

IGCSE

London Examinations IGCSE

Chemistry (4335)

First examination May 2005

September 2003, Issue 1

delivered locally, recognised globally

Specimen Papers and Mark Schemes

London Examinations IGCSE

Chemistry (4335)

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Centre No.					Paper Reference						Surname	Initial(s)	
Candidate No.					4	3	3	5	/	1	F	Signature	

Paper Reference(s)

4335/1F

London Examinations IGCSE

Chemistry

Paper 1F

Foundation Tier

Specimen Paper

Time: 1 hour 30 minutes

Examiner's use only

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Team Leader's use only

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Materials required for examination

Nil

Items included with question papers

Nil

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
Total	

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.

The paper reference is shown at the top of this page. Check that you have the correct question paper.

Answer **ALL** the questions in the spaces provided in this question paper.

Show all the steps in any calculations and state the units.

Calculators may be used.

Information for Candidates

There are 16 pages in this question paper. All blank pages are indicated.

The total mark for this paper is 100. The marks for the various parts of questions are shown in round brackets: e.g. (2).

Advice to Candidates

You are reminded of the importance of clear English and careful presentation in your answers.

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Turn over

THE PERIODIC TABLE

0

7

6

5

4

3

Group

2

1

Period

⁴ He Helium 2
--

¹ H Hydrogen 1

7	9	23	39	45	48	51	52	55	56	59	63.5	65	70	73	75	79	80	84				
7	9	23	39	45	48	51	52	55	56	59	63.5	65	70	73	75	79	80	84				
Li Lithium 3	Be Beryllium 4	Na Sodium 11	Mg Magnesium 12	K Potassium 19	Ca Calcium 20	Sc Scandium 21	Ti Titanium 22	V Vanadium 23	Cr Chromium 24	Mn Manganese 25	Fe Iron 26	Co Cobalt 27	Ni Nickel 28	Cu Copper 29	Zn Zinc 30	Ga Gallium 31	Ge Germanium 32	As Arsenic 33	Se Selenium 34	Br Bromine 35	Kr Krypton 36	
86	88	89	91	93	96	99	101	103	106	108	112	115	119	122	128	127	131	131	131	131		
86	88	89	91	93	96	99	101	103	106	108	112	115	119	122	128	127	131	131	131	131		
Rb Rubidium 37	Sr Strontium 38	Y Yttrium 39	Zr Zirconium 40	Nb Niobium 41	Mo Molybdenum 42	Tc Technetium 43	Ru Ruthenium 44	Rh Rhodium 45	Pd Palladium 46	Ag Silver 47	Cd Cadmium 48	In Indium 49	Sn Tin 50	Sb Antimony 51	Te Tellurium 52	I Iodine 53	Xe Xenon 54	Xe Xenon 54	Xe Xenon 54	Xe Xenon 54	Xe Xenon 54	
133	137	139	179	181	184	186	190	192	195	197	201	204	207	209	210	210	222	222	222	222	222	
133	137	139	179	181	184	186	190	192	195	197	201	204	207	209	210	210	222	222	222	222	222	
Cs Caesium 55	Ba Barium 56	La Lanthanum 57	Hf Hafnium 72	Ta Tantalum 73	W Tungsten 74	Re Rhenium 75	Os Osmium 76	Ir Iridium 77	Pt Platinum 78	Au Gold 79	Hg Mercury 80	Tl Thallium 81	Pb Lead 82	Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86	Rn Radon 86	Rn Radon 86	Rn Radon 86	Rn Radon 86	Rn Radon 86
223	226	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	
223	226	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	
Fr Francium 87	Ra Radium 88	Ac Actinium 89	Fr Francium 87	Ra Radium 88	Ac Actinium 89	Fr Francium 87	Ra Radium 88	Ac Actinium 89	Fr Francium 87	Ra Radium 88	Ac Actinium 89	Fr Francium 87	Ra Radium 88	Ac Actinium 89	Fr Francium 87	Ra Radium 88	Ac Actinium 89	Fr Francium 87	Ra Radium 88	Ac Actinium 89	Fr Francium 87	Ra Radium 88

Key

Relative atomic mass
Symbol
Name
Atomic number

SECTION A

*Leave
blank*

1. Using the Periodic Table (opposite) give the name or symbol of:

(a) a Group 1 element;

(b) the transition metal that has the atomic number 29;

(c) a non-metallic element that is in Period 2;

(d) an element in Group 7 that is a solid at room temperature and atmospheric pressure;

.....

(e) the element that is in both Group 3 and Period 3

Q1

(Total 5 marks)

--

2. Complete the sentences using words from the box. Each word should only be used once.

alkalis allotropes ions isotopes metals
--

(a) The elements in Group 1 are all

(b) Different forms of the same element in the same physical state are called

.....

(c) Bases that are soluble in water are called

(d) Atoms that have lost or gained electrons are called

(e) Atoms of the same element that have different relative atomic masses are called

.....

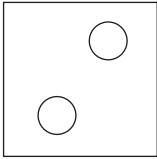
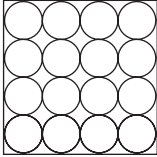
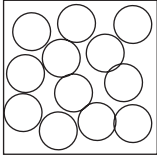
Q2

(Total 5 marks)

--

Turn over

3. (a) The diagrams show the arrangement of particles in the three states of matter: solid, liquid and gas.
 Each circle represents a particle.
 Draw a line to join each state to the correct diagram.

Solid ●	●	
Liquid ●	●	
Gas ●	●	

(2)

- (b) For each substance, tick a box to show its state at room temperature.

Substance	Solid	Liquid	Gas
Air			
Iron			
Water			

(3)

- (c) Look at the Periodic Table on page 2.

In one group, all the elements are gases at room temperature.
 Give the number and name of this group.

Number

Name

(2)

- (d) Give the original and final state (solid, liquid or gas) of the substance when

- (i) ice melts

from to

(2)

- (ii) steam in the atmosphere cooled to form the oceans, millions of years ago

from to

(2)

- (iii) petrol vaporises inside a car engine

from to

(2)

Q3

(Total 13 marks)

--	--

4. A small piece of sodium is dropped into a large beaker of water. It reacts to form sodium hydroxide solution and a gas.

Leave blank

(a) Describe **three** things you would **see** in this experiment.

.....
.....
.....
.....
.....
.....
.....

(3)

(b) Give the name of the gas formed by this reaction.

.....

(1)

(c) Sodium hydroxide solution has a pH of 14.

Complete the sentence using a word from the box.

acidic alkaline neutral

Sodium hydroxide solution is

(1)

(d) The reaction between sodium and water is exothermic.

How would the temperature of the water change during the reaction?

.....

(1)

Q4

(Total 6 marks)

--

Turn over

5. (a) Sulphuric acid is manufactured by the Contact process.

*Leave
blank*

Use words from the box to complete the paragraph below.

Each word may be used once, more than once or not at all.

air	sulphur	sulphur dioxide
sulphur trioxide	sulphuric acid	water

The raw materials for the Contact process are and
.....

They are heated together to form

More air and are then heated and passed over the catalyst.

The catalysed reaction produces (5)

(b) State **two** uses of sulphuric acid.

1
.....

2
.....

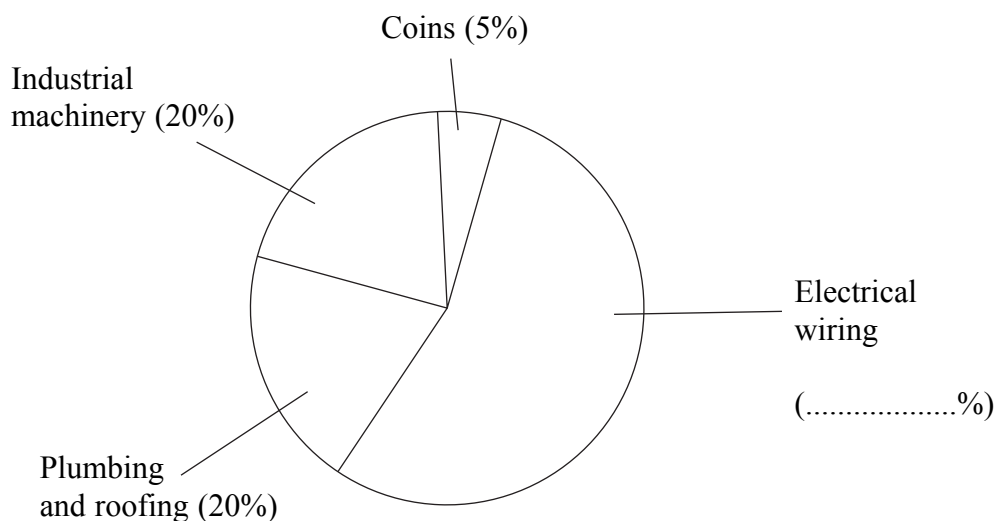
(2) **Q5**

(Total 7 marks)

--

6. (a) The pie chart shows some of the main uses of copper.

Complete the pie chart to show the percentage of copper used in electrical wiring.

