

FOR OFFICIAL USE

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C

KU PS

Total  
Marks

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**0500/402**

NATIONAL  
QUALIFICATIONS  
2007

THURSDAY, 10 MAY  
10.50 AM – 12.20 PM

**CHEMISTRY**  
**STANDARD GRADE**  
Credit 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

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Scottish candidate number

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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 9 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 <sub>4</sub>	B	H <sub>2</sub>	C	CO <sub>2</sub>
D	CO	E	C <sub>2</sub> H <sub>5</sub> OH	F	C

(a) Identify the hydrocarbon.

Ⓐ	B	C
D	E	F

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

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

A	Ⓑ	C
D	E	Ⓕ

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:

<del>Ⓐ</del>	B	C
Ⓓ	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:

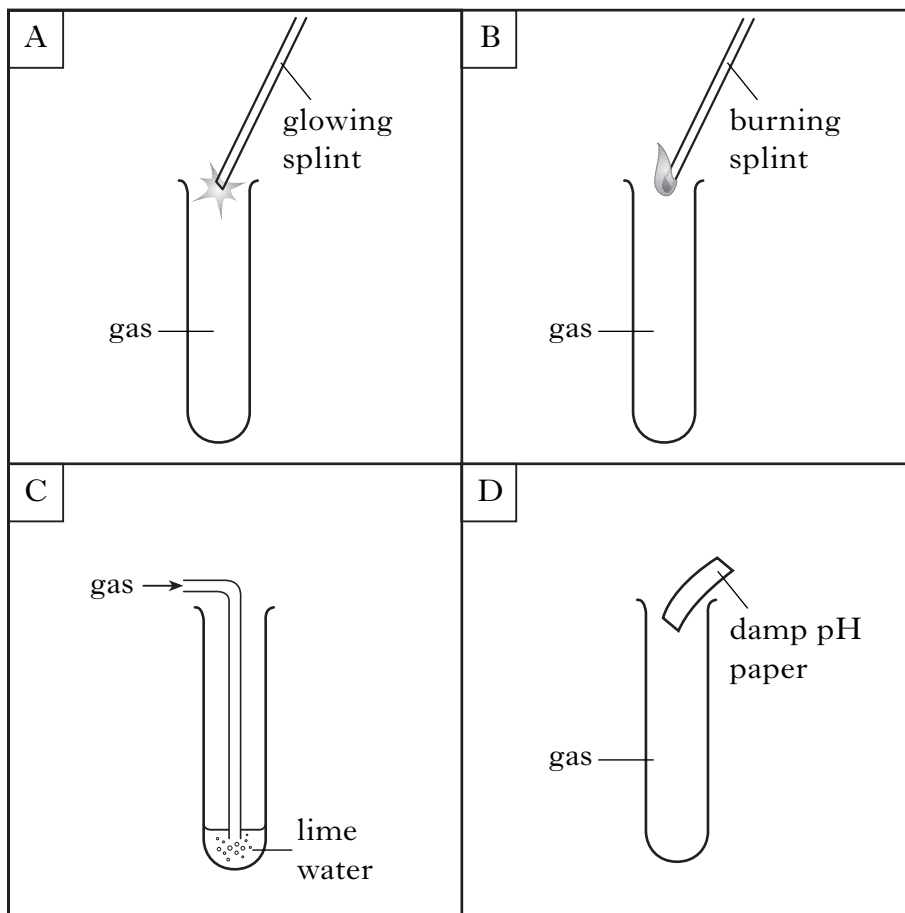
✓ <del>Ⓐ</del>	B	C
<del>Ⓓ</del>	E	F

Marks

KU PS

1.

Testing gases



(a) Identify the test for oxygen gas.

A	B
C	D

1

(b) Identify a test for ammonia gas.

