

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 1H

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 spaces 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** When insoluble copper(II) carbonate is added to dilute sulfuric acid, the salt copper(II) sulfate is made.

The word equation for the reaction is:

copper(II) carbonate + sulfuric acid \rightarrow copper(II) sulfate + carbon dioxide + water

A student followed the instructions in the table to make a pure, dry, crystalline sample of hydrated copper(II) sulfate.

Step	Instruction
1	Place approximately 25 cm ³ of dilute sulfuric acid in a conical flask.
2	Add a spatula full of copper(II) carbonate to the acid.
3	Continue to add copper(II) carbonate until it is in excess.
4	Filter the solution.
5	Heat the solution until a saturated solution is obtained.
6	Allow the saturated solution to cool.
7	Pour the excess liquid off the crystals that have formed.
8	Rinse the crystals with a small amount of cold distilled water.
9	Dry the crystals obtained.

- 1 (a)** Why is excess copper(II) carbonate added in step 3?

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(1 mark)

- 1 (b)** Identify another substance that could have been used in place of copper(II) carbonate to make copper(II) sulfate.

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(1 mark)

1 (c) How could the student tell that a saturated solution had been formed in step 5?

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(1 mark)

1 (d) Suggest **one** reason why the crystals were rinsed with a small amount of cold distilled water in step 8.

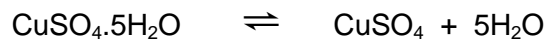
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(1 mark)

1 (e) Write a balanced symbol equation for the reaction of copper(II) carbonate with dilute sulfuric acid.

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(2 marks)

1 (f) In step 7, if the crystals of hydrated copper(II) sulfate are dried by heating them strongly, they decompose to give a white solid.

The equation for this decomposition is:



1 (f) (i) Give the name of the white solid formed.

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(1 mark)

1 (f) (ii) What would be seen if the white solid was added to dilute sulfuric acid?

Explain your answer.

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(2 marks)

9

Turn over ►

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

Give **one** advantage and **one** disadvantage of using ethanol as a fuel.

Explain your answers.

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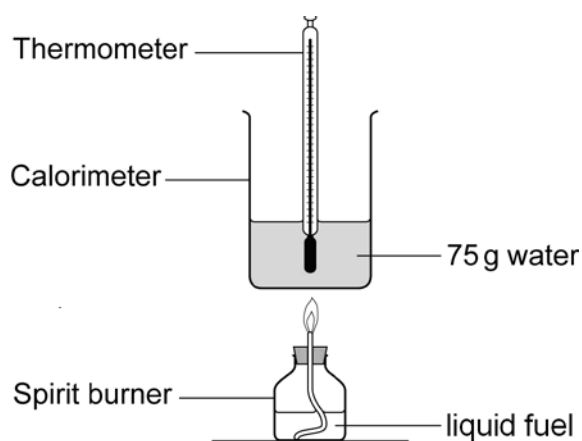
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(4 marks)

- 2 (b)** A student used different liquid fuels to heat water.
She used the apparatus shown in the diagram.



She obtained these results:

Liquid fuel	Mass of fuel used in g	Temperature change of water in °C	Energy given out by fuel in kJ
1	0.78	52	16.4
2	0.68	45	14.2

2 (b) (i) The energy given out by 1.00 g of fuel can be calculated using the equation:

$$\text{energy given out by 1.00 g of fuel} = \frac{\text{energy given out by fuel}}{\text{mass of fuel used}}$$

Calculate the energy given out by 1.00 g of fuel 2. Give your answer to three significant figures.

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energy given out by 1.00 g of fuel = kJ
(1 mark)

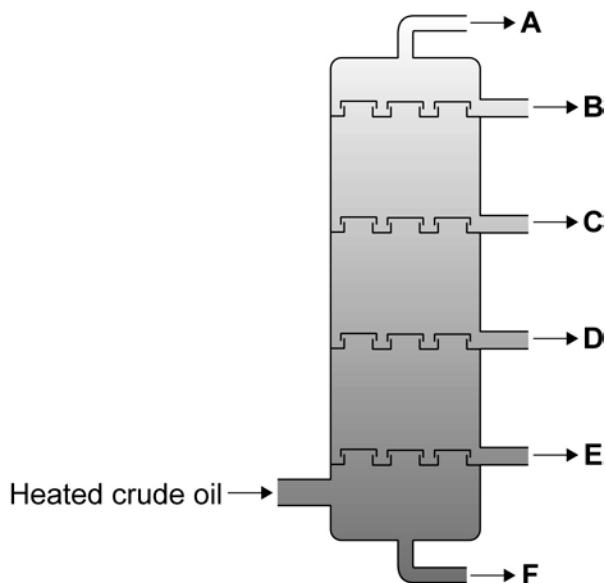
2 (b) (ii) The student noticed that when using fuel 1 the bottom of the calorimeter became covered in a black substance. Identify this black substance and explain how it formed.

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(2 marks)

Turn over for the next question

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



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

What is meant by the term *saturated hydrocarbon*?

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(3 marks)

3 (b) Use the diagram to explain how the crude oil is separated by this method.

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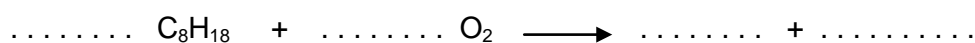
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(4 marks)

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

3 (c) (i) Complete and balance the symbol equation for the complete combustion of the compound with the formula C_8H_{18}



(2 marks)

3 (c) (ii) When fuels are used in car engines, it is possible for oxygen and nitrogen from the air to react together and form oxides of nitrogen which cause pollution.