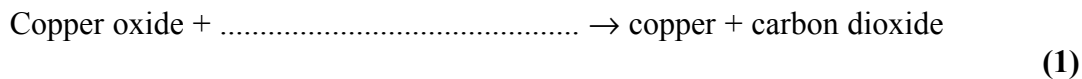


(1)

(b) Copper can be made by reduction of copper oxide.

In this process copper oxide is heated strongly with another substance.

(i) Complete the word equation for the process.



(ii) Write the chemical formula, with state symbol, for carbon dioxide gas.

..... (2)

(iii) What is meant by reduction?

- A addition of oxygen to a compound
- B conversion of a compound into its elements
- C heating a compound strongly
- D removal of oxygen from a compound

Write the correct answer (A, B, C or D) in the space provided.

..... (1)

(Total 5 marks)

Q6

--

Turn over

7. The table gives information about four hydrocarbons.

*Leave
blank*

Name of hydrocarbon	Number of carbon atoms in one molecule	Boiling point (°C)
Ethane	2	-90
Propane	3	-40
Butane	4	0
Hexane	6	+70

(a) (i) Which element, other than carbon, is present in hydrocarbons?

..... (1)

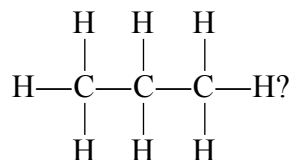
(ii) Which of these hydrocarbons has the lowest boiling point?

..... (1)

(iii) Which of these hydrocarbons has the biggest molecules?

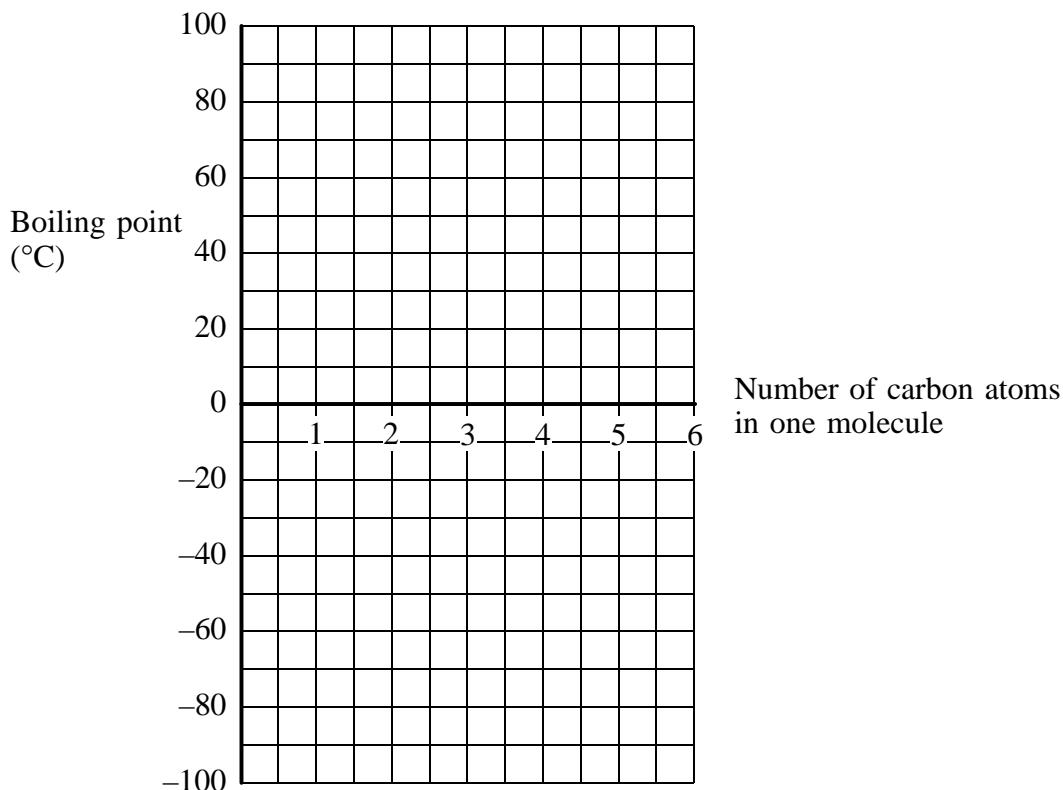
..... (1)

(iv) Which of these hydrocarbons has molecules with the structure



..... (1)

(b) (i) Use the information in the table opposite to draw a graph on the grid.



(3)

(ii) Pentane is a hydrocarbon with five carbon atoms in each molecule. Use your graph to estimate the boiling point of pentane.

..... °C
(1)

(c) Some of these hydrocarbons are present in petroleum gas which is obtained from crude oil.

(i) Name the process used to separate petroleum gas from crude oil.

.....
(2)

(ii) Name **two** other fuels obtained from crude oil by this process.

1

2

(2)

(d) Ethane gas burns in air.

Complete the word equation for this reaction.

ethane + → carbon dioxide +

(2)

Q7

(Total 14 marks)

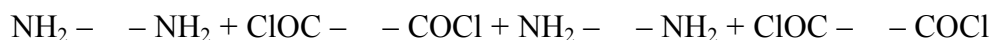
TOTAL FOR SECTION A: 55 MARKS

Turn over

SECTION B

*Leave
blank*

8. The following represents four molecules of monomers reacting together to form a polymer.



(a) Name this kind of polymerisation (1)

(b) What substance is lost during polymerisation? (1)

(c) Draw a diagram to show the structure of the polymer formed from the molecules of monomer shown above.

(2)

(d) What is the name of this particular polymer? (1)

Q8

(Total 5 marks)

--

9. (a) Name the starting materials used in the manufacture of ammonia.

..... and (1)

(b) The industrial process for the manufacture of ammonia uses a catalyst of iron.

(i) What is a catalyst?

.....
 (2)

(ii) Why does the same mass of a catalyst work better when it is in the form of thin wires rather than in large lumps?

.....
 (1)

(c) An NPK fertiliser is a mixture of chemicals containing elements represented by the symbols N, P and K.

Complete the following table.

Symbol	Name of element	Formula of a compound containing this element
N	Nitrogen	NH ₄ NO ₃
P		P ₂ O ₅
K	Potassium	

(2)

(d) The chemical formula NH₄NO₃ represents the compound ammonium nitrate.

(i) How many atoms of nitrogen are shown in the formula for ammonium nitrate?

..... (1)

(ii) What is the relative formula mass of ammonium nitrate?

..... (1)

(iii) Calculate the percentage by mass of nitrogen in ammonium nitrate.

.....

 (1)

Q9

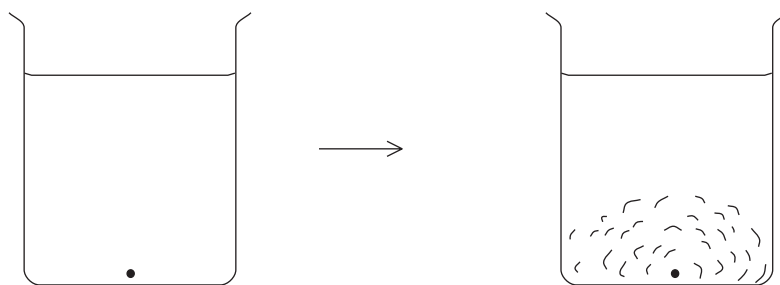
(Total 9 marks)

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Turn over

10. In an experiment a small crystal of potassium manganate(VII) (potassium permanganate) was placed at the bottom of a beaker of cold water. After a short time the colour of the crystal began to spread through the water.

Leave blank



- (a) Why is a crystal of potassium manganate(VII) and not potassium chloride used in this experiment?

.....
(1)

- (b) Name the process by which the potassium and manganate(VII) ions move through the water.

.....
(1)

- (c) In what way would the outcome of the experiment be different, if at all, if warm water was used in place of cold water?

.....
.....
(1)

- (d) Explain your answer to part (c) in terms of movement of particles.

.....
.....
.....
(2)

- (e) The dot (●) below represents a single manganate(VII) ion. Draw lines from it to show the typical movement of the ion in water.



(2)

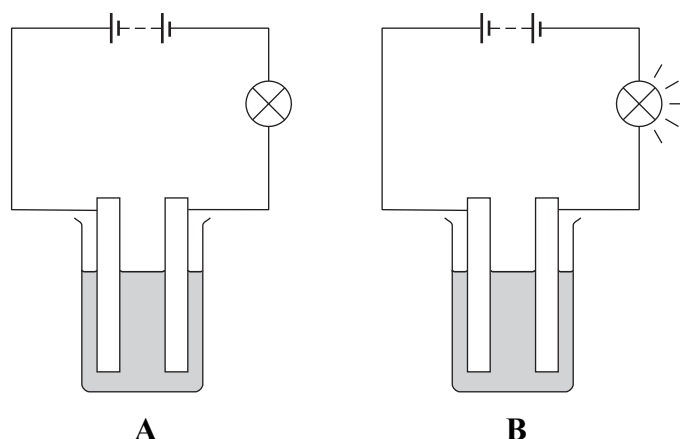
Q10

(Total 7 marks)

--

11. The following diagrams show what happens when an electric current was passed through lead bromide (PbBr_2). In diagram **A** the lead bromide is solid while in diagram **B** it is molten.

