energy.

(*a*) What name is given to all chemical reactions which release heat energy?

_____ **1**

(*b*) Coal is a finite resource.
What is meant by the term **finite**?

_____

_____ **1**

(*c*) Name another fossil fuel.

_____ **1**

(3)

[Turn over

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10. Magnesium and chlorine are common elements.

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

Element	Atomic Number	Metal or non-metal
magnesium		
chlorine		

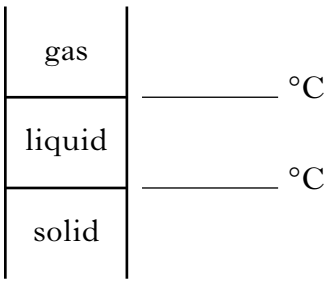
1

(*b*) Magnesium and chlorine react together to form magnesium chloride.

(i) Write the formula for magnesium chloride.

1

(ii) Using information from page 6 of the data booklet, enter the melting point and boiling point of magnesium chloride on the diagram below.



1

(iii) (Circle) the correct word to complete the following sentence.

At 1000 °C magnesium chloride is a { gas / liquid / solid }.

1

(4)

DO NOT WRITE IN THIS MARGIN

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11. Plastics have many uses. Perspex is used to make advertising signs. Artificial limbs can be made from PVC. Polythene can be used to make carrier bags and egg cartons can be made from polystyrene.

(*a*) Present this information as a table with suitable headings.

2

(*b*) Scientists have produced a plastic which is biodegradable.

What is meant by the term **biodegradable**?

_____

_____ **1**

(*c*) PVC softens when heated and can be easily reshaped.

What term is used to describe this type of plastic?

_____ **1**

(*d*) Name the monomer which is used to make polystyrene.

_____ **1**

(*e*) Name the type of chemical reaction which is used to make polystyrene.

_____ **1**

(6)

[Turn over

DO NOT WRITE IN THIS MARGIN

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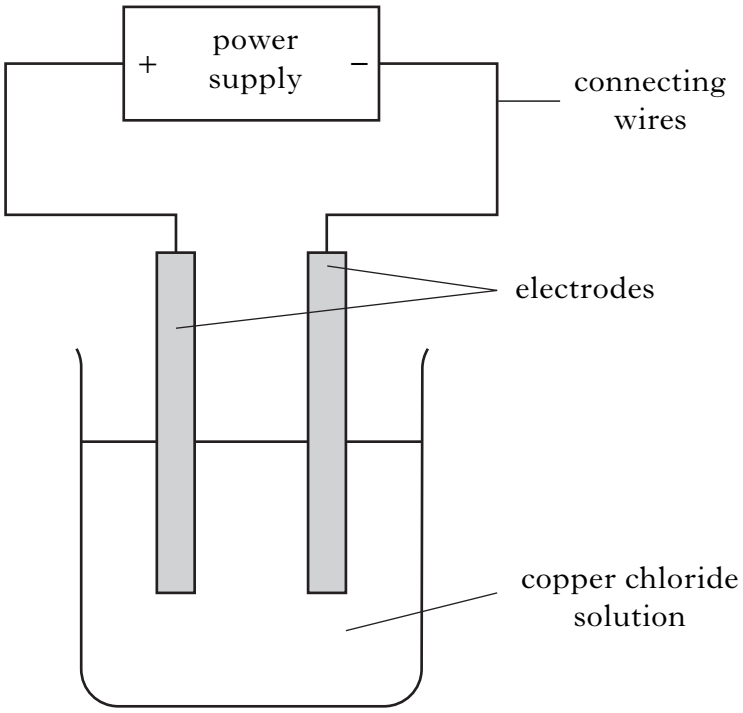
12. A student carried out the experiment shown.



(*a*) Name the product formed at the positive electrode.

_____ **1**

(*b*) Name the charged particles that flow through the connecting wires.

_____ **1**

(*c*) Name a non-metal element which is suitable for use as the electrodes.