A	B
C	D

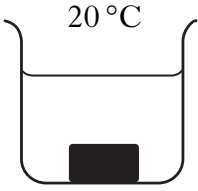
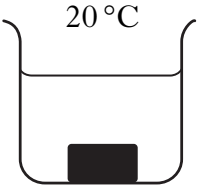
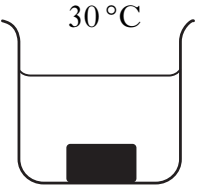
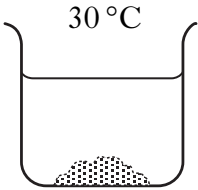
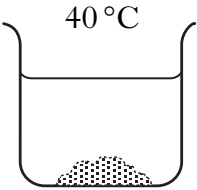
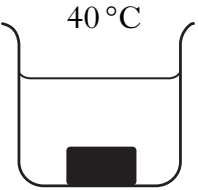
1  
(2)

[Turn over

Marks

KU PS

2. Zinc and magnesium both react with dilute hydrochloric acid.

<p>A</p>  <p>20°C</p> <p>zinc lump 1 mol/l hydrochloric acid</p>	<p>B</p>  <p>20°C</p> <p>magnesium lump 1 mol/l hydrochloric acid</p>	<p>C</p>  <p>30°C</p> <p>magnesium lump 1 mol/l hydrochloric acid</p>
<p>D</p>  <p>30°C</p> <p>zinc powder 2 mol/l hydrochloric acid</p>	<p>E</p>  <p>40°C</p> <p>magnesium powder 2 mol/l hydrochloric acid</p>	<p>F</p>  <p>40°C</p> <p>zinc lump 2 mol/l hydrochloric acid</p>

(a) Identify the experiment with the **slowest** rate of reaction.

A	B	C
D	E	F

1

(b) Identify the **two** experiments which could be used to investigate the effect of temperature on the rate of reaction.

A	B	C
D	E	F

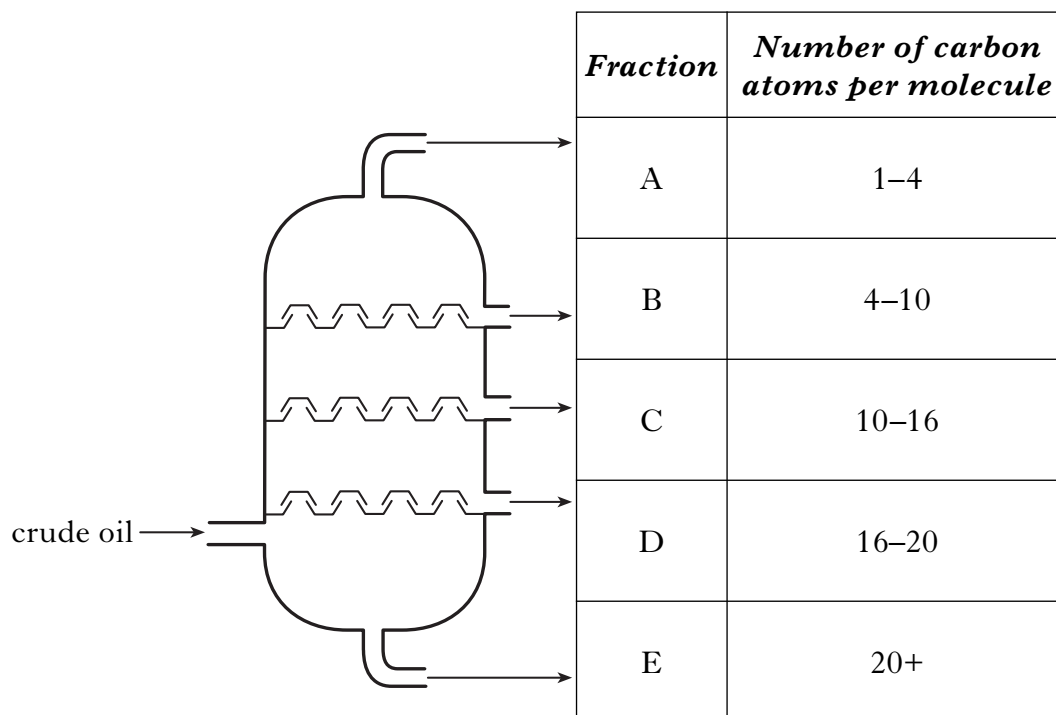
1

(2)

Marks

KU PS

3. Distillation of crude oil produces several fractions.



(a) Identify the fraction which is used to tar roads.