Leave blank



- (a) (i) What difference do you observe between diagrams **A** and **B**?

..... (1)

- (ii) Which of the following is the best explanation for your observation? Draw a ring around the letter of your answer.

- A** Lead bromide only contains ions when it is molten
B Solid lead bromide is a covalent compound
C When lead bromide is molten the ions can move about
D Metals like lead are good conductors of electricity

(1)

- (b) What is the name of the process that occurs in diagram **B**?

..... (1)

- (c) Complete the table showing what happens at the electrodes in diagram **B**.

Electrode	Name of product	Equation for reaction
positive	Lead	$\text{Pb}^{2+} + \dots \rightarrow \text{Pb}$
negative	.....	$2\text{Br}^- - 2\text{e}^- \rightarrow \text{Br}_2$

(2)

Q11

(Total 5 marks)

Turn over

12. (a) (i) Draw a dot-and-cross diagram (representing outer electrons only) to show the type of bonding present in methane (CH₄).

*Leave
blank*

(1)

(ii) Draw a diagram to show the **shape** of a methane molecule.

(1)

(b) When methane is burnt in a good supply of air it produces only water and carbon dioxide.

(i) Write a word equation for this reaction.

.....
(1)

(ii) Under what conditions would carbon monoxide gas also be produced?

.....
(1)

(iii) Why is it dangerous for methane gas to produce carbon monoxide?

.....
.....
(1)

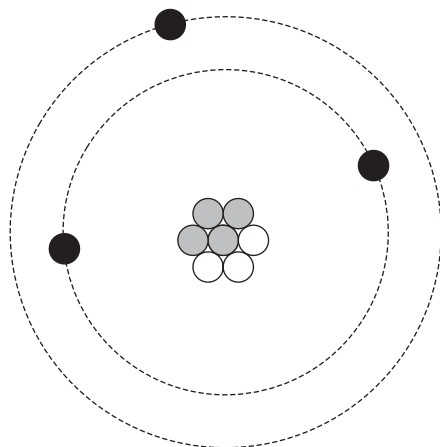
Q12

(Total 5 marks)

--

13. (a) The diagram shows the arrangement of particles in an atom of the element lithium.

Leave blank



Key

- Particle A
- Particle B
- Particle C

(i) Identify the particles **A**, **B** and **C**.

Particle **A**

Particle **B**

Particle **C**

(3)

(ii) What is the mass number of the atom in the diagram?

.....
(1)

(iii) Use the diagram to explain why this element is in group 1 of the periodic table.

.....
.....
(1)

(b) Another element in group 1 is sodium.

Sodium reacts with chlorine (Cl_2) to form sodium chloride (NaCl).

Write a balanced equation for this reaction.

.....
(2)

QUESTION CONTINUES OVERLEAF

Turn over

(c) Sodium chloride solution is used to manufacture chlorine, hydrogen and sodium hydroxide.

(i) This manufacturing process uses

- A combustion
- B cracking
- C electrolysis
- D neutralisation

Write the correct answer (A, B, C or D) in the box.

(1)

(ii) Which product is used in water purification?

- A chlorine
- B hydrogen
- C sodium hydroxide

Write the correct answer (A, B or C) in the box.

(1)

(d) The table shows the number of protons, neutrons and electrons in a chlorine atom.

(i) Complete the table to show the number of these particles in the chloride ion, Cl⁻, formed from this atom.

	Chlorine atom (Cl)	Chloride ion (Cl ⁻)
Number of protons	17	.....
Number of neutrons	18	.....
Number of electrons	17	.....

(3)

(ii) What is the arrangement of electrons in a chlorine **atom**?

.....
(1)

(iii) What is the arrangement of electrons in a chloride **ion**.

.....
(1)

Q13

(Total 14 marks)

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TOTAL FOR SECTION B: 45 MARKS

END

Centre No.				
Candidate No.				

Paper Reference						
4	3	3	5	/	2	H

Surname	Initial(s)
Signature	

Paper Reference(s)

4335/2H

London Examinations IGCSE

Chemistry

Paper 2H

Higher Tier

Specimen Paper

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Nil

Items included with question papers

Nil

Question Number	Leave Blank
1	
2	
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9	
10	
11	
12	
13	
Total	

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.

The paper reference is shown at the top of this page. Check that you have the correct question paper.

Answer **ALL** the questions in the spaces provided in this question paper.

Show all the steps in any calculations and state the units.

Calculators may be used

Information for Candidates

There are 20 pages in this question paper. All blank pages are indicated.

The total mark for this paper is 120. The marks for the various parts of questions are shown in round brackets: e.g. (2).

Advice to Candidates

You are reminded of the importance of clear English and careful presentation in your answers.

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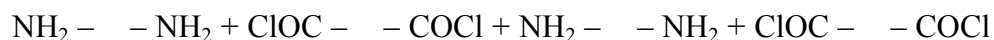
M P 6 8 6 9 9 A

Turn over

SECTION A

*Leave
blank*

1. The following represents four molecules of monomers reacting together to form a polymer.



(a) Name this kind of polymerisation (1)

(b) What substance is lost during polymerisation? (1)

(c) Draw a diagram to show the structure of the polymer formed from the molecules of monomer shown above.

(2)

(d) What is the name of this particular polymer? (1)

Q1

(Total 5 marks)

--

Turn over

2. (a) Name the starting materials used in the manufacture of ammonia.

..... and
(1)

(b) The industrial process for the manufacture of ammonia uses a catalyst of iron.

(i) What is a catalyst?

.....
.....
(2)

(ii) Why does the same mass of a catalyst work better when it is in the form of thin wires rather than in large lumps?

.....
.....
(1)

(c) An NPK fertiliser is a mixture of chemicals containing elements represented by the symbols N, P and K.

Complete the following table.

Symbol	Name of element	Formula of a compound containing this element
N	Nitrogen	NH ₄ NO ₃
P		P ₂ O ₅
K	Potassium	

(2)

(d) The chemical formula NH₄NO₃ represents the compound ammonium nitrate.

(i) How many atoms of nitrogen are shown in the formula for ammonium nitrate?

.....
(1)

(ii) What is the relative formula mass of ammonium nitrate?

.....
(1)

(iii) Calculate the percentage by mass of nitrogen in ammonium nitrate.

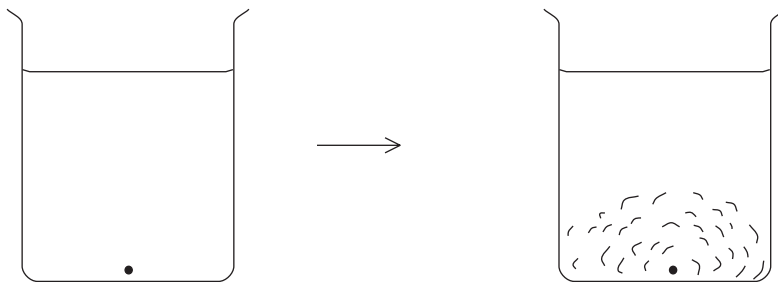
.....
.....
.....
(1)

Q2

(Total 9 marks)

3. In an experiment a small crystal of potassium manganate(VII) (potassium permanganate) was placed at the bottom of a beaker of cold water. After a short time the colour of the crystal began to spread through the water.

Leave blank



- (a) Why is a crystal of potassium manganate(VII) and not potassium chloride used in this experiment?

.....
(1)

- (b) Name the process by which the potassium and manganate(VII) ions move through the water.

.....
(1)

- (c) In what way would the outcome of the experiment be different, if at all, if warm water was used in place of cold water?

.....
.....
(1)

- (d) Explain your answer to part (c) in terms of movement of particles.

.....
.....
.....
(2)

- (e) The dot (●) below represents a single manganate(VII) ion. Draw lines from it to show the typical movement of the ion in water.



(2) **Q3**

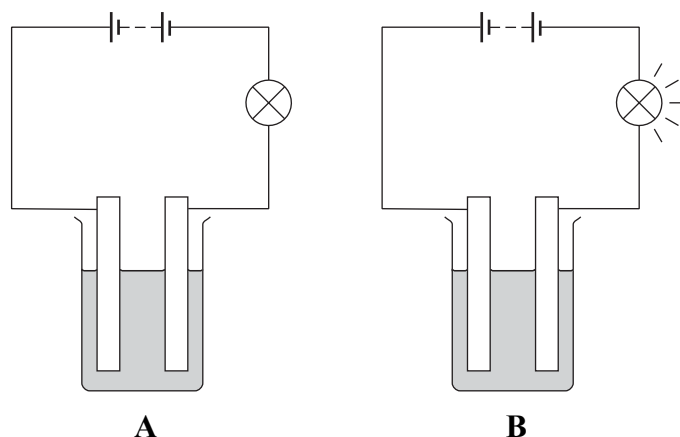
(Total 7 marks)

--

Turn over

4. The following diagrams show what happens when an electric current was passed through lead bromide (PbBr_2). In diagram **A** the lead bromide is solid while in diagram **B** it is molten.

Leave blank



- (a) (i) What difference do you observe between diagrams **A** and **B**?

..... (1)

- (ii) Which of the following is the best explanation for your observation? Draw a ring around the letter of your answer.