Write a balanced chemical equation to show the formation of nitrogen dioxide, NO_2

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(2 marks)

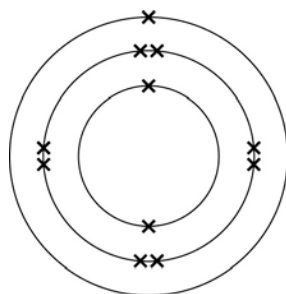
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Turn over for the next question

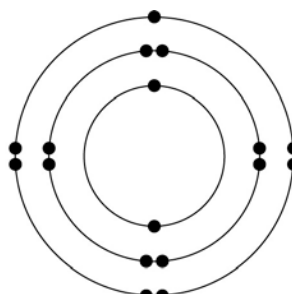
Turn over ►

4 Sodium chloride is an ionic compound. It is formed when sodium reacts with chlorine.

4 (a) The diagrams show the arrangement of the electrons in atoms of sodium and chlorine.



Sodium atom



Chlorine atom

Draw and label diagrams to show the arrangement of the electrons in the ions formed when sodium reacts with chlorine.

(2 marks)

4 (b) Radium is in Group 2 of the periodic table. Predict the charge that a radium ion would have.

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(1 mark)

4 (c) Sodium chloride is a typical ionic compound.

4 (c) (i) Sodium chloride has a very high melting point.

Explain why.

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(3 marks)

4 (c) (ii) Explain why solid sodium chloride does **not** conduct electricity but when molten it does conduct electricity.

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(3 marks)

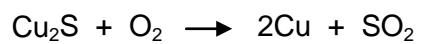
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Turn over for the next question

Turn over ►

5 Copper is a widely used material.

5 (a) One method of obtaining copper involves roasting copper(I) sulfide in air.

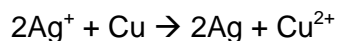


The sulfur dioxide produced is soluble in water.

Write a chemical equation for the reaction of sulfur dioxide with water. Include the state symbols.

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(1 mark)

- 5 (c)** When a solution of silver nitrate is added to copper, a displacement reaction takes place. The ionic equation for the reaction is



- 5 (c) (i)** State which species is reduced in this reaction and explain why it is a reduction.

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(2 marks)

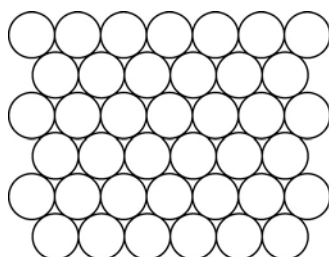
- 5 (c) (ii)** Another method of obtaining copper involves the addition of scrap iron to solutions containing copper(II) ions. Write an ionic equation for this reaction.

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(1 mark)

- 5 (d)** Copper is a typical metal. It conducts electricity and is malleable. Pure copper is soft.

The diagram shows the structure of a metal such as copper.



- 5 (d) (i)** Explain, in terms of its structure, why copper is a good conductor of electricity.

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(2 marks)

5 (d) (ii) Copper is often alloyed with other metals, such as tin. Alloys of copper are harder than pure copper.

Explain why alloys of copper are harder than pure copper.

You may draw a diagram to help explain your answer.

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(2 marks)

Turn over for the next question

14

Turn over ►

6 Plants require nitrogen for healthy growth. Most plants are not able to use nitrogen from the air and so fertilisers containing nitrogen are often added to the soil.

6 (a) Nitrogen gas has the formula N_2
Draw a dot and cross bonding diagram to show the bonding in a molecule of nitrogen.

(2 marks)

6 (b) Ammonium sulfate is a fertiliser that contains nitrogen.

6 (b) (i) Describe a chemical test you could carry out on a sample of fertiliser to show that it contains sulfate ions.

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(3 marks)

6 (b) (ii) A sample of fertiliser was thought to be contaminated with sodium sulfate.

Name a test that could be carried out to show that the fertiliser was contaminated with a sodium compound, and give the positive result of that test.

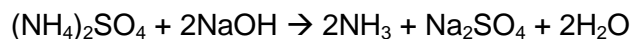
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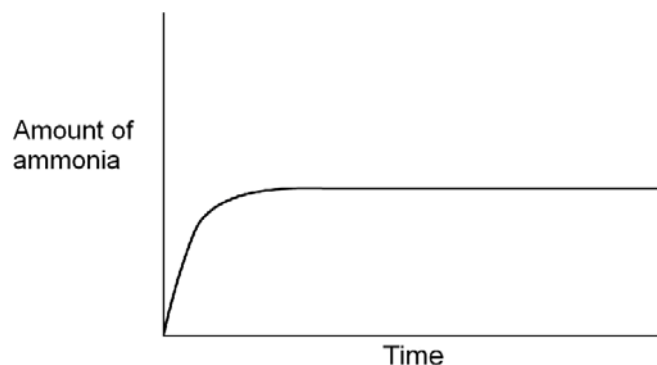
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(2 marks)

- 6 (b) (iii) When warm sodium hydroxide solution is added to ammonium sulfate, ammonia is produced. The equation for the reaction is given below.



The graph shows how the amount of ammonia formed during the reaction changes as the reaction proceeds.



Describe how the rate of the reaction changes as the reaction proceeds, and explain why it changes.

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(3 marks)

END OF QUESTIONS

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED**

