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

Paper Reference(s)

4335/1F

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Chemistry

Paper 1F

Foundation Tier

Wednesday 21 May 2008 – Afternoon

Time: 1 hour 30 minutes

Materials required for examination
Nil

Items included with question papers
Nil

Question Number	Leave Blank
1	
2	
3	
4	
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6	
7	
8	
9	
10	
Total	

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname and initial(s) and your signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer ALL questions in the spaces provided in this question paper.
Show all stages in any calculations and state the units. Calculators may be used.
Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (~~☒~~) and then mark your new answer with a cross (☒).

Information for Candidates

The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
There are 24 pages in this question paper. All blank pages are indicated.
A Periodic Table is given on page 2.

Advice to Candidates

Write your answers neatly and in good English.

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THE PERIODIC TABLE

Period	1	2	Group										3	4	5	6	7	0
1												1 H Hydrogen 1						4 He Helium 2
2	7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
3	23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
4	39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	63.5 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
5	86 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	99 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
6	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	179 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
7	223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89															

Key

Relative atomic mass
Symbol
Name
Atomic number

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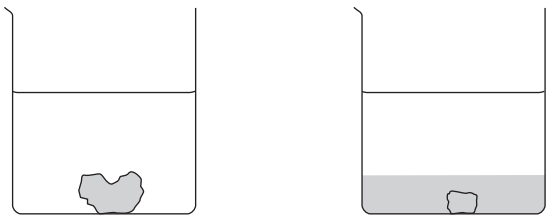
SECTION A

1. Copper(II) sulphate is a blue solid. It is soluble in water.
A crystal of copper(II) sulphate is placed in a beaker of cold water.



Start After a while

(a) After a while the crystal becomes smaller and the liquid in the bottom of the beaker becomes blue.
Place a cross (☒) in the box next to the correct explanation for this.

The cold water makes the crystal shrink. ☒

The crystal dissolves in the water. ☒

The crystal melts in the water. ☒

(1)

(b) After a few days the liquid in the beaker looks different.

(i) Place a cross (☒) in the box next to the statement that best describes the appearance of the liquid in the beaker.

All of the liquid is blue. ☒

None of the liquid is blue. ☒

Only the liquid at the top is blue. ☒

(1)

(ii) Place a cross (☒) in the box next to the process that causes this change.

Condensation. ☒

Diffusion. ☒

Evaporation. ☒

(1)

Leave blank

(c) Copper(II) sulphate is a compound formed from atoms of different elements. It has the formula $CuSO_4$.

(i) What is an element?

.....

.....

(1)

(ii) How many different types of atom are present in copper(II) sulphate?

.....

(1)

Q1

(Total 5 marks)

Leave blank

2. (a) The table shows what happens when four metals are added to the same volume of dilute hydrochloric acid in a test tube.

Metal	Observations
gold	no bubbles seen temperature does not change
magnesium	violent bubbling tube becomes hot and contents come out of the top
nickel	slow bubbling very small increase in temperature
zinc	fast bubbling tube becomes warm

Use the information in the table to help you decide which of these metals is

(i) the most reactive

.....

(1)

(ii) the least reactive.

.....

(1)

(b) Zinc reacts with iron(II) sulphate solution in a displacement reaction.

(i) Why does this reaction occur?

.....

.....

(1)

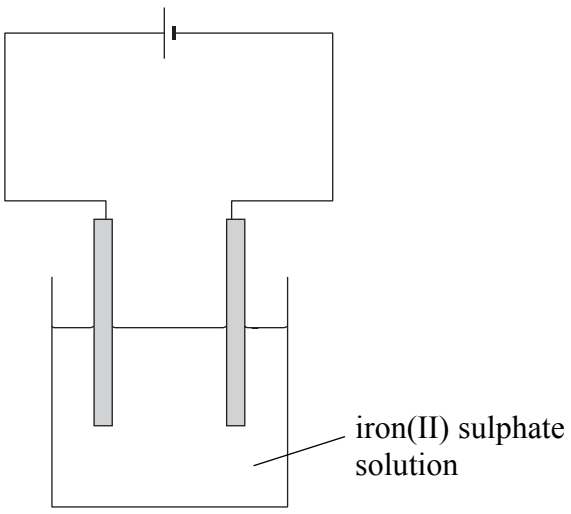
(ii) Complete the word equation for the reaction.

zinc + iron(II) sulphate → ..... + ...