- A** Lead bromide only contains ions when it is molten
B Solid lead bromide is a covalent compound
C When lead bromide is molten the ions can move about
D Metals like lead are good conductors of electricity

(1)

- (b) What is the name of the process that occurs in diagram **B**?

..... (1)

- (c) Complete the table showing what happens at the electrodes in diagram **B**.

Electrode	Name of product	Equation for reaction
positive	Lead	$\text{Pb}^{2+} + \dots \rightarrow \text{Pb}$
negative	.....	$2\text{Br}^- - 2\text{e}^- \rightarrow \text{Br}_2$

(2)

Q4

(Total 5 marks)

5. (a) (i) Draw a dot-and-cross diagram (representing outer electrons only) to show the type of bonding present in methane (CH₄).

*Leave
blank*

(1)

- (ii) Draw a diagram to show the **shape** of a methane molecule.

(1)

- (b) When methane is burnt in a good supply of air it produces only water and carbon dioxide.

- (i) Write a word equation for this reaction.

.....
(1)

- (ii) Under what conditions would carbon monoxide gas also be produced?

.....
(1)

- (iii) Why is it dangerous for methane gas to produce carbon monoxide?

.....
.....
(1)

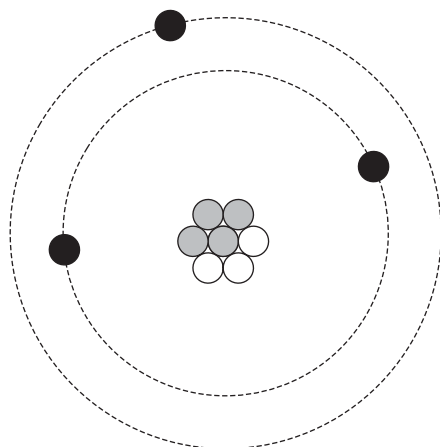
Q5

(Total 5 marks)

Turn over

6. (a) The diagram shows the arrangement of particles in an atom of the element lithium.

Leave blank



Key

- Particle A
- Particle B
- Particle C

(i) Identify the particles **A**, **B** and **C**.

Particle **A**

Particle **B**

Particle **C**

(3)

(ii) What is the mass number of the atom in the diagram?

.....

(1)

(iii) Use the diagram to explain why this element is in group 1 of the periodic table.

.....

.....

(1)

(b) Another element in group 1 is sodium.

Sodium reacts with chlorine (Cl_2) to form sodium chloride (NaCl).

Write a balanced equation for this reaction.

.....

(2)

(c) Sodium chloride solution is used to manufacture chlorine, hydrogen and sodium hydroxide.

(i) This manufacturing process uses

- A combustion
- B cracking
- C electrolysis
- D neutralisation

Write the correct answer (A, B, C or D) in the box.

(1)

(ii) Which product is used in water purification?

- A chlorine
- B hydrogen
- C sodium hydroxide

Write the correct answer (A, B or C) in the box.

(1)

(d) The table shows the number of protons, neutrons and electrons in a chlorine atom.

(i) Complete the table to show the number of these particles in the chloride ion, Cl⁻, formed from this atom.

	Chlorine atom (Cl)	Chloride ion (Cl ⁻)
Number of protons	17	.....
Number of neutrons	18	.....
Number of electrons	17	.....

(3)

(ii) What is the arrangement of electrons in a chlorine **atom**?

.....
(1)

(iii) What is the arrangement of electrons in a chloride ion?

.....
(1)

Q6

(Total 14 marks)

--	--

TOTAL FOR SECTION A: 45 MARKS

Turn over

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blank*

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SECTION B

Leave
blank

7. Carbon dioxide, CO_2 , and silicon dioxide, SiO_2 , both occur widely in nature. Carbon dioxide sublimates at -78°C . Silicon dioxide melts at 1728°C . The two compounds have some similar chemical properties; for example, both react with alkalis. They also have some similar physical properties; for example both are electrical insulators.

(a) (i) What change of state takes place when carbon dioxide sublimates?

..... (1)

(ii) In what way are the electron arrangements of a carbon atom and a silicon atom the same?

..... (1)

(iii) Suggest why carbon dioxide and silicon dioxide have some similar properties.

.....
..... (2)

(b) (i) Suggest the type of **bonding** present in carbon dioxide and silicon dioxide. Give a reason for your answer.

Bonding

Reason

..... (2)

(ii) Suggest the type of **structure** present in silicon dioxide. Give a reason for your answer.

Structure

Reason

..... (2)

(iii) Describe the structure of **solid** carbon dioxide.

.....
..... (2)

(Total 10 marks)

Q7

--	--

Turn over

8. The table below gives information about the main fractions obtained from crude oil.

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blank*

Fraction	Boiling range (°C)	Number of carbon atoms in each molecule
Gas	-40 to 40	1 to 4
Petrol	40 to 100	4 to 8
Naphtha	100 to 160	6 to 10
Kerosene	160 to 250	10 to 16
Diesel oil	250 to 300	16 to 20
Fuel oil	300 to 350	20 to 25

(a) State and explain the pattern shown between the boiling range of the fractions and the number of carbon atoms in each molecule.

.....
.....
.....
.....

(2)

(b) Fuel oil is cracked to form more useful products such as petrol and naphtha. Cracking produces a mixture of saturated and unsaturated hydrocarbons.

(i) Describe how cracking is carried out.

.....
.....
.....
.....

(2)

(ii) Describe a test for an unsaturated hydrocarbon.

.....
.....
.....
.....

(2)

(c) Propene (C_3H_6) can be obtained by cracking alkanes.

(i) Draw the structure of a molecule of propene showing **all** the bonds.

(2)

(ii) One molecule of the alkane decane ($C_{10}H_{22}$) was cracked to give two molecules of propene and one molecule of an alkane.

Write the balanced equation for this reaction.

.....
(2)

(d) Propene is used to make poly(propene).

(i) What feature of a propene molecule enables it to form poly(propene)?

.....
(1)

(ii) Draw the structure of the repeating unit in poly(propene).

(2)

(iii) Poly(ethene) is used to make many types of bottle.

Suggest why the more expensive poly(propene) is used to make bottles for fizzy drinks.

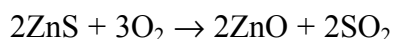
.....
.....
(1)

Q8

(Total 14 marks)

Turn over

9. Much of the sulphur dioxide required for the manufacture of sulphuric acid is obtained from roasting metal sulphide ores such as zinc sulphide in air. The equation for this reaction is



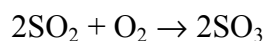
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- (a) Calculate the maximum volume of sulphur dioxide, measured at room temperature and atmospheric pressure, which would be released when 48.5 kg of zinc sulphide is roasted. (Relative atomic masses: Zn = 65, S = 32)
(1 mol of a gas occupies 24.0 dm³ at room temperature and atmospheric pressure.)

.....
.....
.....
.....
.....
.....
.....
.....
.....

(4)

- (b) In the next stage of the process, the sulphur dioxide is converted into sulphur trioxide.



- (i) What volume of sulphur trioxide, measured under the same conditions, is obtained from 1000 dm³ of sulphur dioxide?

.....

(1)

- (ii) What volume of oxygen, measured under the same conditions, would be used?

.....

(1)

- (iii) The conversion is carried out at atmospheric pressure and a temperature of 450 °C. The use of higher pressures and lower temperatures would give a greater yield of sulphur trioxide.

Explain why such conditions are not normally used.

Higher pressures

.....
.....

Lower temperatures

.....
.....

(2)

Q9

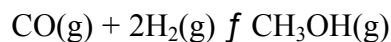
(Total 8 marks)

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10. Methanol is manufactured from carbon monoxide and hydrogen using similar conditions to those used in the manufacture of ammonia by the Haber process.

Leave blank

The equation for the manufacture of methanol is



This reaction is exothermic.

The reaction conditions are a pressure of 200 atm and a temperature of 400 °C.

(a) State **two** advantages of using a pressure higher than 200 atm.

1

2

(2)

(b) (i) State **one** advantage of using a temperature lower than 400 °C.

Explain your answer.

.....

.....

.....

.....

.....

.....

(4)

(ii) State **one** disadvantage of using a temperature lower than 400 °C.

Explain your answer.

.....

.....

.....

(2)

Q10

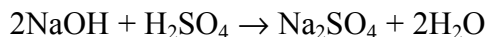
(Total 8 marks)

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Turn over

11. The concentration of a solution of sodium hydroxide was found by titrating the solution with $0.200 \text{ mol dm}^{-3}$ sulphuric acid.
 25.0 cm^3 of the sodium hydroxide solution required 31.5 cm^3 of the sulphuric acid for complete reaction.

The equation for the reaction is



- (a) (i) Explain why Universal indicator is **not** a suitable indicator for use in titrations.

.....
..... (1)

- (ii) Name a suitable indicator for this titration.

..... (1)

- (b) (i) Calculate the concentration, in mol dm^{-3} , of sodium hydroxide in the solution.

.....
.....
.....
.....
.....
.....
.....
..... (3)

- (ii) Calculate the concentration, in g dm^{-3} , of sodium hydroxide in the solution.