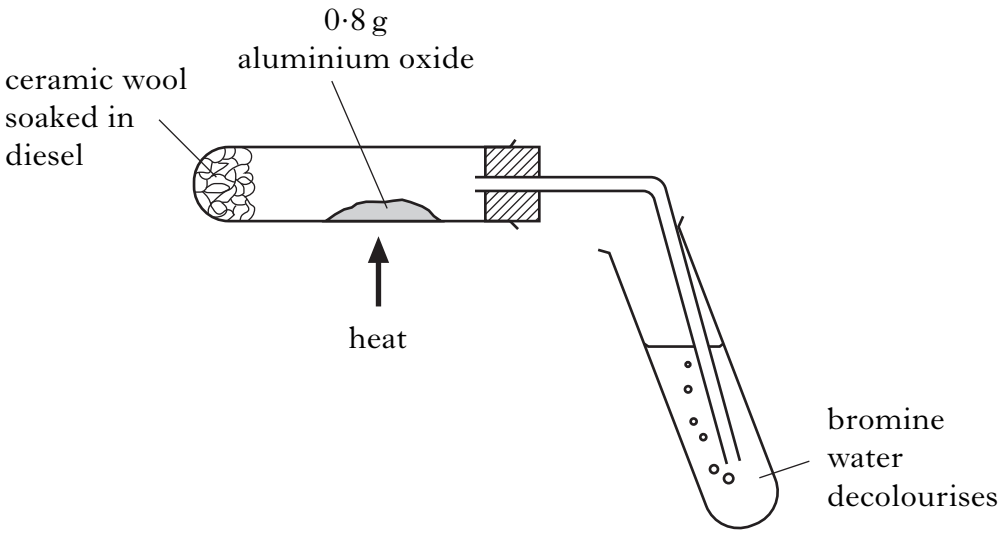
_____ **1**

(3)

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

13. Long chain alkanes in diesel can be broken down using aluminium oxide as a catalyst.



(*a*) What mass of aluminium oxide will be present at the end of the experiment?

_____ g **1**

(*b*) One reaction taking place in the heated test tube is:

$$C_{16}H_{34} \longrightarrow C_7H_{14} + C_9H_{20}$$

(i) Name this type of chemical reaction.

_____ **1**

(ii) On the equation above circle the formula of the product which decolourised the bromine water. **1**

(3)

[Turn over

DO NOT WRITE IN THIS MARGIN

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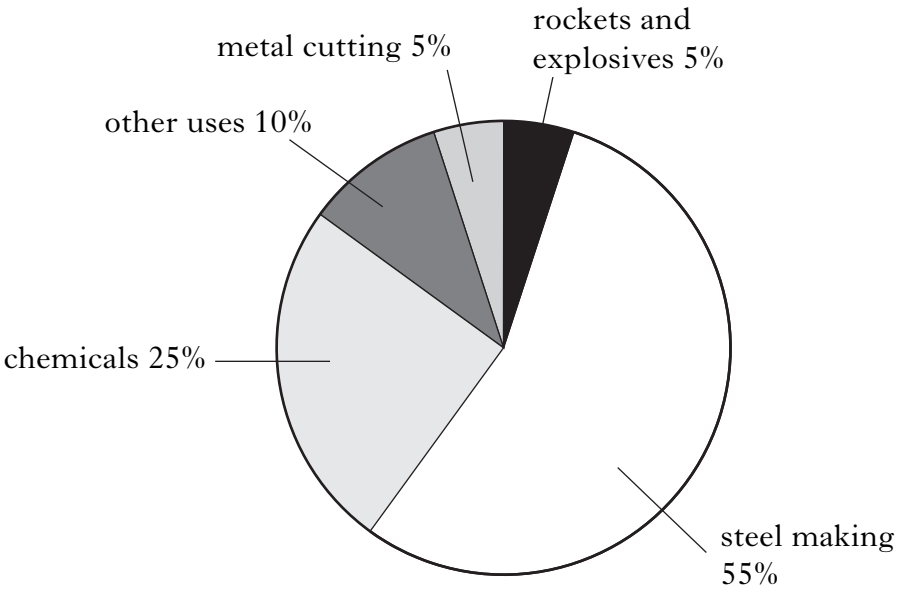
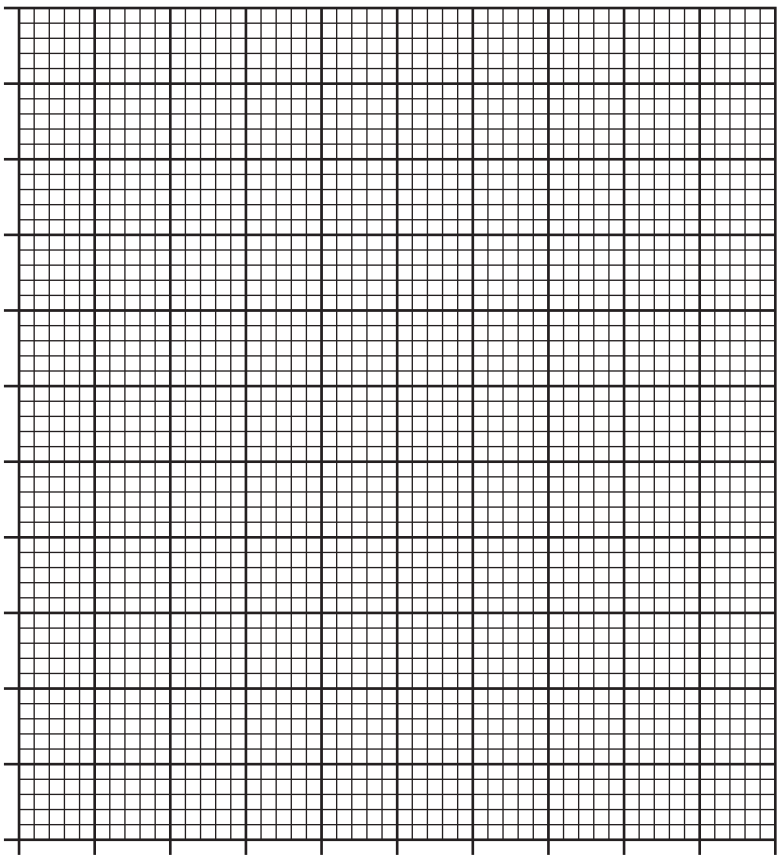
14. The pie chart shows the uses of oxygen.