(1)

Leave blank

(c) A student tries to show that iron(II) sulphate solution conducts electricity.
The diagram shows the circuit he uses.



(i) Suggest a piece of apparatus that could be added to the circuit to show that the solution conducts electricity.

.....

(1)

(ii) Use **one** word from the box to complete the sentence.

atoms	ions	molecules

Iron(II) sulphate solution can conduct electricity because it

contains ..... that are able to move.

(1)

Q2

(Total 6 marks)

Leave blank

3. (a) Universal indicator solution is added to some water. A small piece of sodium is then placed on the water. There is a vigorous reaction. One of the products of the reaction is hydrogen gas.

(i) Describe the test for hydrogen.

Test .....

Result .....

(2)

(ii) Name the other product that forms when sodium reacts with water.

.....

(1)

(iii) State the colour of the universal indicator solution before and after the reaction.

Colour before the reaction .....

Colour after the reaction .....

(2)

(b) Sodium chloride is an ionic compound. It can be made by reacting sodium with chlorine. Complete the passage by selecting words from the box. Each word may be used once, more than once or not at all.

different	gains	high	loses
low	shares	strong	weak

When a sodium atom becomes an ion, it ..... one electron.

A chlorine atom ..... an electron to become an ion.

Sodium chloride has a ..... melting point.

This is because there is a ..... force of attraction between oppositely charged ions.

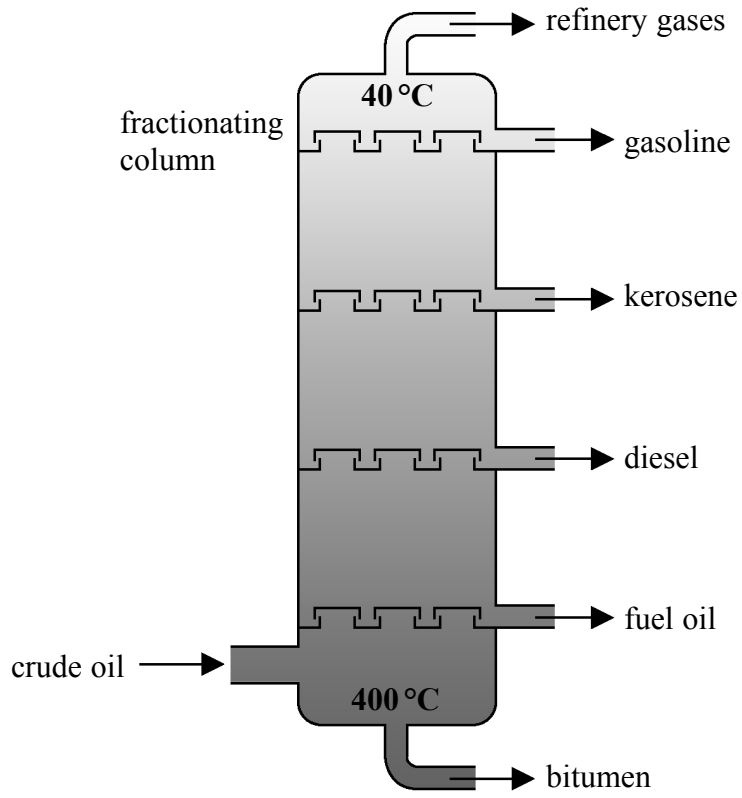
(4) **Q3**

(Total 9 marks)

Leave blank

4. Crude oil is a mixture of hydrocarbons.

The diagram shows how the hydrocarbons in crude oil can be separated by fractional distillation.



(a) Use the information in the diagram to help you answer these questions.

(i) Name the fraction that does not evaporate during fractional distillation.

.....

(1)

(ii) Name the fraction that does not condense as it rises up the fractionating column.

.....

(1)

(iii) Name the **liquid** fraction that leaves the column at the lowest temperature.

.....

(1)

Leave blank

(b) The table shows uses of some fractions obtained from crude oil.

Complete the table by selecting fractions from the diagram.

Use of fraction	Name of fraction
aviation fuel	
car fuel	
road surfacing	

(3)

(c) Kerosene contains hydrocarbons.