(Relative atomic masses: H = 1.0; O = 16; Na = 23)

.....
.....
..... (2)

(c) Sodium hydroxide solution is used to test for copper(II) ions in solution.

*Leave
blank*

(i) Describe what you would see in this test.

.....

.....

(2)

(ii) Write the ionic equation for this reaction.

.....

(3)

Q11

(Total 12 marks)

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Turn over

12. Ethanol is manufactured in two ways.

Leave
blank

(a) Ethanol is produced by the fermentation of a carbohydrate.

(i) What must be added to a solution of the carbohydrate to make fermentation occur?

.....
(1)

(ii) Name the process used to separate ethanol from the fermentation mixture.

.....
(1)

(b) Ethanol is produced by the hydration of ethene.

(i) Write a balanced chemical equation, including state symbols, for the hydration of ethene.

.....
(3)

(ii) State the conditions for this reaction.

.....
.....
(2)

(c) Country A is a large country where the climate allows crops to grow easily. It is a relatively poor country with no oil reserves.

Country B is densely populated. It is a relatively rich country and has its own oil reserves.

Explain, with reasons in each case, which method of ethanol production (fermentation or hydration) is likely to be used in each country.

Country A

.....
.....

Country B

.....
.....
(4)

(d) Ethene can be formed by dehydrating ethanol using concentrated sulphuric acid.

Complete the equation for this process.



(1)

Q12

(Total 12 marks)

--	--

13. The element bromine exists as a mixture of two isotopes.

- (a) (i) Complete the table to show the number of protons and neutrons in the nuclei of the two isotopes of bromine.

Atomic number of isotope	Mass number of isotope	Number of protons	Number of neutrons
35	79	.....	.....
35	81	.....	.....

(2)

- (ii) The relative atomic mass of bromine is 80.
Deduce the percentage abundance of the two isotopes in bromine.

.....
.....

(1)

- (b) Bromine is extracted by blowing chlorine gas through sea water which contains bromide ions.

- (i) Write an ionic equation for this reaction.

.....

(2)

- (ii) Explain why iodine could **not** be used instead of chlorine in this process.

.....
.....

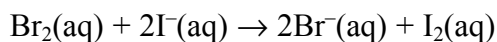
(1)

QUESTION CONTINUES OVERLEAF

Turn over

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blank

(c) Bromine is reduced when it reacts with iodide ions.



(i) Name one compound containing I^- ions, which would be suitable for this reaction.

.....
(1)

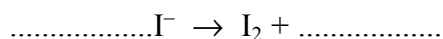
(ii) State **one** change you would **see** as this reaction takes place.

.....
(1)

(iii) Explain why bromine is said to be reduced in this reaction.

.....
.....
(1)

(iv) Complete the half equation to show the iodide ions being oxidised.



(2)

(Total 11 marks)

Q13

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TOTAL FOR SECTION B: 75 MARKS

END

Centre No.					
Candidate No.					

Paper Reference					
4	3	3	5	/	03

Surname	Initial(s)
Signature	

Paper Reference(s)

4335/03

**London Examinations IGCSE
Chemistry**

Paper 03

Written alternative to coursework
Specimen Paper

Time: 1 hour 15 minutes

Materials required for examination
Nil

Items included with question papers
Nil

Examiner's use only

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Team Leader's use only

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Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
Total	

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.

The paper reference is shown at the top of this page. Check that you have the correct question paper.

Answer **ALL** the questions in the spaces provided in this question paper.

Show all the steps in any calculations and state the units.

Calculators may be used.

Information for Candidates

There are 16 pages in this question paper. All blank pages are indicated.

The total mark for this paper is 50. The marks for the various parts of questions are shown in round brackets: e.g. (2).

Advice to Candidates

You are reminded of the importance of clear English and careful presentation in your answers.

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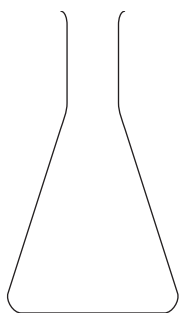


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1. (a) All of these pieces of apparatus are used for Chemistry practical work.

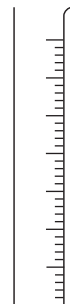
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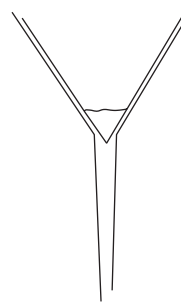
A



B



C



D

Name each piece of apparatus

A

B

C

D

(4)

(b) Which of the above pieces of equipment would you use to:

(i) measure out **roughly** 25 cm³ of liquid?

.....

(ii) measure out **exactly** 25 cm³ of liquid?

.....

(iii) separate clear water from a mixture of sand and water?

.....

(3)

Q1

(Total 7 marks)

--

Turn over

2. (a) Some chemical tests are given below. Match up the chemical tests with the boxes shown on the right, by joining the boxes with straight lines. One has been done for you.

Leave blank

Chemical Test	Substance Tested For
This gas “pops” when a lighted splint is put into a test tube of gas.	An acid
This liquid turns universal indicator solution to red.	Hydrogen
This gas relights a glowing splint.	Oxygen
When this gas is bubbled through lime water, the lime water turns cloudy.	Carbon dioxide

(2)

- (b) Wasim was asked by his teacher to identify a white, powdery solid, labelled X. He carried out two tests. The results of these are given below.

Test	Procedure	Result
1	I dipped a wire loop into some concentrated hydrochloric acid. I then dipped the loop into powder X, and then put the wire into a colourless bunsen burner flame.	The bunsen flame turned bright orange/yellow.
2	I dissolved some of powder X in a little cold water, and added a few drops of dilute acid, followed by some barium chloride solution.	A thick white precipitate formed in the test tube.

- (i) In test 1, why was the wire loop dipped into the acid?

..... (1)

- (ii) From the result of test 1, suggest the identity of the metal in X.

..... (1)

- (iii) From the result of test 2 what is the chemical name for powder X?

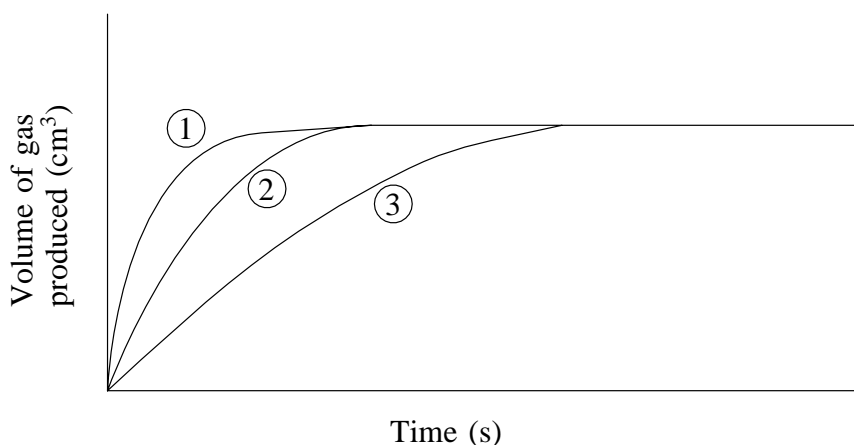
..... (1)

Q2

(Total 5 marks)

Turn over

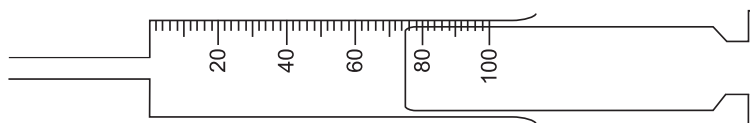
3. A student carried out an experiment to investigate the rate of reaction between magnesium ribbon and dilute hydrochloric acid. He carried out the reaction three times. He used different lengths of magnesium ribbon in each experiment. The sketch graph below shows his results.



- (a) (i) Which gas is produced when the metal magnesium reacts with hydrochloric acid?

..... (1)

- (ii) The student uses a gas syringe to collect the gas and measure its volumes accurately.



What is the reading on the gas syringe? cm³ (1)

- (b) (i) In which graph (1, 2 or 3) was the reaction finished in the shortest time?

..... (1)

- (ii) Name **two** things the student should have done to make each experiment a **fair test**.

1

2

(2)

- (c) Sophie carried out another investigation, to find out how the rate of reaction between 20 g of marble pieces and 40 cm³ of 2M hydrochloric acid is affected when the size of the pieces of marble is changed.

Sophie predicted that the reaction would be quickest with the largest pieces of marble.

She recorded the volume of gas given off every minute from 0 to 6 minutes. All data is given in cm³.

