Specimen Paper

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	

AQA Level 1/2 Certificate in Science: Double Award
Specimen Paper

Double Award

Chemistry Paper 1F

For this paper you must have:
- a ruler
- the Periodic Table (enclosed).

You may use a calculator.

Time allowed
- 60 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

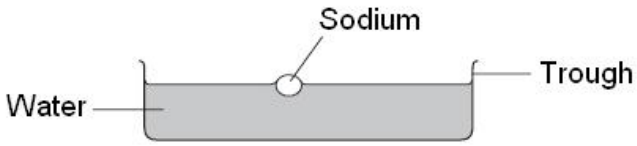
Answer **all** questions in the spaces provided.

1 (a) A chemistry teacher demonstrated the reaction between sodium and water to some students. One of the students wrote the following notes.

The reaction between sodium and water

A piece of sodium was cut easily into smaller pieces with a knife.

The sodium was added to water in a trough.



The sodium:

- floated
- melted quickly to give a silvery ball
- moved on the surface of the water
- fizzed.

Use the information in the box to help you to answer the questions.

How can you tell that:

1 (a) (i) sodium has a low melting point

.....

.....

(1 mark)

1 (a) (ii) sodium is soft

.....

.....

(1 mark)

1 (a) (iii) a gas was produced

.....

.....

(1 mark)

1 (a) (iv) sodium has a low density?

.....

.....

(1 mark)

1 (b) Sodium reacts with chlorine to form sodium chloride.

Write a word equation for this reaction.

.....

(1 mark)

1 (c) Use words from the box to answer the questions.

compound	**element**	**metal**	**mixture**

Which word best describes:

1 (c) (i) chlorine .....

(1 mark)

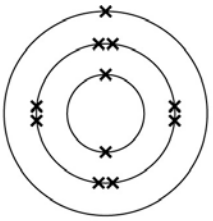
1 (c) (ii) sodium chloride? .....

(1 mark)

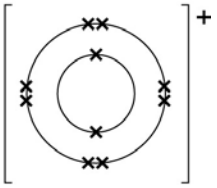
Question 1 continues on the next page

1 (d) When sodium reacts with chlorine the sodium atoms change into sodium ions.

The diagrams below represent a sodium atom and a sodium ion.



Sodium atom (Na)



Sodium ion (Na^+)

Use the diagrams to help you to describe how a sodium atom turns into a sodium ion.

.....

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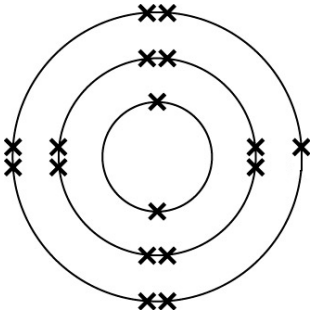
.....

.....

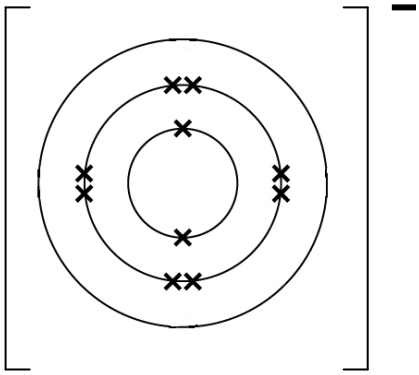
(2 marks)

1 (e) (i) The diagram below represents a chlorine atom.



When chlorine reacts with sodium the chlorine forms negative chloride ions.

Complete the diagram below to show the outer electrons in a chloride ion (Cl^-).



(*1 mark*)

1 (e) (ii) Chloride ions are attracted to sodium ions in sodium chloride.

Explain why.

.....

.....