(i) Complete the word equation for the **complete** combustion of kerosene.

kerosene + ... → ..... + ...

(3)

(ii) Name the poisonous gas that may form during the **incomplete** combustion of kerosene.

.....

(1)

(iii) Incomplete combustion may form a black solid called soot. Name the element present in soot.

.....

(1)

Leave blank

(d) Some organic compounds can be made into polymers.

(i) Use words from the box to complete the sentence. Each word may be used once, more than once or not at all.

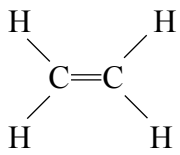
giant	monomers	plastics	small

Polymers are ..... molecules formed when molecules

called ..... join together.

(2)

(ii) Place a cross (☒) in the box next to the repeat unit of poly(ethene).



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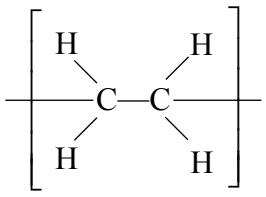

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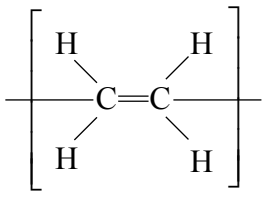


☒

(1)

(Total 14 marks)

Q4

Leave blank

5. (a) Zinc sulphate is a soluble salt. It can be made by reacting zinc carbonate with dilute sulphuric acid. Zinc carbonate is insoluble in water.

(i) Place a cross (☒) in **one** box to show the correct word equation for the reaction of zinc carbonate with dilute sulphuric acid.

zinc carbonate + sulphuric acid → zinc sulphate + carbon dioxide ☒

zinc carbonate + sulphuric acid → zinc sulphate + hydrogen ☒

zinc carbonate + sulphuric acid → zinc sulphate + hydrogen + carbon dioxide ☒

zinc carbonate + sulphuric acid → zinc sulphate + water ☒

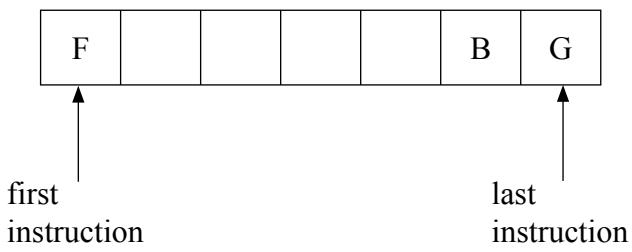
zinc carbonate + sulphuric acid → zinc sulphate + water + carbon dioxide ☒

(1)

The following instructions for making crystals of zinc sulphate are in the wrong order.

A	Add a spatula of zinc carbonate and stir.
B	Cool the filtrate.
C	Filter the mixture.
D	Heat the filtrate until it is saturated.
E	If all of the solid disappears add more zinc carbonate.
F	Place 25 cm^3 of dilute sulphuric acid in a beaker.
G	Remove the crystals and dry between two pieces of filter paper.

(ii) Complete the boxes to show the correct order for the instructions. The first instruction and the last two instructions have already been completed.



(3)

(iii) What extra instruction could be added after **F** to speed up the reaction?

.....

(1)

Leave blank

(b) Phenol red is an indicator. Its colour at different pH values is

pH 4	pH 7	pH 10
yellow	orange	red

Some dilute sulphuric acid is placed in a beaker. A few drops of phenol red indicator are added to the acid. Dilute sodium hydroxide solution is added gradually until it is in excess.

(i) What colour is phenol red indicator in dilute sulphuric acid?

.....

(1)

(ii) What colour is phenol red indicator when excess dilute sodium hydroxide is added?

.....

(1)

(iii) What type of reaction takes place when dilute sulphuric acid reacts with dilute sodium hydroxide?

.....

(1)

(iv) Suggest a substance in which phenol red indicator is orange.

.....

(1)

Q5

(Total 9 marks)

Leave blank

6. (a) The following gases are present in air.

argon	carbon dioxide	nitrogen	oxygen

Put the name of each gas in the correct column in the table below.

Makes up over 50% of air	**Makes up about 20% of air**	**Makes up 1% or less of air**

(4)

(b) When copper is heated in air, it reacts with oxygen.