Her results were:

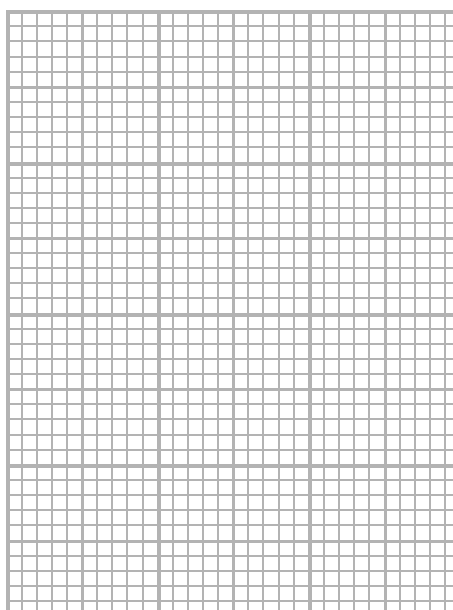
Expt 1	Using large marble pieces	0, 17, 30, 43, 53, 60, 60
Expt 2	Using medium sized marble pieces	0, 30, 40, 57, 60, 60, 60

- (i) Display her results in two tables, one for large marble pieces and one for medium sized marble pieces. Each table should show columns for time and volume of gas given off. Include units.

(2)

- (ii) Using the results given, plot two graphs of volume of gas released against time on the grid below. Draw two smooth line curves, on the same axes. Clearly label each line.

Volume of
gas released
/cm³



Time

(2)

Turn over

(iii) Give one similarity between the results of the two experiments.

.....
(1)

(iv) Give a reason for this similarity.

.....
(1)

(v) Sketch on your graph the shape of the line you would expect to see when Sophie repeated the test using 20 g of marble pieces ground to a **powder** and 40 cm³ of 2M hydrochloric acid.

(1)

(vi) Circle one point on your graph to show an anomalous result.

(1)

(vii) Given that Sophie found one anomalous result, what should she have done to check the accuracy of her other results?

.....
(1)

(Total 14 marks)

*Leave
blank*

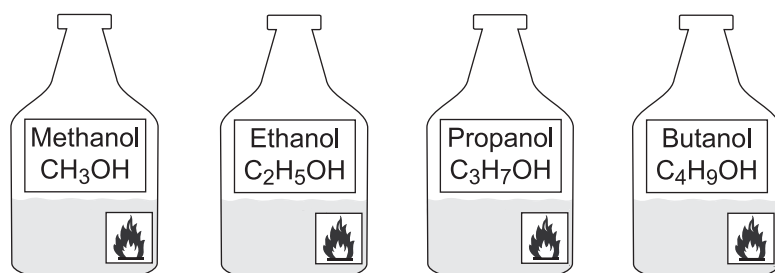
Q3

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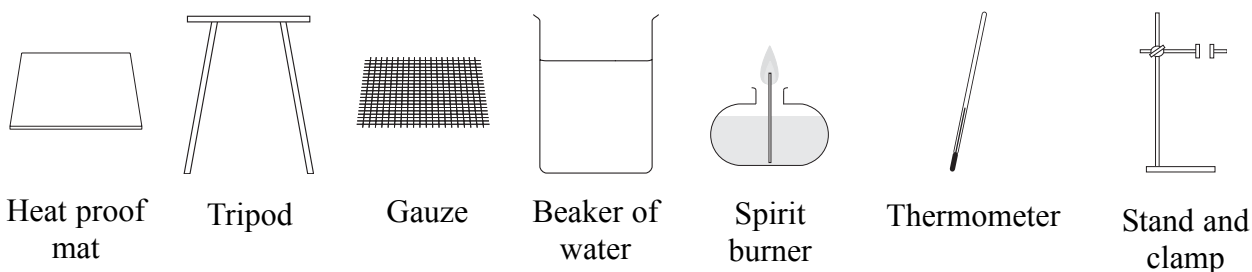
4. Rohan wanted to carry out an investigation, on the combustion of alcohols. He wanted to find out if there is any relationship between the number of carbon atoms in the molecules of four alcohols, and the heat energy released when the alcohols are burned in air.

Leave blank

The alcohols available to Rohan were:



Here is Rohan's equipment:



- (a) (i) In the space below, draw a diagram to show how Rohan should have assembled his equipment in order to carry out the task.

(2)

Turn over

(ii) Here are four steps Rohan took to carry out the task – **BUT NOT IN ORDER**.

Step 1 – Measure the water temperature after the alcohol has burned for 20 seconds.

Step 2 – Weigh out 2 g of each alcohol, in turn, into the crucible.

Step 3 – Pour 100 cm³ water into the beaker, and set up as shown in the diagram.

Step 4 – Ignite each alcohol in turn, and allow it to burn for 20 seconds.

What is the **correct** order in which to carry out these four steps?

.....
(1)

(iii) There is at least one step missing from Rohan's list. What else should Rohan have done before starting his tests?

.....
(1)

(iv) Give **two** safety precautions Rohan should have taken in order to carry out the tests in a safe way.

1

2

(2)

(v) List **two** things Rohan should have done in order to make his experiment a fair test:

1

2

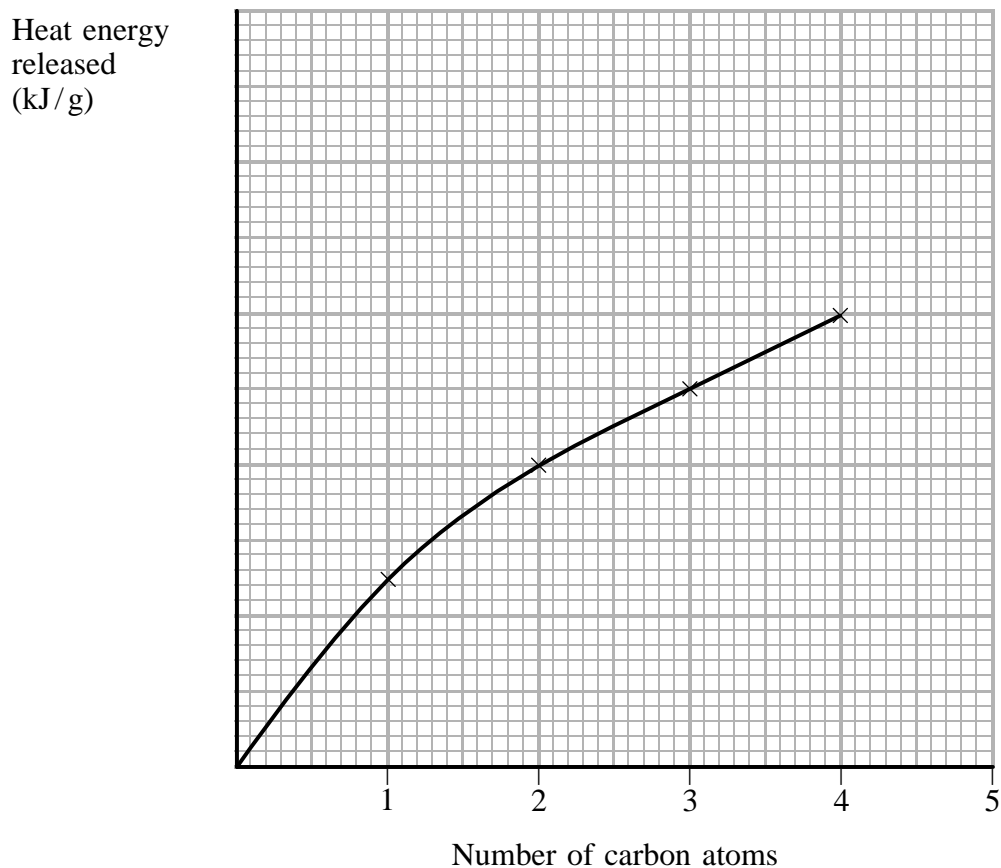
(2)

(vi) Suggest **one** change that could be made to the experiment to obtain more accurate results.

.....

.....
(1)

(b) The graph below shows Rohan's results.



(i) What conclusions can you draw from the shape of the graph?

.....

.....

.....

.....

.....

(2)

(ii) Show on the graph how Rohan could predict the value for the heat energy released for an alcohol containing 5 carbon atoms.

(1)

Q4

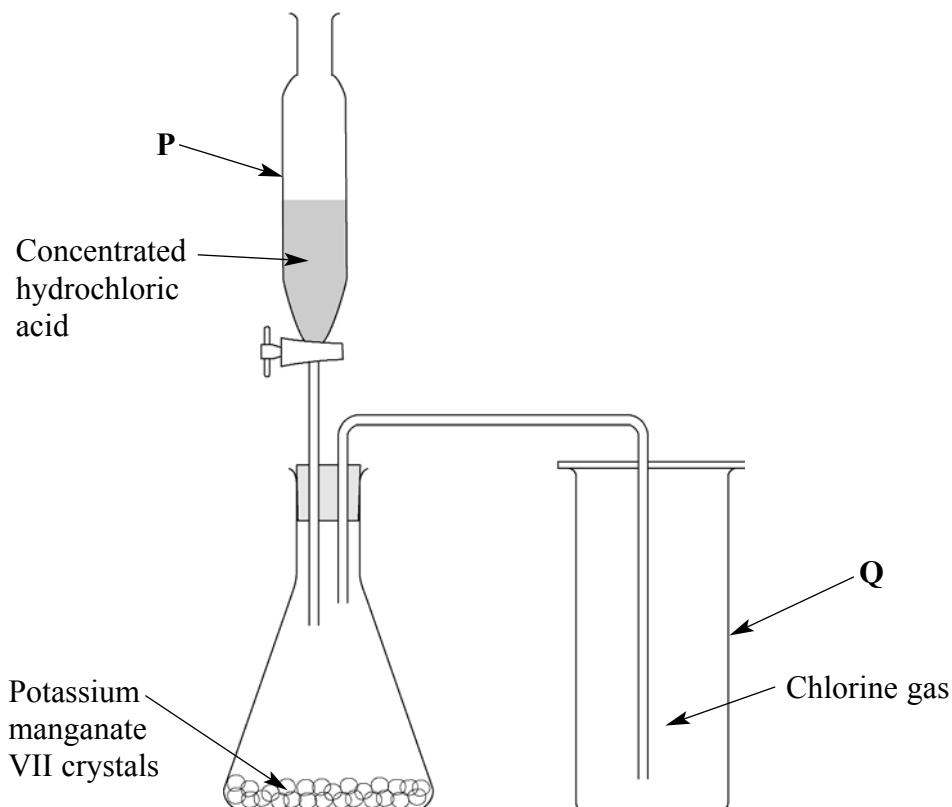
(Total 12 marks)

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Turn over

5. This diagram shows how chlorine gas can be made in the chemistry laboratory.

Leave blank



(a) Name the pieces of apparatus labelled

P and **Q** (2)

(b) Why is chlorine not collected over water?