A
B
C
D
E

1

(b) Identify the fraction with the lowest boiling point.

A
B
C
D
E

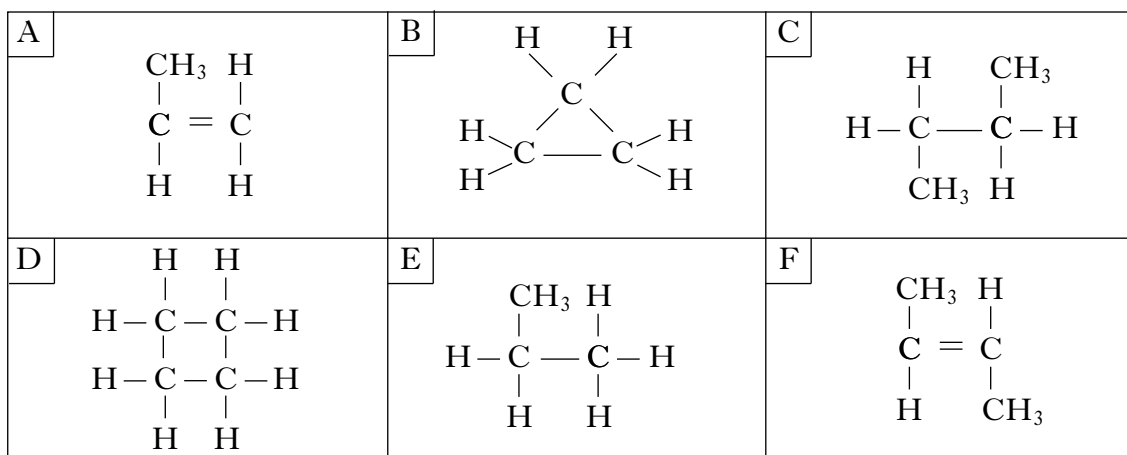
1  
(2)

[Turn over

Marks

KU PS

4. The structural formulae for some hydrocarbons are shown below.



(a) Identify the hydrocarbon which could be used to make poly(butene).

A	B	C
D	E	F

1

(b) Identify the **two** hydrocarbons with the general formula  $\text{C}_n\text{H}_{2n}$  which do **not** react quickly with hydrogen.

A	B	C
D	E	F

1  
(2)

Marks

KU PS

5. The table contains information about some substances.

<i>Substance</i>	<i>Melting point/°C</i>	<i>Boiling point/°C</i>	<i>Conducts as a solid</i>	<i>Conducts as a liquid</i>
A	1700	2230	no	no
B	605	1305	no	yes
C	-13	77	no	no
D	801	1413	no	yes
E	181	1347	yes	yes
F	-39	357	yes	yes

(a) Identify the substance which exists as covalent molecules.

A
B
C
D
E
F

1

(b) Identify the metal which is liquid at 25 °C.

A
B
C
D
E
F

1  
(2)

[Turn over



Marks

KU PS

7. A student made some statements about the particles found in atoms.

A	It has a positive charge.
B	It has a negative charge.
C	It has a relative mass of almost zero.
D	It has a relative mass of 1.
E	It is found inside the nucleus.
F	It is found outside the nucleus.

Identify the **two** statements which apply to **both** a proton and a neutron.

A
B
C
D
E
F

(2)

8. A student made some statements about the reaction of silver(I) oxide with excess dilute hydrochloric acid.

A	The concentration of hydrogen ions increases.
B	Carbon dioxide gas is produced.
C	An insoluble salt is produced.
D	Hydrogen gas is produced.
E	Water is produced.

Identify the **two** correct statements.