(1 mark)

11

Turn over for the next question

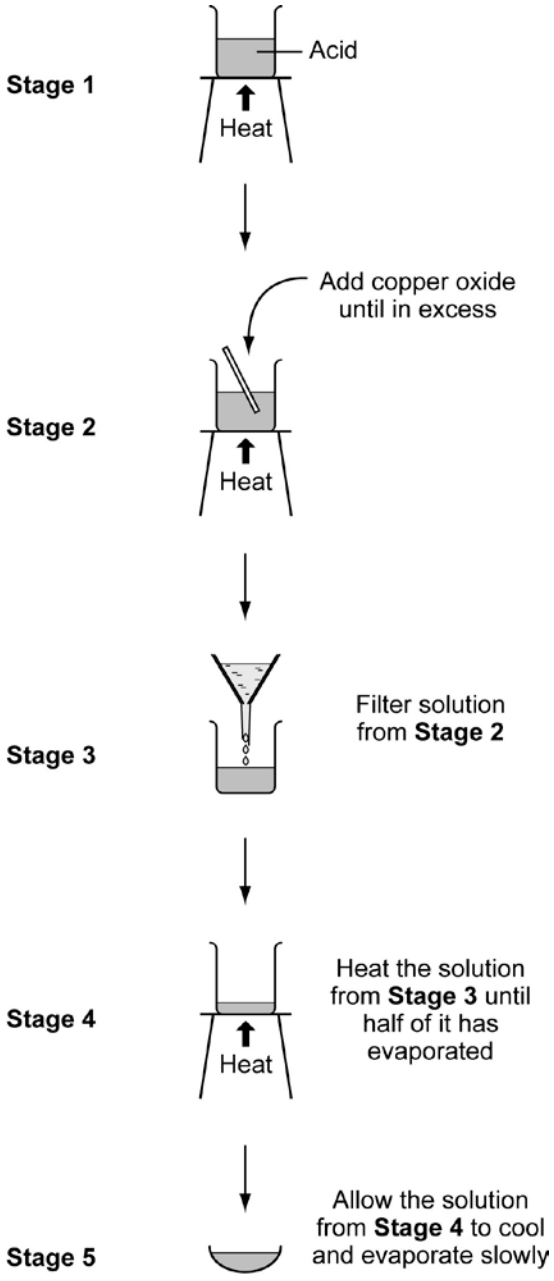
2 Copper sulfate crystals can be made from copper oxide and an acid.

2 (a) Complete the word equation for this reaction.

…….. acid + copper oxide ⟶ copper sulfate + ……..

(2 marks)

2 (b) A student followed the stages shown in the diagram to make a sample of copper sulfate.



2 (b) (i) Why was the acid heated in Stages **1** and **2**?

……

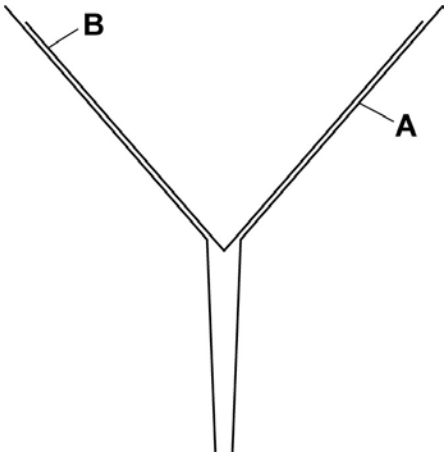
(1 mark)

2 (b) (ii) How would the student know when the copper oxide was in excess in Stage **2**?

.....

(1 mark)

2 (b) (iii) The apparatus below is used in Stage **3**. Name **A** and **B**.



A .....

B .....

(2 marks)

2 (b) (iv) Complete the sentence using a word from the box.

crystallisation	**distillation**	**filtration**

In Stage **5** the solid copper sulfate is formed by ..... .

(1 mark)

2 (b) (v) This method makes copper sulfate crystals that contain no acid and no copper oxide. Explain how.

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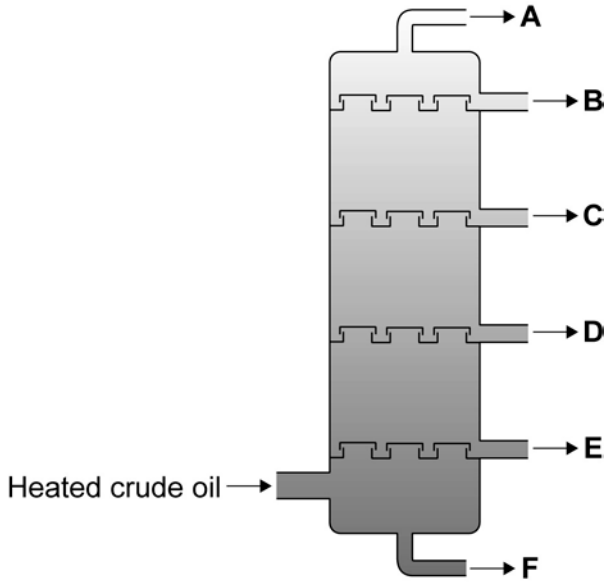
(3 marks)

10

3 Crude oil is a mixture of hydrocarbons. The diagram shows a method of separating crude oil.



3 (a) Complete the sentence.