.....
..... (1)

(c) What colour is chlorine gas?

..... (1)

(b) Describe a chemical test for chlorine.

.....
.....
..... (2)

Q5

(Total 6 marks)

6. Indigestion liquids contain a chemical, an alkali which neutralises acid in the stomach. Describe an investigation you could carry out to compare the concentration of two different indigestion liquids.

*Leave
blank*

You should include full experimental details in your account and include names of pieces of apparatus you would use.

.....

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Q6

(Total 6 marks)

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TOTAL FOR PAPER: 50 MARKS

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Edexcel International

London Examinations

IGCSE

IGCSE in Chemistry (4335)

Mark Scheme for Specimen Paper

Paper 1F (Foundation Tier)

**MARK SCHEME FOR
LONDON EXAMINATIONS IGCSE IN CHEMISTRY (4335)
SPECIMEN PAPER 1F
FOUNDATION TIER**

- | | | |
|----|---|-------------------------|
| 1. | (a) Any Gp1 element name/symbol | 1 |
| | (b) Copper/Cu | 1 |
| | (c) Any element from boron to neon name/symbol | 1 |
| | (d) Iodine/I or Astatine/At | 1 |
| | (e) Aluminium/Al | 1 |
| | | (Total 5 marks) |
| 2. | (a) metals | 1 |
| | (b) allotropes | 1 |
| | (c) alkalis | 1 |
| | (d) ions | 1 |
| | (e) isotopes | 1 |
| | | (Total 5 marks) |
| 3. | (a) solid <input type="checkbox"/>
liquid <input type="checkbox"/>
gas <input type="checkbox"/>
(one correct = 1 mark, all correct = 2 marks) | 2 |
| | (b) air – gas | 1 |
| | iron – solid | 1 |
| | water – liquid | 1 |
| | (c) 0 | 1 |
| | noble gases | 1 |
| | (d)(i) solid to liquid | 2 |
| | (ii) gas to liquid | 2 |
| | (iii) liquid to gas | 2 |
| | | (Total 13 marks) |
| 4. | (a) A description to include three from:
• fizzes/bubbles
• moves about
• floats on water
• white smoke
• burns with yellow flame
• dissolves/gets smaller | 3 |
| | (b) hydrogen | 1 |
| | (c) alkaline | 1 |
| | (d) increases | 1 |
| | | (Total 6 marks) |

5.	(a)	sulphur air sulphur dioxide sulphur dioxide sulphur trioxide	5
	(b)	Any two from: • making fertilisers • detergents • paints • plastics	2
			(Total 7 marks)
6.	(a)	55%	1
	(b)(i)	carbon	1
	(ii)	CO ₂	
	(g)		2
	(iii)	D	1
			(Total 5 marks)
7.	(a)(i)	hydrogen	1
	(ii)	ethane	1
	(iii)	hexane	1
	(iv)	propane	1
	(b)(i)	points plotted correctly (2) smooth curve	3
	(ii)	value in range 32 to 38 °C	1
	(c)(i)	fractional distillation	2
	(ii)	Any two from: • petrol • naphtha • kerosine • diesel (oil) • fuel oil	2
	(d)	oxygen water/steam/hydrogen oxide	2
			(Total 14 marks)
8.	(a)	Condensation (polymerisation)	1
	(b)	HCl/hydrogen chloride	1
	(c)	– NH – – NHOC – – CONH – – NHOC – – CO – Three correct –CONH– linkages Remaining molecular structure correct	1 1
	(d)	Nylon	1
			(Total 5 marks)

9. (a) Nitrogen/N₂ and hydrogen/H₂ 1
 (b)(i) A substance that speeds up a reaction 1
 but is not used up 1
 (ii) Greater surface area/more room for reacting molecules 1
 (c) Phosphorus 1
 Any potassium salt 1
 (d)(i) 2 1
 (ii) 80 1
 (iii) $28/80 = 35\%$ 1
(Total 9 marks)
10. (a) potassium manganate(VII) gives a coloured solution but 1
 potassium chloride does not 1
 (b) diffusion 1
 (c) diffuse more quickly 1
 (d) particles move more quickly in warm water 1
 particles would collide more often/with more force and 1
 move further apart more quickly 1
 (e) movement in short straight lines only 1
 random directions 1
(Total 7 marks)
11. (a)(i) No current flowing in diagram A 1
 (ii) C 1
 (b) electrolysis 1
 (c) bromine 1
 $2e^-$ 1
(Total 5 marks)
12. (a)(i) correct covalent bonding shown 1
 (ii) tetrahedral 1
 (b)(i) methane + oxygen → carbon dioxide + water 1
 (ii) poor supply of air/oxygen 1
 (iii) carbon monoxide is poisonous 1
(Total 5 marks)

13.	(a)(i)	Particle A – electron	
		Particle B – neutron	
		Particle C – proton	3
	(ii)	7	1
	(iii)	one electron in outer shell	1
	(b)	$2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$	
		formulae correct	
		balanced	2
	(c)(i)	C	1
	(ii)	A	1
	(d)(i)	protons – 17	1
		neutrons – 18	1
		electrons – 18	1
	(ii)	2.8.7	1
	(iii)	2.8.8	1
			(Total 14 marks)

TOTAL FOR PAPER: 100 MARKS

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Edexcel International

London Examinations

IGCSE

IGCSE in Chemistry (4335)

Mark Scheme for Specimen Paper

Paper 2H (Higher Tier)

**MARK SCHEME FOR
LONDON EXAMINATIONS IGCSE IN CHEMISTRY (4335)
SPECIMEN PAPER 2H
HIGHER TIER**

- | | | |
|----|--|------------------------|
| 1. | (a) Condensation (polymerisation) | 1 |
| | (b) HCl/hydrogen chloride | 1 |
| | (c) –NH– –NHOC– –CONH– –NHOC– –CO–
Three correct –CONH– linkages
Remaining molecular structure correct | 1
1 |
| | (d) Nylon | 1 |
| | | (Total 5 marks) |
| 2. | (a) Nitrogen/N ₂ and hydrogen/H ₂ | 1 |
| | (b)(i) A substance that speeds up a reaction
but is not used up | 1
1 |
| | (ii) Greater surface area/more room for reacting molecules | 1 |
| | (c) Phosphorus
Any potassium salt | 1
1 |
| | (d)(i) 2 | 1 |
| | (ii) 80 | 1 |
| | (iii) 28/80 = 35% | 1 |
| | | (Total 9 marks) |
| 3. | (a) potassium manganate(VII) gives a coloured solution but
potassium chloride does not | 1 |
| | (b) diffusion | 1 |
| | (c) diffuse more quickly | 1 |
| | (d) particles move more quickly in warm water
particles would collide more often/with more force and
move further apart more quickly | 1
1 |
| | (e) movement in short straight lines only
random directions | 1
1 |
| | | (Total 7 marks) |
| 4. | (a)(i) No current flowing in diagram A | 1 |
| | (ii) C | 1 |
| | (b) electrolysis | 1 |
| | (c) bromine
2e ⁻ | 1
1 |
| | | (Total 5 marks) |
| 5. | (a)(i) correct covalent bonding shown | 1 |
| | (ii) tetrahedral | 1 |
| | (b)(i) methane + oxygen → carbon dioxide + water | 1 |
| | (ii) poor supply of air/oxygen | 1 |
| | (iii) carbon monoxide is poisonous | 1 |
| | | (Total 5 marks) |

6.	(a)(i)	Particle A – electron	
		Particle B – neutron	
		Particle C – proton	3
	(ii)	7	1
	(iii)	one electron in outer shell	1
	(b)	$2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$	
		formulae correct	
		balanced	2
	(c)(i)	C	1
	(ii)	A	1
	(d)(i)	protons – 17	1
		neutrons – 18	1
		electrons – 18	1
	(ii)	2.8.7	1
	(iii)	2.8.8	1
			(Total 14 marks)

