



General Certificate of Secondary Education
2013

Double Award Science: Chemistry

Unit C2

Foundation Tier

[GSD51]

ML

MONDAY 10 JUNE 2013, AFTERNOON

TIME

1 hour 15 minutes, plus your additional time allowance.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.
Answer **all nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 90.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question **6(a)**.
A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

Centre Number

71

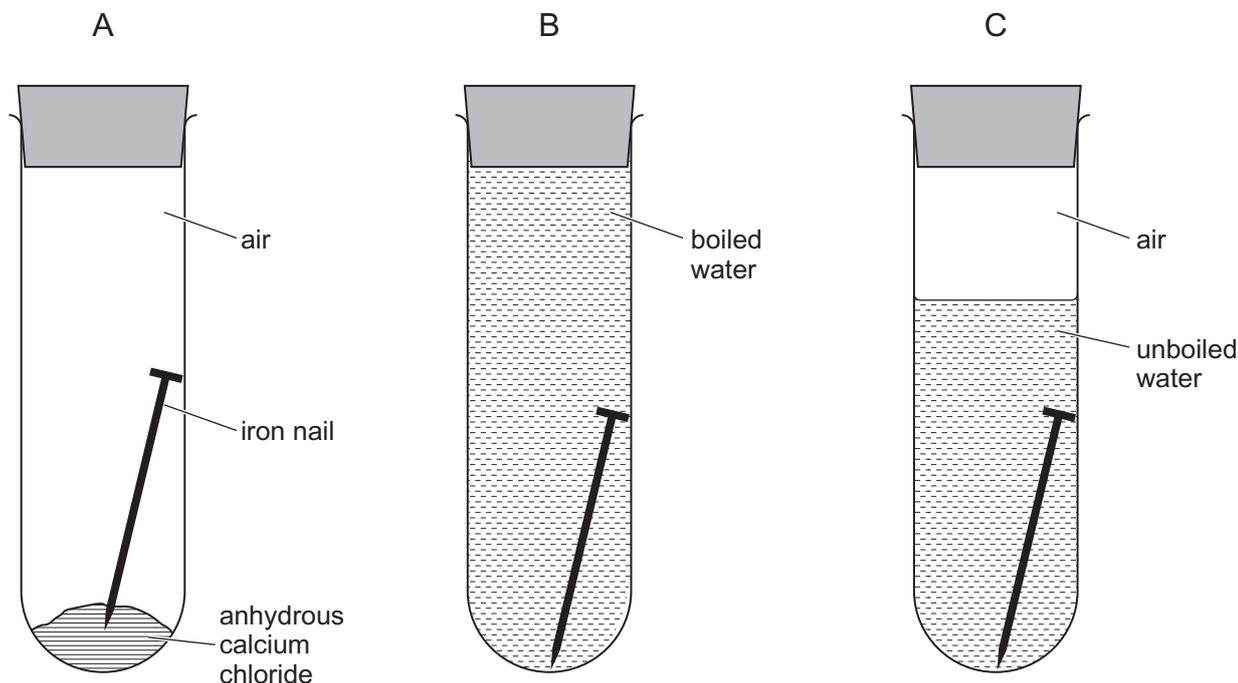
Candidate Number

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Question Number	Marks
1	
2	
3	
4	
5	
6	
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8	
9	

Total
Marks

- 1 (a) An experiment was carried out to investigate the conditions needed for iron nails to rust.

After one week, only **one** of the test tubes contained a rusty nail.



- (i) Look at test tube B. Why was the water boiled?

_____ [1]

- (ii) Look at test tube A. Why was **anhydrous** calcium chloride used?

_____ [1]

- (iii) What **two** conditions are necessary for the rusting of iron?

