

FOR OFFICIAL USE

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G

KU

PS

Total
Marks

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0500/401

NATIONAL
QUALIFICATIONS
2011

THURSDAY, 26 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

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Town

--

Forename(s)

--

Surname

--

Date of birth

Day Month Year

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Scottish candidate number

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Number of seat

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- 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 ₂ H ₅ OH	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

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A	B	C
Mg	N	Ag
D	E	F
S	F	Si

- 1**

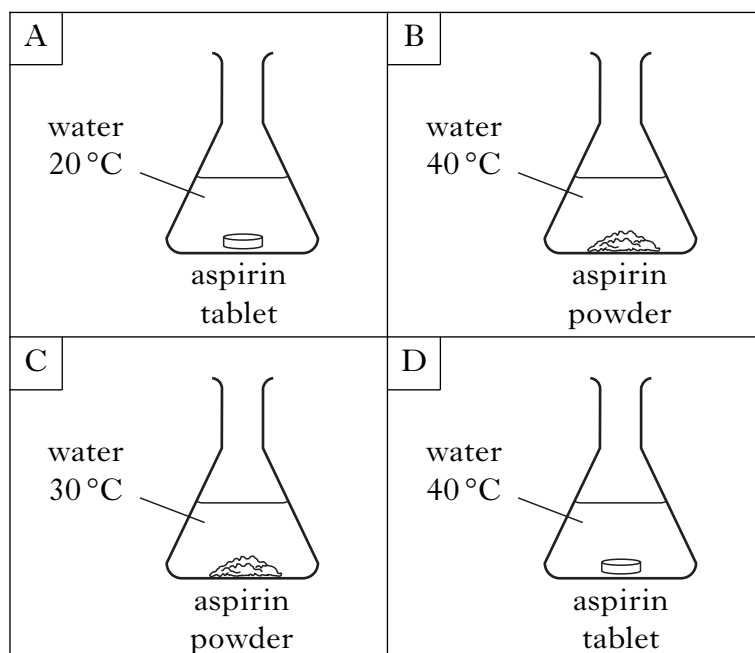
A	B	C
D	E	F

- 1**
(2)

A	B	C
D	E	F

[Turn over

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(a) Identify the experiment in which the aspirin would take the longest time to dissolve.

A	B
C	D

1

(b) Identify the **two** experiments which should be compared to show the effect of particle size on the speed of dissolving.

A	B
C	D

1

(2)

[illegible]

A	B	C
sodium	calcium	potassium
D	E	F
zinc	tin	gold

(a) Identify the metal used to galvanise iron.

A	B	C
D	E	F

1

(b) Identify the metal that does **not** react with dilute acid.

A	B	C
D	E	F

1

(c) Identify the metal which has a relative atomic mass of 118.5.

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

A	B	C
D	E	F

1

(d) Identify the metal found uncombined in the Earth's crust.

A	B	C
D	E	F

1

(4)

[Turn over

Marks

KU PS

4. The grid contains the names of some chemical processes.

A	electrolysis	B	polymerisation	C	Ostwald
D	Haber	E	distillation	F	cracking

- (a) Identify the process used to produce smaller, more useful hydrocarbons.

A	B	C
D	E	F

1

- (b) Identify the process which uses electricity to break up a compound into its elements.

A	B	C
D	E	F

1

- (c) Identify the process used to make plastics from alkenes.

A	B	C
D	E	F

1

(3)

[illegible]

A	B	C
He	NO ₂	H ₂
D	E	F
K ₂ O	O ₂	CO ₂

A	B	C
D	E	F

1

A	B	C
D	E	F

1

A	B	C
D	E	F

1

A	B	C
D	E	F

1
(4)

[Turn over

KU	PS
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A	ammonium sulphate	B	sodium sulphate	C	barium sulphate
D	zinc sulphate	E	copper sulphate	F	magnesium sulphate

- 1**

1
(2)

A	B	C
D	E	F

- (b) Identify the sulphate which contains an essential element for healthy plant growth.

A	B	C
D	E	F

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-
- The diagram shows a gas jar (labeled 'nitrogen') containing a burning magnesium ribbon (labeled 'burning magnesium') at the bottom. Wavy lines above the ribbon indicate it is burning.

A	oxygen
B	ammonia
C	hydrogen
D	carbon dioxide

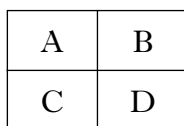
A
B
C
D

(1)

[Turn over

KU	PS
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- (2)



[Turn over for Part 2 on *Page twelve*

Marks

KU	PS
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PART 2**A total of 40 marks is available in this part of the paper.****9.** The Periodic Table lists the names of elements.

(a) Elements are made up of atoms.

Why are atoms neutral?