7.	(a)(i)	solid to gas	1
	(ii)	both atoms have four electrons in their outer shell	1
	(iii)	carbon and silicon in the same group of the Periodic Table	1
		both compounds are oxides	1
	(b)(i)	covalent	1
		for ionic bonding the atoms would need to lose or gain	
		four electrons	1
	(ii)	giant covalent	1
		very stable structure	1
	(iii)	lattice	1
		of carbon dioxide molecules	1
			(Total 10 marks)

8. (a) An explanation to include:
- the more carbon atoms, the higher the boiling point
 - more energy needed to separate larger molecules
- 2
- (b)(i) A description to include two from:
- high temperature
 - catalyst
 - absence of air
- 2
- (ii) A description to include:
- bromine (water)
 - is decolourised
- 2
- (c)(i)
- $$\begin{array}{c}
 \text{H} \quad \text{H} \quad \text{H} \\
 | \quad | \quad / \\
 \text{H}-\text{C}-\text{C}=\text{C} \\
 | \quad \quad | \\
 \text{H} \quad \quad \text{H}
 \end{array}$$
- [Allow one mark for C=C] 2
- (ii) $\text{C}_{10}\text{H}_{22} \rightarrow 2\text{C}_3\text{H}_6 + \text{C}_4\text{H}_{10}$ 2
 [Allow one mark for $\text{C}_{10}\text{H}_{22} \rightarrow \text{C}_3\text{H}_6 + \text{C}_7\text{H}_{16}$]
- (d)(i) double bond 1
- (ii)
- $$\begin{array}{c}
 \text{H} \quad \text{CH}_3 \\
 | \quad | \\
 -\text{C}-\text{C}- \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}$$
- 2
- (iii) poly(propene) stronger 1
- (Total 14 marks)**
9. (a) $1 \text{ mol ZnS} \rightarrow 1 \text{ mol SO}_2$
 $\text{ZnS} = 97$
- $$\text{Mol ZnS} = \frac{48.5 \times 10^3}{97} = 500$$
- Vol of SO_2 $500 \times 24 = 12\,000 \text{ dm}^3$ 4
- (b)(i) $1000 \text{ (dm}^3\text{)}/\text{same volume}$ 1
- (ii) $500 \text{ (dm}^3\text{)}/\text{half volume}$ 1
- (iii) Higher pressures – expensive to maintain/safety risks
 Lower temperatures – slow 2
- (Total 8 marks)**

10. (a) greater yield of methanol
faster reaction 2
- (b)(i) An explanation to include:
 - greater yield of methanol
 - forward reaction/formation of methanol is exothermic
 - lower temperature allows equilibrium to move in exothermic direction
4
- (ii) An explanation to include:
 - molecules collide with less energy/less frequently
 - slower reaction
2
- (Total 8 marks)**
11. (a)(i) difficult to see the exact end point 1
(ii) methyl orange 1
- (b)(i) number of moles of sulphuric acid
 $= 0.2 \times (31.5/1000) = 0.0063 \text{ mol}$ 1
number of moles of sodium hydroxide
 $= 2 \times 0.0063 = 0.0126 \text{ mol}$ 1
concentration of sodium hydroxide
 $= 0.0126 \times (1000/25) = 0.504 \text{ mol dm}^{-3}$ 1
- (ii) relative formula mass = 40 1
concentration = $40 \times 0.504 = 20.16 \text{ g dm}^{-3}$ 1
- (c)(i) a gelatinous blue precipitate 1
that does not dissolve in excess sodium hydroxide solution 1
- (ii) $\text{Cu}^{2+}(\text{aq}) + 2\text{OH}^{-}(\text{aq}) \rightarrow \text{Cu}(\text{OH})_2(\text{s})$
reactant ions 1
product 1
state symbols 1
- (Total 12 marks)**
12. (a)(i) yeast 1
(ii) fractional distillation 1
- (b)(i) $\text{CH}_2 = \text{CH}_2(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightarrow \text{CH}_3 - \text{CH}_2\text{OH}(\text{l})$
all formulae correct 1
equation balanced 1
state symbols 1
- (ii) phosphoric acid catalyst 1
300 °C 1
- (c) A – fermentation, as easy to grow suitable carbohydrates 1
expensive to import crude oil/ethene 1
B – can't grow enough carbohydrates due to lack of space 1
ethene readily available as a by-product of oil refining 1
- (d) H_2O 1
- (Total 12 marks)**

- | | | | |
|-----|--------|--|---|
| 13. | (a)(i) | 35, 44 | 1 |
| | | 35, 46 | 1 |
| | (ii) | around 50% each | 1 |
| | (b)(i) | $2\text{Br}^- + \text{Cl}_2 \rightarrow \text{Br}_2 + 2\text{Cl}^-$ | |
| | | all symbols correct | 1 |
| | | equation balanced | 1 |
| | (ii) | iodine is less reactive than bromine so it would not displace bromide ions | 1 |
| | (c)(i) | sodium iodide | 1 |
| | (ii) | colour would go from red-brown to pink | 1 |
| | (iii) | each bromine atom gains an electron | 1 |
| | (iv) | 2 | 1 |
| | | 2e^- | 1 |

(Total 11 marks)

TOTAL FOR PAPER: 120 MARKS

Edexcel International

London Examinations

IGCSE

IGCSE in Chemistry (4335)

Mark Scheme for Specimen Paper

Paper 03 (Written alternative to coursework)

**MARK SCHEME FOR
LONDON EXAMINATIONS IGCSE IN CHEMISTRY (4335)
SPECIMEN PAPER 3
(WRITTEN ALTERNATIVE TO COURSEWORK)**

- | | | |
|----|---|-------------------------|
| 1. | (a)(i) A – Conical flask | 1 |
| | (ii) B – Pipette | 1 |
| | (iii) C – Measuring cylinder | 1 |
| | (iv) D – (Filter) funnel | 1 |
| | (b)(i) Measuring cylinder | 1 |
| | (ii) Pipette | 1 |
| | (iii) (Filter) funnel | 1 |
| | | (Total 7 marks) |
| 2. | (a) Lines joined to correct boxes. Deduct one mark for an error
(hydrogen – “pops”, acid turns UI red, carbon dioxide turns lime water cloudy) | 2 |
| | (b)(i) to clean the wire | 1 |
| | (ii) sodium | 1 |
| | (iii) sodium sulphate | 1 |
| | | (Total 5 marks) |
| 3. | (a)(i) Hydrogen | 1 |
| | (ii) 75 cm ³ (+/- 1 cm ³) | 1 |
| | (b)(i) graph 1 | 1 |
| | (ii) Any two from:
Use same mass/length of magnesium ribbon
Use same acid
Use same volume of acid
Use same concentration of acid
Use same temperature for all three tests. | 2 |
| | (c)(i) Columns for time and volume shown in two tables | 1 |
| | Correct units shown for both time and volume | 1 |
| | (ii) 1 mark for each graph (points plotted correctly, smooth curves) | 2 |
| | (iii) Both go to same max volume/Both are curves | 1 |
| | (iv) Same mass and volume of reagents used/Reaction starts quick and then slows down as reagents are used up | 1 |
| | (v) Curve is steeper but horizontal at 60 cm ³ | 1 |
| | (vi) Anomalous result is circled | 1 |
| | (vii) Checked by repeating them | 1 |
| | | (Total 14 marks) |

4. (a)(i) Correct diagram = 2 marks
Deduct 1 for any piece wrongly placed (min = 0) 2
- (ii) 3-2-4-1 1
- (iii) Take water temperature at the start of each test 1
- (iv) Any two from:
Wear safety spectacles
Take care not to break thermometer
Care with flammable liquid
Care with hot water 2
- (v) Any two from:
Use same volume of water each time
Use same start temperature
Make sure beaker is same distance above crucible each time
Use same mass of alcohol each time
Stir equally each time
Use same position in lab (i.e. to avoid draughts) 2
- (vi) Lack of heat shielding 1
- (b)(i) More carbon atoms in the molecule = more heat released (1)
Energy released is not directly proportional to number of carbon atoms (1) 2
- (ii) Reasonable placing for pentanol (graph continues rising, but less steep) 1
- (Total 12 marks)**
5. (a)(i) P = Tap/dropping funnel (1)
Q = Gas jar (1) 2
- (ii) Chlorine dissolves in water 1
- (iii) Green/yellow 1
- (iv) Add moist litmus paper (1)
Chlorine bleaches paper white (1) 2
- (Total 6 marks)**

6. Apparatus used:
- | | |
|---|---|
| Conical flask/or other suitable container | 1 |
| Pipette/Measuring cylinder | 1 |
| Burette | 1 |
- Method – Any three points from the following:
- Use pipette/cylinder to place a known volume of acid
(e.g. 0.1 M HCl) in flask/or similar
- Fill burette with first indigestion liquid
- Add suitable indicator (e.g. universal/screened methyl orange)
- Titrate into acid until end point/neutralization
- Record volume of acid used
- Rinse out flask/similar container, and repeat with liquid 2
- Strongest indigestion liquid is the one which needed least
volume of liquid to neutralise the acid
- 3
- (Total 6 marks)**

TOTAL FOR PAPER: 50 MARKS

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