_____ and _____ [1]

- (iv) From the list below, **circle** the word which best describes rusting.

decomposition displacement
neutralisation oxidation reduction [1]

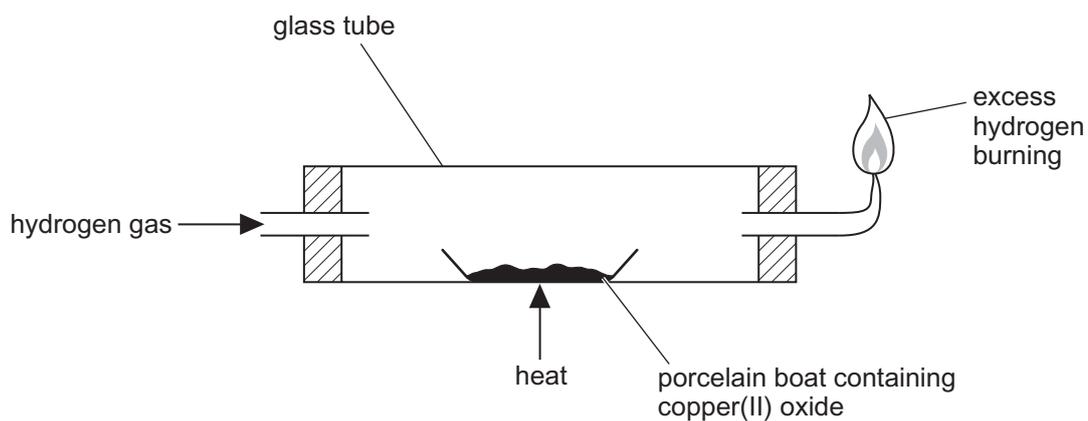
Examiner Only	
Marks	Remark

(b) Write down two suitable methods that could be used to prevent the bars of an iron gate from rusting.

1. _____

2. _____ [2]

(c) The reaction between hydrogen gas and copper(II) oxide can be carried out using the apparatus shown below.



(i) What colour change takes place during this reaction?

from _____ to _____ [2]

(ii) Complete the word equation for the reaction.

copper(II) oxide + hydrogen → _____ + _____ [2]

Examiner Only	
Marks	Remark

2 This question is about the reaction between zinc powder and dilute hydrochloric acid. The reaction rate can be altered by making some changes.

(a) Complete the table by stating if the changes will speed up the reaction or not. One has been done for you.

Change	Speed up Reaction? Yes or No
stir the reaction mixture	Yes
cool the reaction mixture down	
use hydrochloric acid which is more concentrated	
add a catalyst	
use a larger lump of zinc	

[4]

(b) The rate of the reaction can be measured by timing how long it takes for the reaction to stop and then using a formula. Look at the formulae below.

$$\text{rate} = \text{time} \quad \square$$

$$\text{rate} = 2 \times \text{time} \quad \square$$

$$\text{rate} = \frac{1}{\text{time}} \quad \square$$

$$\text{rate} = (\text{time})^2 \quad \square$$

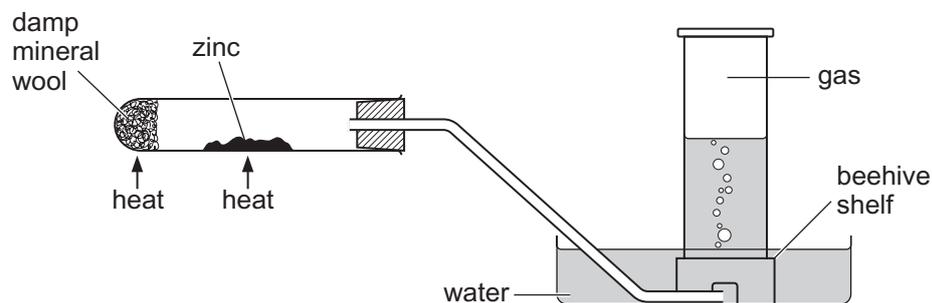
Which is the correct formula? Put a tick (✓) in the box beside the correct formula for the rate of a reaction.

[1]

Examiner Only	
Marks	Remark

- 3 (a) Zinc does not react with cold water, but zinc does react with steam.

The diagram below shows the apparatus used to react zinc with steam and to collect the gas produced.



- (i) What gas is produced when zinc reacts with steam?