1

(b) The alkali metals, the halogens and the noble gases are groups of elements in the Periodic Table.

Complete the table by circling a word in each box to give correct information about each group.

(Two pieces of correct information have already been circled.)

You may wish to use page 1 of the data booklet to help you.

Alkali Metals	Halogens	Noble Gases
<u>metal</u> / non-metal	metal / non-metal	metal / non-metal
reactive / unreactive	<u>reactive</u> / unreactive	reactive / unreactive

**2
(3)**

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-

○ represents a hydrogen atom (H)

- 1

- 1**

- 1**

[Turn over

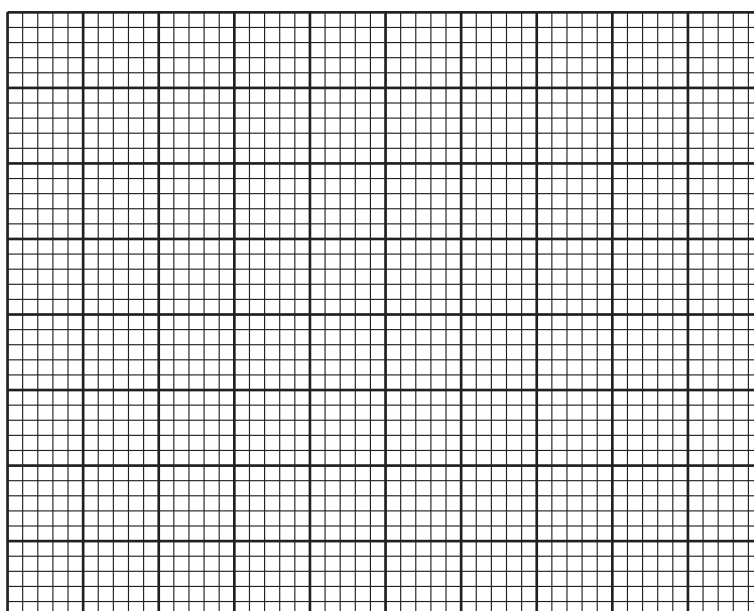
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- Marks*

[illegible]

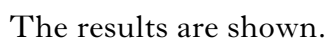
2

1
(3)



- 1**
(3)

- [illegible]



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

1

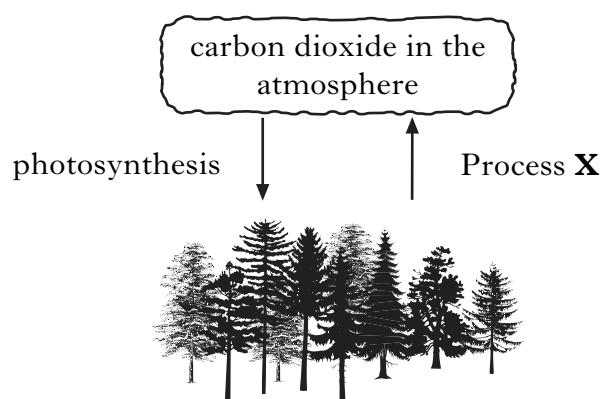
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1
(2)

[Turn over

KU	PS
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13. Forests are important in maintaining the level of carbon dioxide in the atmosphere.



(a) Name Process **X**.

1

(b) The equation for photosynthesis is:

carbon dioxide + compound **Y** $\longrightarrow$ glucose + oxygen

Name compound **Y**.

1

(c) The table shows how the level of carbon dioxide in the atmosphere has changed since 1975.

Year	Level of carbon dioxide/units
1975	330
1985	345
1995	358
2005	374
2015	

Predict the level of carbon dioxide in the atmosphere in 2015 if the trend continues.

_____ units

1

(3)

KU	PS
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- Complete the table to show the property of the metal which makes it suitable for each use.

conducts heat low density conducts electricity

1

- What **term** is used to describe naturally occurring compounds of metals?

1
(2)

[0500/401]

[illegible]

- (a) (i) What does non-biodegradable mean?

1

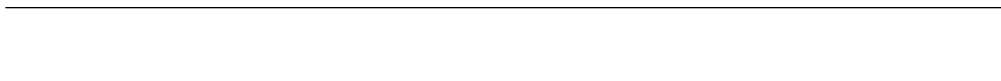
- $$\begin{array}{c} \text{H} & \text{H} \\ | & | \\ \text{C} & = \text{C} \\ | & | \\ \text{H} & \text{H} \end{array} + \begin{array}{c} \text{H} & \text{H} \\ | & | \\ \text{C} & = \text{C} \\ | & | \\ \text{H} & \text{H} \end{array} + \begin{array}{c} \text{H} & \text{H} \\ | & | \\ \text{C} & = \text{C} \\ | & | \\ \text{H} & \text{H} \end{array}$$



1

[illegible]

1



Test tube	Observation after one week
A	Nail stayed bright
B	Nail rusted
C	Nail stayed bright

Suggest why the nail in test tube **A** did not rust.