This method of separation is called ..... .

(1 mark)

3 (b) Most of the compounds in crude oil are *saturated hydrocarbons*.

Complete the sentences.

A *hydrocarbon* is a compound that contains …… and

…… only.

A hydrocarbon is *saturated* if it contains only …… bonds.

(2 marks)

3 (c) (i) Give the letter from the diagram that represents the least flammable fraction.

.....

(1 mark)

3 (c) (ii) Give the letter from the diagram that represents the most viscous fraction.

.....

(1 mark)

3 (d) (i) How does the temperature change between the bottom and the top of the tower?

.....

.....

(1 mark)

3 (d) (ii) Complete the sentence below.

The different hydrocarbons in crude oil can be separated by this method because they have different ..... .

(1 mark)

3 (e) Many of the fractions of crude oil are used as fuels.

3 (e) (i) When fuels such as petrol and diesel are burned, substances are released into the air. These substances cause acid rain, global dimming and climate change.

Draw a straight line from each environmental problem to the substance that causes it.

Environmental problem	Substance that causes problem
Acid rain	Carbon particles
Climate change	Carbon dioxide
Global dimming	Sulfur dioxide
	Water vapour

(3 marks)

Question 3 continues on the next page

3 (e) (ii) Carbon particles are produced by the partial combustion of a fuel.

Complete the sentences using words from the box.

carbon dioxide	**carbon monoxide**	**nitrogen**	**oxygen**

Partial combustion is caused by too little ..... .

A gas formed by the partial combustion of petrol is ..... .

(2 marks)

12

Turn over for the next question

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

4 Calcium nitrate decomposes when it is heated.

$$2\ Ca(NO_3)_2(s) \longrightarrow 2\ CaO(s) + 4\ NO_2(g) + O_2(g)$$

4 (a) A flame test was carried out on a sample of the solid product. What colour flame would be seen?

.....

(1 mark)

4 (b) The solid product (CaO) reacts with water to form a solution of $Ca(OH)_2$

4 (b) (i) Give the name of $Ca(OH)_2$

.....

(1 mark)

4 (b) (ii) Complete the sentences.

When universal indicator is added to the solution formed it turns ..... .

This shows that $Ca(OH)_2$ is ..... .

(2 marks)

4 (b) (iii) Draw a ring around the most likely pH value of the solution.

3 **7** **11**

(1 mark)

4 (c) When water is added to the solid product in a test tube the tube becomes very hot.

4 (c) (i) This shows that the reaction is ..... .

(1 mark)

4 (c) (ii) The tube becomes hot.
Explain why.

.....

.....

.....

.....

(2 marks)

4 (d) Oxygen is given off when calcium nitrate decomposes.

Describe a test for oxygen, and give the result if oxygen is present.

.....

.....

(1 mark)

9

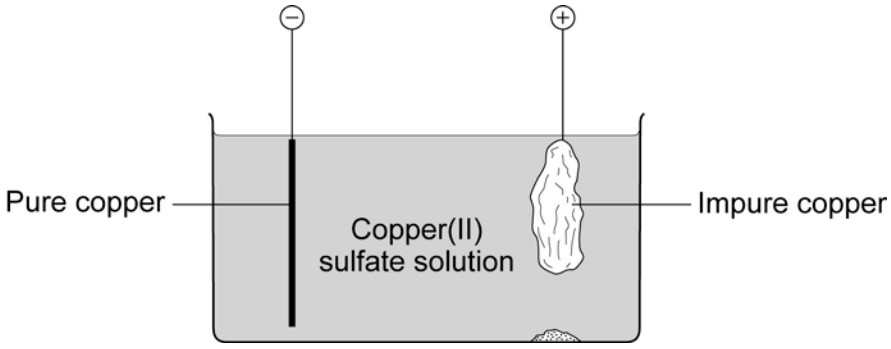
Turn over for the next question

5 Copper is a widely used material.

5 (a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate*.