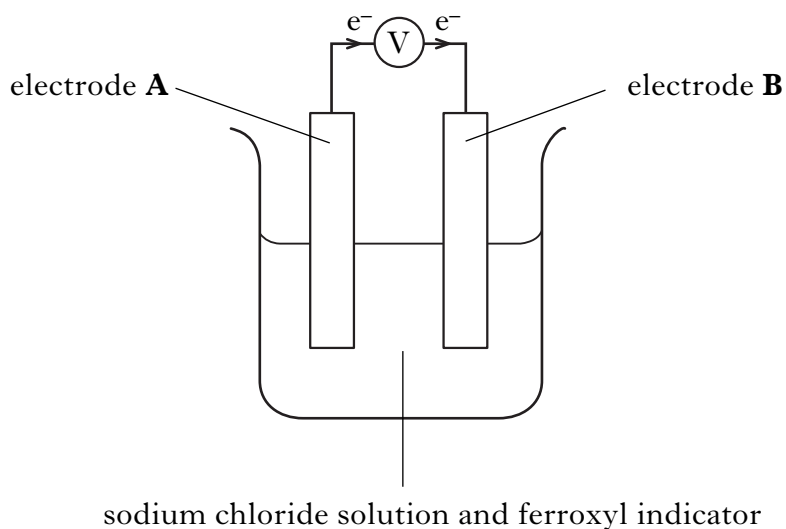
A
B
C
D
E

(2)

Marks

KU PS

9. When two different electrodes are joined in a cell, a chemical reaction takes place and a voltage is produced.



	<i>Electrode A</i>	<i>Electrode B</i>
<b>A</b>	magnesium	iron
<b>B</b>	iron	carbon
<b>C</b>	iron	aluminium
<b>D</b>	iron	copper
<b>E</b>	lead	iron

Which **two** pairs of electrodes will produce a flow of electrons in the same direction as shown in the diagram and would produce a blue colour around electrode **A**?

You may wish to use the data booklet to help you.

A
B
C
D
E

(2)

**[Turn over for Part 2 on *Page twelve***

Marks

KU PS

**PART 2****A total of 40 marks is available in this part of the paper.**

10. A sample of silver was found to contain two isotopes,  ${}_{47}^{107}\text{Ag}$  and  ${}_{47}^{109}\text{Ag}$ .

(a) This sample of silver has an average atomic mass of 108.

What does this indicate about the amount of each isotope in this sample?

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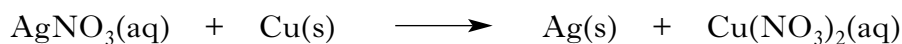
1

(b) Complete the table to show the number of each type of particle in a  ${}_{47}^{107}\text{Ag}^+$  ion.

<i>Particle</i>	<i>Number</i>
proton	
neutron	
electron	

2

(c) Silver can be displaced from a solution of silver(I) nitrate.



(i) Balance this equation.

1

(ii) Name a metal which would **not** displace silver from silver(I) nitrate.

You may wish to use the data booklet to help you.

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1

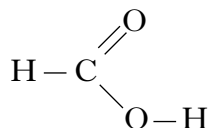
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Marks

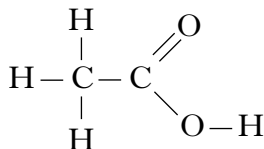
KU PS

11. Alkanoic acids are a family of compounds which contain the  $-\text{C}\begin{array}{l} \text{=O} \\ \text{O-H} \end{array}$  group.

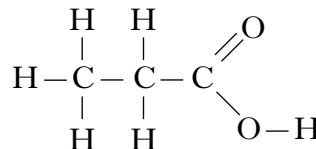
The **full** structural formulae for the first three members are shown.



methanoic  
acid



ethanoic  
acid



propanoic  
acid

- (a) Draw the **full** structural formula for the alkanolic acid containing 4 carbon atoms.

1

- (b) The table gives information on some alkanolic acids.

<i>Acid</i>	<i>Boiling point/ °C</i>
methanoic acid	101
ethanoic acid	118
propanoic acid	141
butanoic acid	164

- (i) Using this information, make a general statement linking the boiling point to the number of carbon atoms.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

1

- (ii) Predict the boiling point of pentanoic acid.