(i) What colour is the surface of the copper after it has been heated in air?

.....

(1)

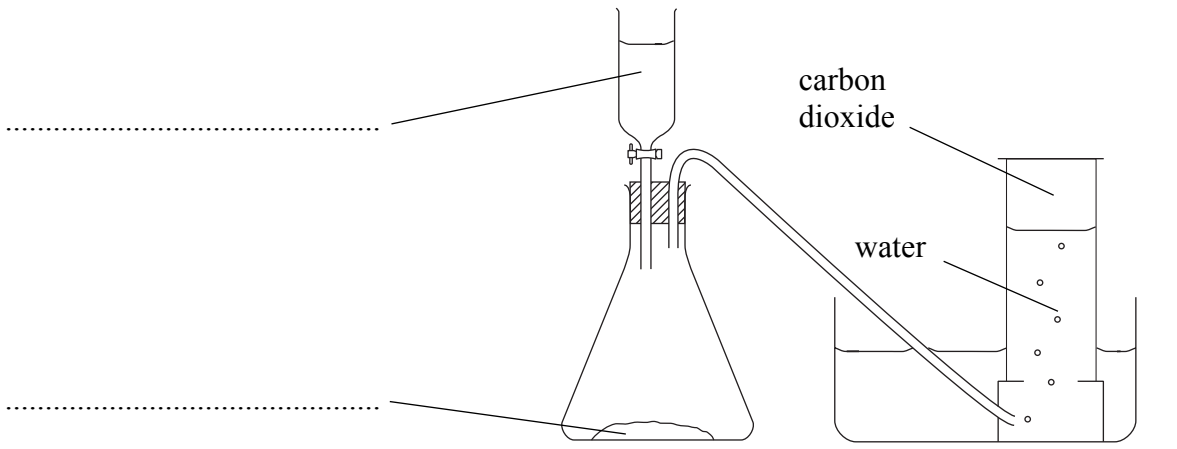
(ii) Give the formula of the compound formed.

.....

(1)

(c) (i) Carbon dioxide can be made using the apparatus shown. Use names from the box to complete the labels on the diagram. Each name may be used once or not at all.

calcium carbonate	hydrochloric acid
hydrogen peroxide	manganese(IV) oxide



(2)

Leave blank

(ii) Carbon dioxide is bubbled through a colourless liquid. The liquid becomes milky. Identify the liquid.

.....

(1)

(iii) Give **one** use for carbon dioxide.

.....

(1)

(d) When burning magnesium is placed in a gas jar of carbon dioxide, the magnesium continues to burn. The chemical equation for the reaction is

$$2Mg + CO_2 \rightarrow 2MgO + C$$

After the reaction a white solid and a black solid are seen in the gas jar.

(i) Give the **name** of the black solid made in the reaction.

.....

(1)

(ii) Identify the substance that is oxidised in this reaction.

.....

(1)

Q6

(Total 12 marks)

TOTAL FOR SECTION A: 55 MARKS

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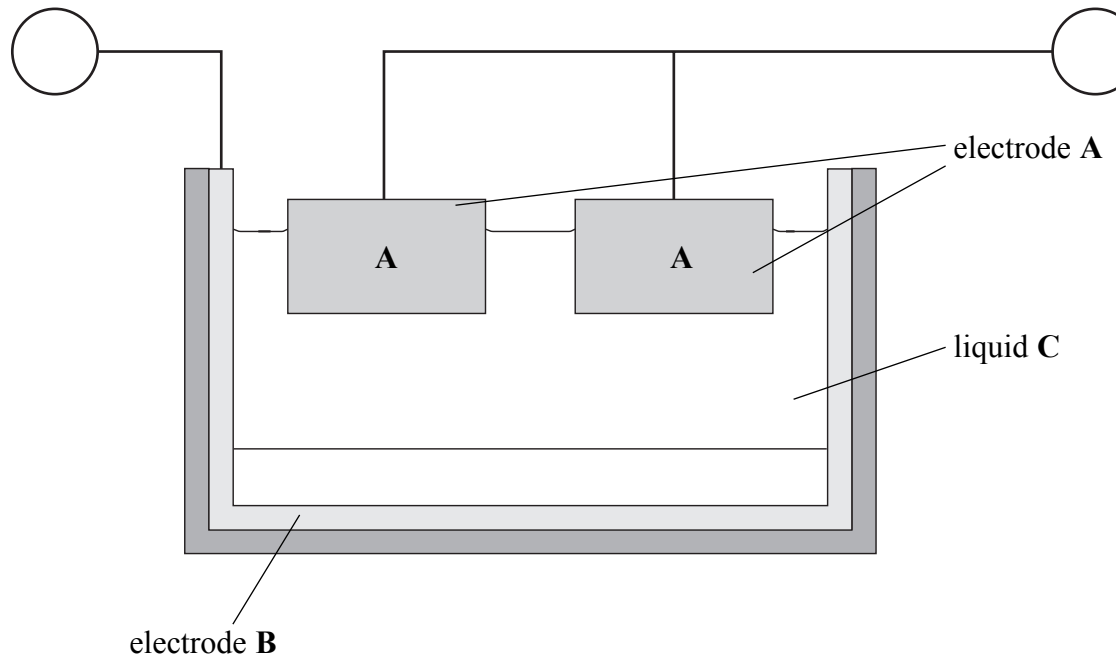
SECTION B