(*a*) Present the information as a bar chart.

Use appropriate scales to fill most of the graph paper.

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



2

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	Marks	KU	PS

14. (continued)

(*b*) Oxygen is made up of diatomic molecules.

What is meant by the term **diatomic**?

_____

_____

_____ **1**

(*c*) Steel is a mixture of metals.

What name is given to a mixture of metals such as steel?

_____ **1**

(*d*) Different methods can be used to prevent steel from rusting.

(i) How does tin-plating prevent rusting?

_____

_____ **1**

(ii) Name a metal which can be used to provide sacrificial protection to steel.

_____ **1**

(6)

[Turn over

Marks	KU	PS

15. Batteries are used in a range of items. A battery is a number of cells joined together.

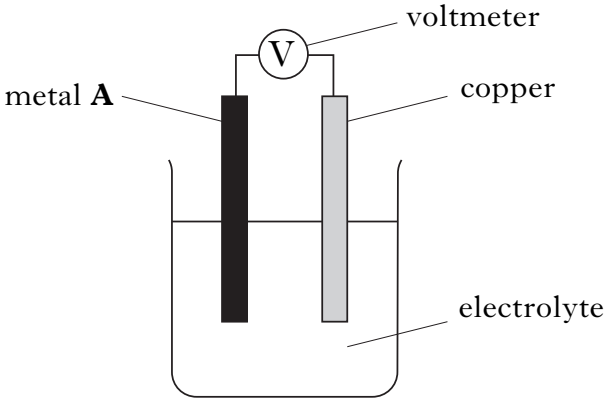


(*a*) Give a **disadvantage** in using a battery rather than mains electricity.

_____

_____ **1**

(*b*) A student investigated how different metals affect the voltage produced by a simple cell.



The results are shown in the table.

Metal A	**Voltage/V**
magnesium	2·7
tin	0·5

(i) The student set up another cell using iron and copper.

Suggest the voltage produced by this cell.

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

_____ V **1**

(ii) Suggest **one** factor which the student would have kept the same to make a fair comparison.

_____ **1**

(3)

DO NOT WRITE IN THIS MARGIN

	Marks	KU	PS

16. (*a*) Ammonium nitrate is a synthetic fertiliser. It contains nitrogen which is essential for plant growth.

(i) What is meant by the term **synthetic**?

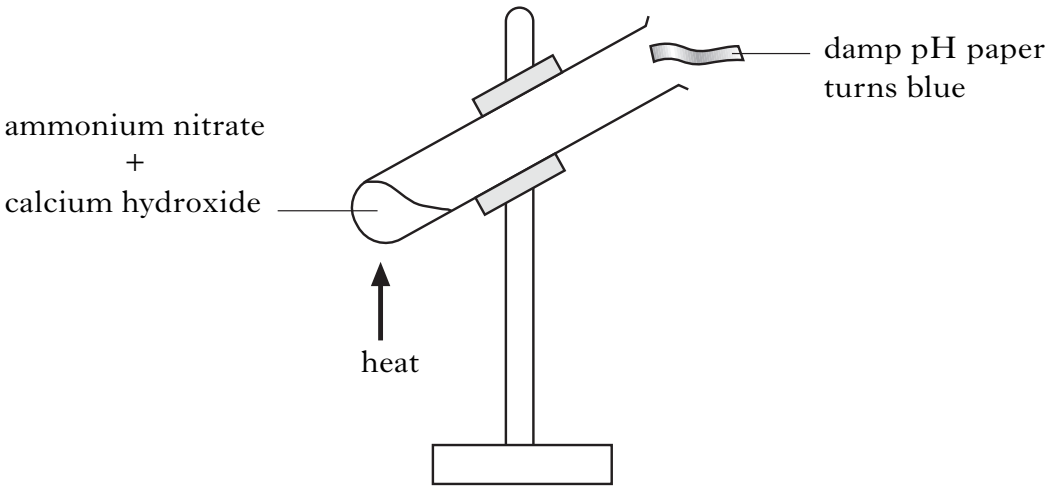
_____

_____ **1**

(ii) Name another essential element supplied by fertilisers.