\_\_\_\_\_ °C

1

(3)

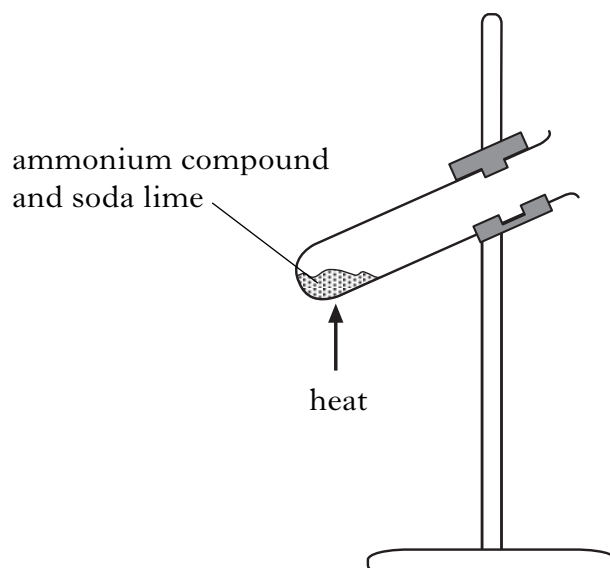


Marks

KU	PS
1	
(4)	

12. (continued)

(c) Ammonia can be produced in the lab by heating an ammonium compound with soda lime.



In order to produce ammonia, what **type** of compound must soda lime be?

\_\_\_\_\_

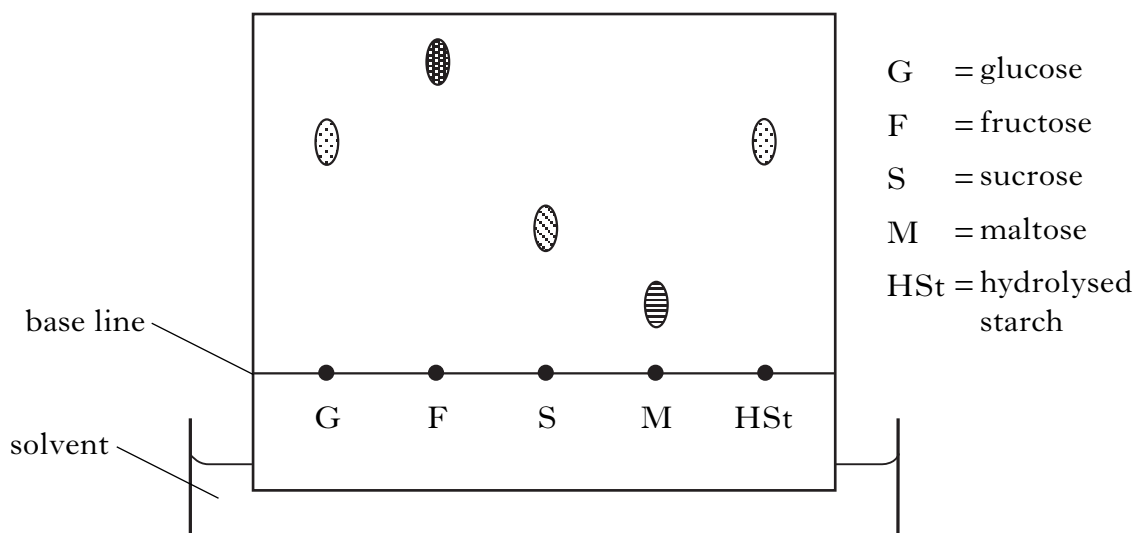
1  
(4)