KU	PS
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KU	PS
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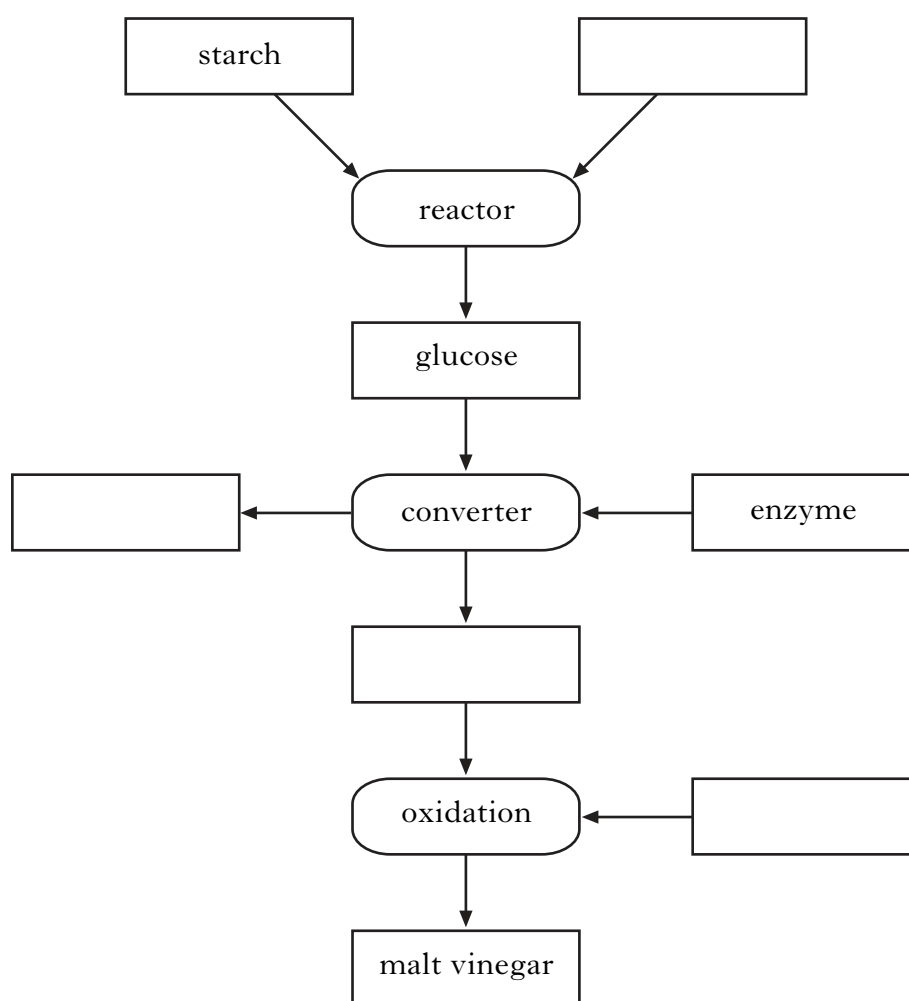
Manufacture of Malt Vinegar

In the manufacture of malt vinegar, starch reacts with water to produce glucose.

Glucose is converted to carbon dioxide and ethanol using an enzyme.

Ethanol is oxidised, by bacteria, producing malt vinegar.

(a) Use the information to complete the flow diagram.



2

(b) A student measured the pH of malt vinegar and other substances.

Substance	pH value
malt vinegar	
oven cleaner	11
water	7
lemon juice	5
liquid soap	8

-

1

1

- Complete the sentence below by circling the correct answer.

When lemon juice is diluted with water the pH $\left\{ \begin{array}{l} \text{decreases} \\ \text{stays the same} \\ \text{increases} \end{array} \right\}$.

1
(5)

[0500/401]

1

```
graph LR; CO[crude oil] --> G[gases<br/>boil below 20 °C]; CO --> N[naphtha<br/>20–175 °C]; CO --> K[kerosene<br/>150–240 °C]; CO --> GO[gas oils<br/>220–350 °C]; CO --> R[residue<br/>boils above 350 °C];
```

The diagram illustrates the fractional distillation of crude oil. A central box labeled "crude oil" has an arrow pointing to a vertical line. From this line, five horizontal branches lead to boxes listing the products and their boiling ranges: gases (boil below 20 °C), naphtha (20–175 °C), kerosene (150–240 °C), gas oils (220–350 °C), and residue (boils above 350 °C).