_____ **1**

(*b*) When ammonium nitrate is heated with calcium hydroxide, a colourless gas is produced. The gas turns damp pH paper blue.



Name the gas produced.

_____ **1**

(3)

[Turn over

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	Marks	KU	PS

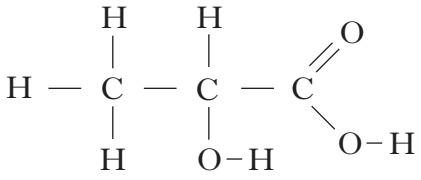
17. Yoghurt is made by fermenting fresh milk. Enzymes help to convert lactose in the milk to lactic acid.

(*a*) What is an enzyme?

_____

_____ **1**

(*b*) The diagram shows a molecule of lactic acid.



Write the molecular formula for lactic acid.

1

(*c*) Sugar can be added to sweeten yoghurt.

Suggest why sugar is added **after** the fermentation stage and not before.

_____

_____

_____ **1**

(3)

DO NOT WRITE IN THIS MARGIN

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18. A student carried out an experiment to find the pH of various solutions.

Workcard

Instructions

1. Burn the element in a gas jar of oxygen.
2. Add water to the oxide formed.
3. Add 5 drops of universal indicator and shake the gas jar.
4.
5. Record the pH.

Results:

Name of oxide	pH of solution
sulphur dioxide	2
sodium oxide	13
phosphorus oxide	
aluminium oxide	could not be measured

(*a*) Instruction 4 is missing from the workcard.

What should instruction 4 tell the student to do?

_____

_____ **1**

(*b*) Complete the table showing the result the student would have obtained for phosphorus oxide. **1**

(*c*) Suggest why the pH of aluminium oxide could not be measured.

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

_____ **1**

(3)

[Turn over

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19. The higher the octane number of a fuel the better it burns.

Number of carbon atoms	Octane number	
	alkane	alkene
4	94	98
5	62	93
6	25	85
7	0	75

(*a*) How does the number of carbon atoms affect the octane number of the alkanes?

_____

_____

_____ **1**

(*b*) Predict the octane number of the **alkene** with 3 carbon atoms.

_____ **1**

(*c*) In general, how does the octane number of an **alkane** compare with the octane number of the **alkene** with the same number of carbon atoms?

_____

_____

_____ **1**

(3)

[*END OF QUESTION PAPER*]

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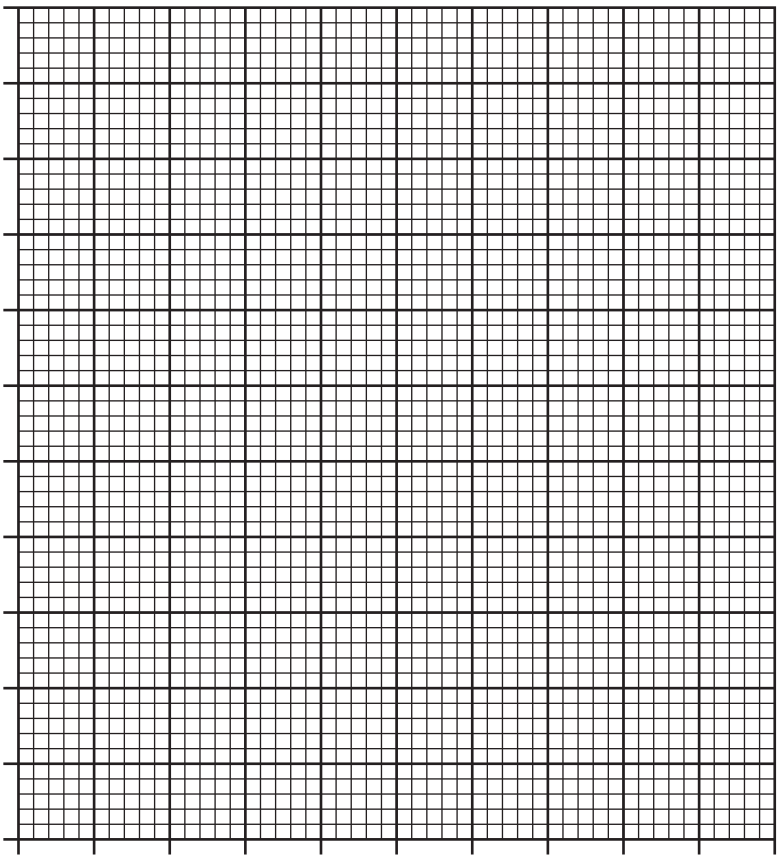
ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 14(*a*)



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ADDITIONAL SPACE FOR ANSWERS

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