[Turn over

13. Starch and sucrose can be hydrolysed to produce simple sugars.

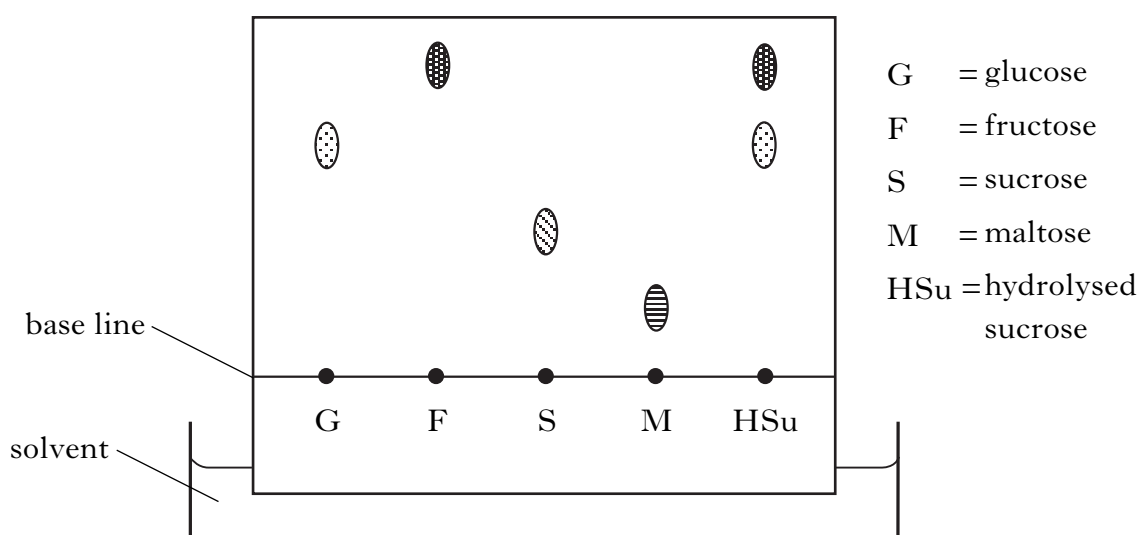
Chromatography is a technique which can be used to identify the sugars produced.

Samples of known sugar solutions are spotted on the base line. The solvent travels up the paper carrying spots of sugars at different rates.



The diagram above shows that **only glucose** is produced when starch is hydrolysed.

(a) The chromatogram below can be used to identify the simple sugars produced when sucrose is hydrolysed.



Name the sugars produced when sucrose is hydrolysed.

\_\_\_\_\_





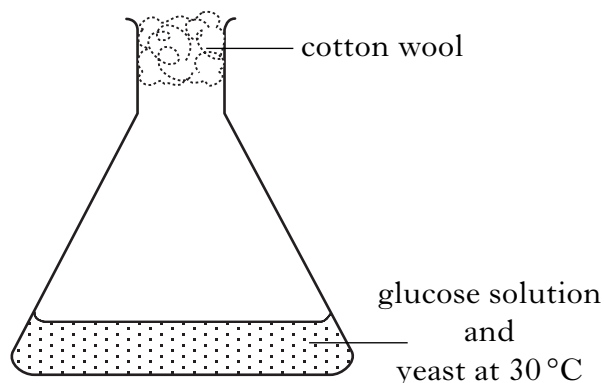


Marks

KU PS

16. Ethanol is the alcohol found in alcoholic drinks.

It can be produced as shown in the diagram.



(a) (i) Name the type of chemical reaction taking place in the flask.

\_\_\_\_\_

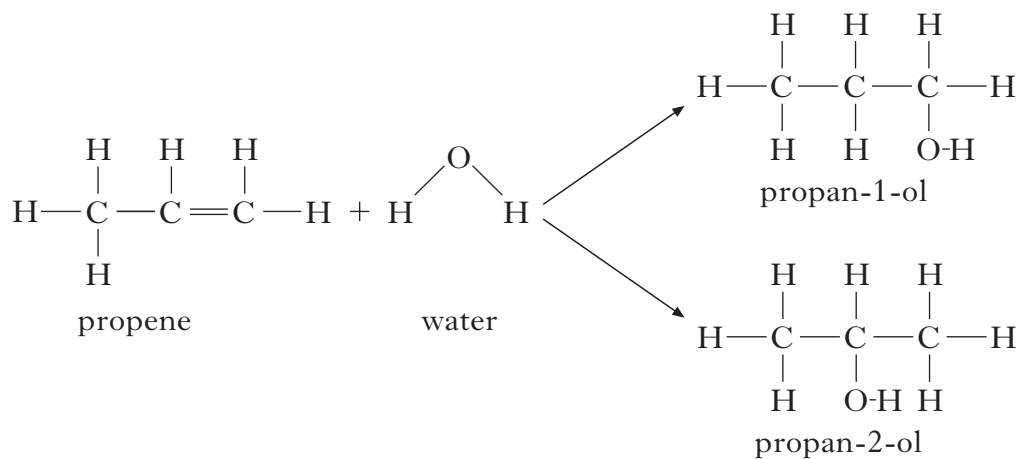
1

(ii) What would happen to the rate of the reaction if the experiment above was repeated at 50 °C?