Product	Boiling Range (°C)
gases	boil below 20
naphtha	20–175
kerosene	150–240
gas oils	220–350
residue	boils above 350

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

1

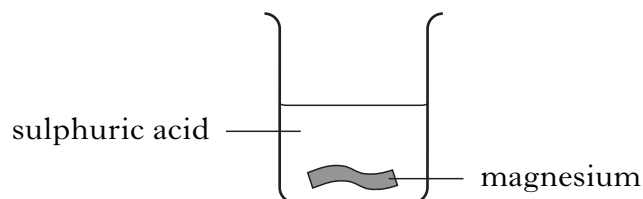
Fraction	Colour
gases	colourless
naphtha	light yellow
kerosene	dark yellow
gas oils	brown
residue	black

1

(3)

KU	PS
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- In each case she used the same mass of magnesium ribbon and timed how long it took for the magnesium to disappear.



	Volume of 2 mol/l sulphuric acid/cm ³	Volume of water/cm ³	Total volume/cm ³	Time/s
Experiment 1	20	0	20	50
Experiment 2	15		20	65

- 1

- 1

- State the test for hydrogen gas.

1

(3)

[Turn over

[illegible]

```

graph TD
    HC[Hydrocarbon] --> SC[straight chain compound]
    HC --> RC[ring compound]
    SC --> alkane
    SC --> alkene
    SC --> alkyne
    RC --> cycloalkane
    RC --> cycloalkene
    RC --> aromatic
    
```

The flowchart classifies hydrocarbons into two main categories: straight chain compounds and ring compounds. Straight chain compounds are further divided into alkanes, alkenes, and alkynes. Ring compounds are divided into cycloalkanes, cycloalkenes, and aromatic compounds. Each category is associated with a general chemical formula.

Category	Subcategory	General Formula
straight chain compound	alkane	$C_n H_{2n+2}$
	alkene	$C_n H_{2n}$
	alkyne	$C_n H_{2n-2}$
ring compound	cycloalkane	$C_n H_{2n}$
	cycloalkene	$C_n H_{2n-2}$
	aromatic	$C_n H_n$

- Using the key, write the **molecular** formula for butyne.

1

- Using the key, name the **family** to which it belongs.

1

- (b) Draw a structural formula for the alkane pentane.

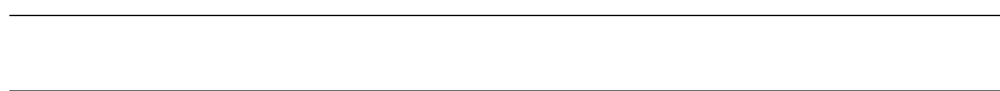
1

- (c) Describe the chemical test, including the result, which shows that an alkene is unsaturated.

1

(4)

(b) A battery is a number of cells joined together.



- $$\mathbf{A} = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{bmatrix} \quad (3)$$

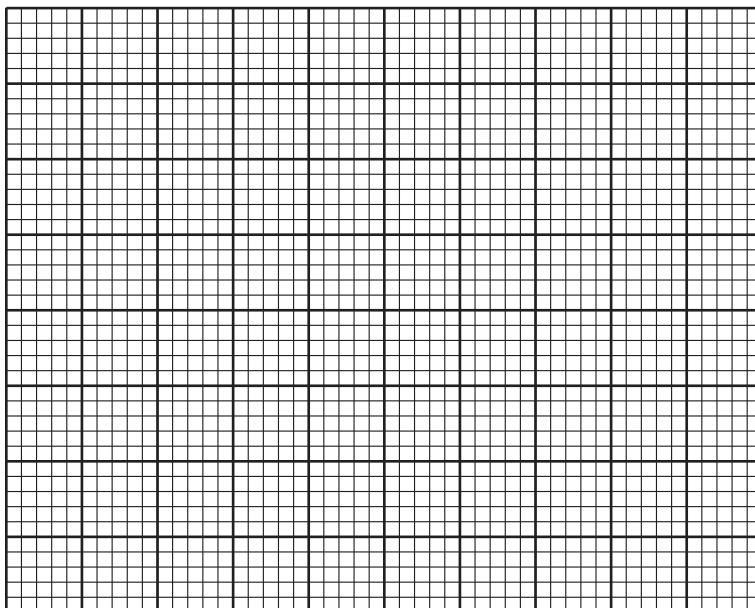
[END OF QUESTION PAPER]

Why do batteries stop producing electricity after some time?

$$\mathbf{A} = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{bmatrix} \quad (3)$$

[END OF QUESTION PAPER]

ADDITIONAL GRAPH PAPER FOR QUESTION 11(a)



ADDITIONAL SPACE FOR ANSWERS

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KU	PS

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL SPACE FOR ANSWERS