One method of obtaining copper is by roasting copper(I) sulfide in air.

The copper produced by roasting copper(I) sulfide is impure. It can be purified by electrolysis, using the apparatus shown in the diagram.



Describe how copper can be purified using the apparatus shown.

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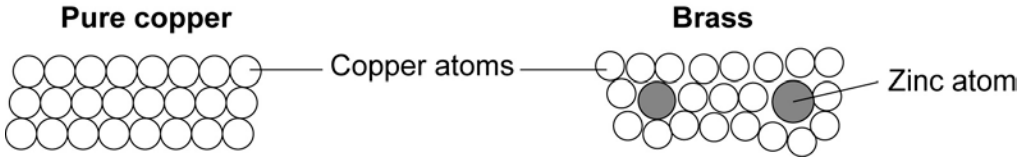
(6 marks)

5 (b) The diagram represents the structures of pure copper and of an alloy, brass.



Use the diagram to help you to explain why:

5 (b) (i) copper can be bent and shaped

.....

.....

.....

.....

(2 marks)

5 (b) (ii) brass is an alloy

.....

.....

(1 mark)

5 (b) (iii) brass is harder than pure copper.

.....

.....

.....

.....

(2 marks)

11

Turn over for the next question

6 (a) Ethanol is a liquid fuel which can be used as an alternative to petrol.
Ethanol can be made by fermentation.

State **one** advantage and **one** disadvantage of using fermentation to produce ethanol as a fuel.

Advantage .....

.....

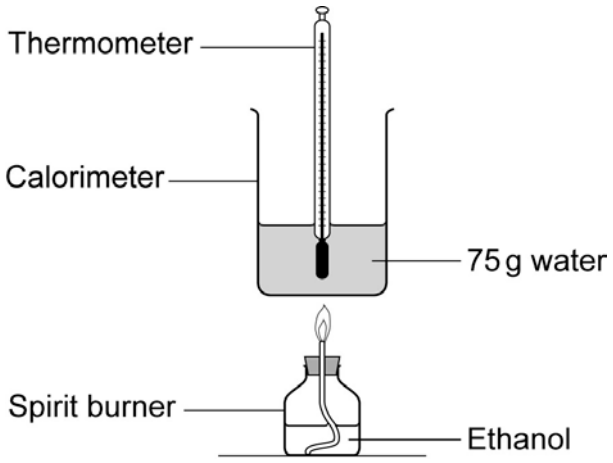
Disadvantage .....

.....

(2 marks)

6 (b) A student did an experiment to find out the energy released when ethanol burns in air.

She used the apparatus shown in the diagram.



Her results are shown in the table.

Experiment	Mass of fuel used in g	Temperature change of water in °C	Energy used to heat water in kJ	Energy given out by 1.00g of fuel in kJ
1	0.78	52	16.4	21.0
2	0.64	43	13.5	21.1
3	0.68	45	14.2	…….

6 (b) (i) The energy given out when 1.00 g of fuel burns can be calculated using the equation:

$$\text{energy given out when 1.00 g of fuel burns} = \frac{\text{energy used to heat water}}{\text{mass of fuel used}}$$

Calculate the amount of energy given out by 1.00 g of fuel in Experiment **3**. Write your answer in the table.

(1 mark)

6 (b) (ii) What measurements must the student have made during the experiment to be able to record the temperature change of the water and the mass of fuel used?

.....

.....

.....

.....

(2 marks)

6 (b) (iii) Suggest **one** reason why the student repeated the experiment.

.....

.....

(1 mark)

6 (b) (iv) The main error in this experiment is energy loss.

Suggest **one** way that the equipment could be changed to reduce energy loss.

.....

(1 mark)

END OF QUESTIONS

7

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

The Periodic Table

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 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
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
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
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **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
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112 – 116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Cu and **Cl** have not been rounded to the nearest whole number.