\_\_\_\_\_

1

(b) In industry, alcohols can be produced from alkenes as shown in the example below.



(i) Name the type of chemical reaction taking place.

\_\_\_\_\_

1

<i>Marks</i>	KU	PS

**16. (b) (continued)**

- (ii) What **term** is used to describe a pair of alcohols like propan-1-ol and propan-2-ol?

---

**1**

- (iii) Propan-1-ol and propan-2-ol have different boiling points. Name the process which could be used to separate a mixture of these alcohols.

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**1****(5)****[Turn over**

Marks

KU PS

17. The table contains information on minerals.

<i>Mineral</i>	<i>Formula</i>
cinnabar	HgS
fluorite	CaF <sub>2</sub>
gibbsite	Al(OH) <sub>3</sub>
haematite	Fe <sub>2</sub> O <sub>3</sub>
zinc blende	ZnS

(a) State the chemical name for zinc blende.

\_\_\_\_\_

1

(b) Name the salt formed when gibbsite reacts with dilute hydrochloric acid.

\_\_\_\_\_

1

(c) Calculate the percentage, by mass, of calcium in fluorite (CaF<sub>2</sub>).

**Show your working clearly.**

\_\_\_\_\_ %

2

(d) Iron metal can be extracted from haematite (Fe<sub>2</sub>O<sub>3</sub>) by heating with carbon monoxide. Carbon dioxide is also produced.

Write an equation, using **symbols** and **formulae**, for this reaction.

There is no need to balance it.

\_\_\_\_\_

1

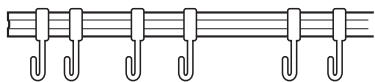
(e) Name a metal which can be extracted from its ore by heat alone.

\_\_\_\_\_

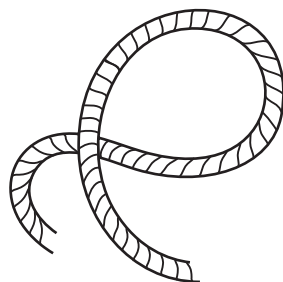
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(6)

18. Nylon is a polymer with many uses.



curtain rail



rope



jacket

(a) Nylon is a thermoplastic polymer.

What does thermoplastic mean?

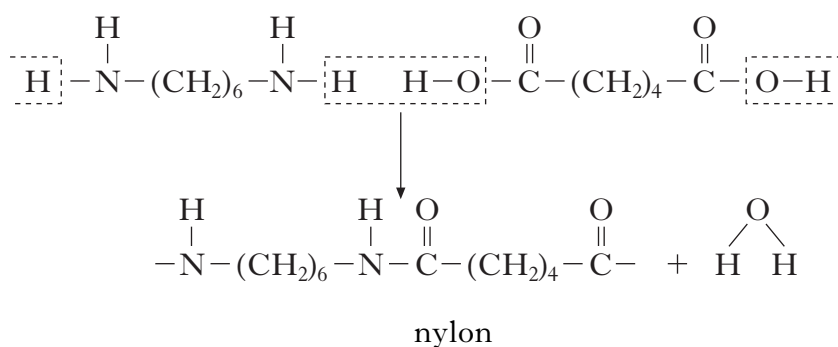
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1

(b) Nylon is a polymer made from two different monomers as shown.



During the polymerisation reaction, water is also produced.

Suggest a name for this **type** of polymerisation.

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1  
(2)

[Turn over

19. Many ionic compounds are coloured.

<i>Compound</i>	<i>Colour</i>
nickel(II) nitrate	green
nickel(II) sulphate	green
potassium permanganate	purple
potassium sulphate	colourless

(a) Using the information in the table, state the colour of the potassium ion.