7. The diagram shows how aluminium is extracted on an industrial scale.



(a) (i) Name the process used to extract aluminium.

.....

(1)

(ii) Name the material used for the electrodes **A** and **B**.

.....

(1)

(iii) Using the symbols + and – identify the polarity of the electrodes **A** and **B**.

Write **one** symbol in each circle in the diagram above.

(1)

(iv) Identify the **two** compounds present in liquid **C**.

1 .....

2 .....

(2)

(v) State **one** major cost that makes this process more expensive than the extraction of iron.

.....

(1)

Leave blank

(b) The mixture of gases coming from electrodes **A** contains an element and a compound.

(i) Identify the element.

.....

(1)

(ii) Identify the compound and explain how it forms.

Compound .....

Explanation of formation .....

.....

(2)

Q7

(Total 9 marks)

Leave blank

8. Ethene, C_2H_4, and methane, CH_4, are the first members of two different homologous series.

(a) One characteristic of a homologous series is that all its members have the same general formula.

(i) State **two** other characteristics of a homologous series.

1 .....

.....

2 .....

.....

(2)

(ii) What is the name of the homologous series to which ethene belongs?

.....

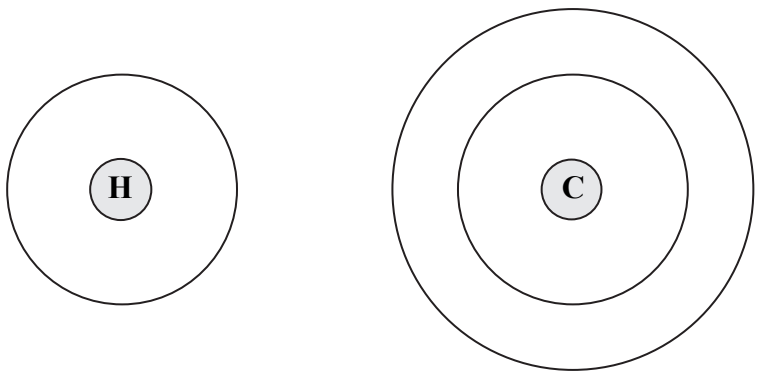
(1)

(iii) What is the general formula of this homologous series?

.....

(1)

(b) (i) Use the Periodic Table to help you complete the diagrams to show the electronic configuration of hydrogen and of carbon.



(2)

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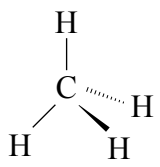
(ii) Draw a dot and cross diagram to show the covalent bonding in a methane molecule.

(2)

(iii) The shape of a methane molecule is shown in the following diagram.



What name describes this shape?

.....

(1)

(c) The alkane C_4H_{10} exists as two isomers.

(i) What are isomers?

.....

.....

(2)

(ii) Draw the displayed formula of each isomer.

(2) **Q8**

(Total 13 marks)

Leave blank

9. Calcium and magnesium are metals in Group 2 of the Periodic Table.

(a) (i) How many electrons are there in the outer shell of an atom of calcium?

.....

(1)

(ii) Write the electronic configuration of an atom of magnesium.