\_\_\_\_\_

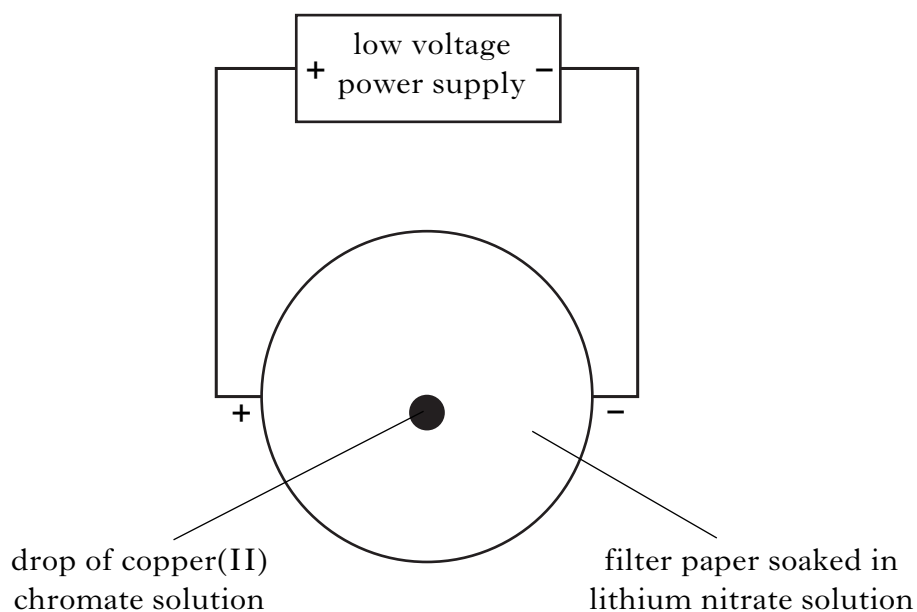
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(b) Write the **ionic** formula for nickel(II) nitrate.

\_\_\_\_\_

1

(c) A student set up the following experiment to investigate the colour of the ions in copper(II) chromate.



The student made the following observation.

<i>Observation</i>
yellow colour moves to the positive electrode
blue colour moves to the negative electrode

<i>Marks</i>	KU	PS
<b>1</b>		
<b>1</b>		
<b>1</b>		
<b>(5)</b>		

**19. (c) (continued)**

(i) State the colour of the chromate ion.

\_\_\_\_\_

(ii) Lithium nitrate solution is used as the electrolyte.  
What is the purpose of an electrolyte?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(iii) Suggest why lithium phosphate can **not** be used as the electrolyte  
in this experiment.  
You may wish to use the data booklet to help you.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

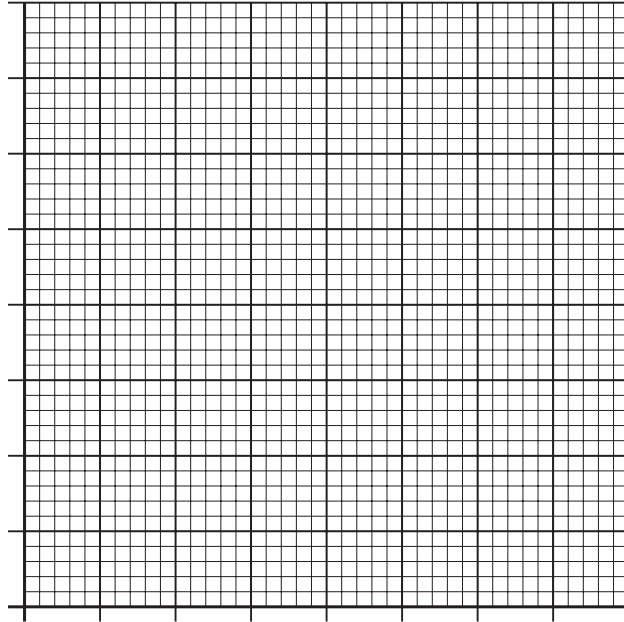
**[Turn over**



**ADDITIONAL SPACE FOR ANSWERS**

KU	PS
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ADDITIONAL GRAPH PAPER FOR QUESTION 12(a)



**ADDITIONAL SPACE FOR ANSWERS**

KU	PS