.....

(1)

(b) A student adds a piece of calcium to some cold water in a beaker. The products of the reaction are calcium hydroxide and hydrogen. Some of the calcium hydroxide dissolves in the water and some does not.

(i) Describe **two** observations that the student could make during the reaction.

1 .....

.....

2 .....

.....

(2)

(ii) Give the formula of calcium hydroxide.

.....

(1)

(iii) When the reaction is complete, a piece of litmus paper is added to the solution in the beaker. State the final colour of the litmus paper and what this colour indicates about the solution.

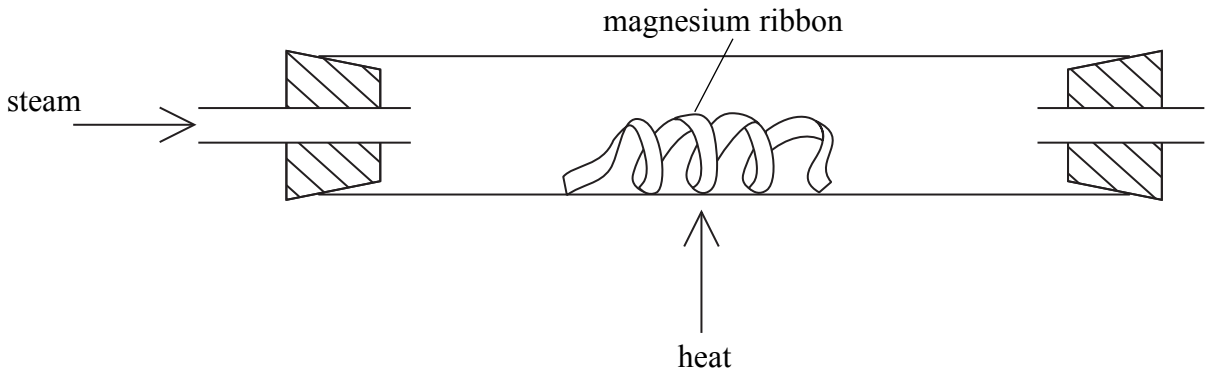
Final colour of litmus .....

What this colour indicates .....

(2)

Leave blank

(c) The diagram shows apparatus for reacting magnesium with steam.



The products of this reaction are magnesium oxide and hydrogen.

(i) State the colour of magnesium and of magnesium oxide.

Magnesium .....

Magnesium oxide .....

(2)

(ii) State **two** ways in which the hydrogen could be collected.

1 .....

.....

2 .....

.....

(2)

(iii) The hydrogen gas can be burned as it leaves the heated tube. Write a word equation for this reaction.

.....

(1)

Q9

(Total 12 marks)

Turn over

Leave blank

10. A student has four solutions labelled **A**, **B**, **C** and **D**.
Each solution contains one compound from the following list:

KNO_3 $FeCl_2$ $Fe(NO_3)_3$ $CuSO_4$ NH_4Cl

The student does some simple tests to identify the compounds present.
The table shows the tests and observations.

Solution	Colour	Add sodium hydroxide solution	Add dilute nitric acid and silver nitrate solution
A	colourless	pungent gas given off	white precipitate
B	blue	blue precipitate	no change
C	colourless	no change	no change
D	green	green precipitate	white precipitate

(a) (i) What is the pungent gas formed by solution **A**?

.....

(1)

(ii) Which ion must be present in **A** for the white precipitate to form?

.....

(1)

(iii) Which ion must be present in **B** for the blue precipitate to form?

.....

(1)

(iv) Which ion must be present in **D** for the green precipitate to form?

.....

(1)

(b) (i) Which compound in the list can be identified using barium chloride solution?

.....

(1)

(ii) State **one** compound in the list that can be identified using a flame test.
State the colour of the flame.

Compound .....

Flame colour .....

(2)

Leave blank

(c) Silver nitrate solution, $AgNO_3(aq)$, is added to a solution of lithium iodide, LiI.

(i) Describe what is seen.

.....

.....

(1)

(ii) Write the chemical equation, including state symbols, for the reaction.

.....

.....

.....

(3)

Q10

(Total 11 marks)

TOTAL FOR SECTION B: 45 MARKS

TOTAL FOR PAPER: 100 MARKS

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