_____ [1]

- (ii) Why is the damp mineral wool heated?

_____ [1]

- (iii) What colour is the solid product formed from zinc in this reaction?

_____ [1]

- (iv) Name a metal, other than zinc, which will react with steam but will not react with cold water.

_____ [1]

- (b) Magnesium is a Group 2 metal.

- (i) What is observed when magnesium is burned in air?
Write down two observations.

1. _____

2. _____ [2]

- (ii) Complete and balance the symbol equation for the reaction of magnesium with air.



[2]

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Marks Remark

4 (a) Exothermic reactions give out heat and endothermic reactions take in heat.

- (i) Complete the table to show which of the processes are exothermic and which processes are endothermic. One has been done for you.

Process	Exothermic or Endothermic
photosynthesis	endothermic
neutralisation of sodium hydroxide with hydrochloric acid	
dehydration of blue copper(II) sulfate crystals	
burning coal	

[3]

- (ii) Calcium carbonate can be broken down into simpler substances by heating it. What two words are used to describe this type of endothermic reaction?

_____ [2]

- (iii) Complete the word equation by identifying the gas given off when calcium carbonate is heated.

calcium carbonate \rightarrow calcium oxide +

[1]

Examiner Only	
Marks	Remark

(b) Limestone is taken from the ground by quarrying and limestone has many uses.

(i) Give one use of limestone.

_____ [1]

(ii) Complete the table below which shows some positive and negative effects of quarrying limestone. The first one has been done for you.

Effect of Quarrying	Positive	Negative
Produces a cheap material with many uses	✓	
Disused quarries can be used for landfill		
Natural habitats are disturbed		
Creates jobs in the community		
Produces dust		
Quarries can be ugly		

[5]

Examiner Only	
Marks	Remark

- (c) This part of the question is about the non-metal sulfur and some of its compounds. Look at the statements below. Put a ring round the correct answer to complete each statement. One has been done for you.

When sulfur burns in air it reacts with:

nitrogen

hydrogen

oxygen

- (i) The flame produced when sulfur burns in air is:

white

blue

black

[1]

- (ii) Sulfur is a:

yellow
gas

yellow
solid

white
solid

[1]

- (iii) When a mixture of iron and sulfur is heated the mixture:

evaporates

glows

turns white

[1]

- (iv) FeS is the formula of:

iron(II)
sulfide

iron(II)
sulfate

iron(II)
sulfite

[1]

- (v) Sulfur dioxide is a colourless gas. It has:

no
smell

a pungent
smell

a pleasant
smell

[1]

- (vi) Sulfur dioxide causes:

acid
rain

hard
water

dry
ice

[1]

- (vii) Sulfur is sometimes:

removed from
fuels

added to
fuels

used as
a fuel

[1]

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Marks

Remark

7 This question is about relative atomic mass and using relative atomic masses to calculate the relative formula mass of compounds.

(a) What is the **relative atomic mass** of an atom?

 [3]

(b) (i) Calculate the relative formula mass of nitric acid HNO_3 .
(Relative atomic masses: H = 1; N = 14; O = 16)

Answer _____ [1]

(ii) The relative formula mass of zinc oxide is 81. Calculate the mass of 0.5 moles of zinc oxide. Write the unit in your answer.

Answer _____ [2]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

8 This question is about carbon dioxide and the gases in the Earth's atmosphere.

- (a) The atmosphere contains about 0.04% carbon dioxide gas. Complete the table below by writing down the two most abundant gases in the atmosphere and their approximate proportions.

Gas	Approximate proportion in the atmosphere
carbon dioxide	about 0.04%

[4]

- (b) The table below shows how the level of carbon dioxide in the Earth's atmosphere has changed over the last 150 years. The table also shows the change in average global temperature over the last 150 years.

Year	1750	1800	1850	1900	1950	2000
concentration of CO ₂ in atmosphere/% by volume	0.027	0.028	0.029	0.030	0.032	0.037
average global temperature/°C	13.3	13.4	13.5	13.6	13.8	14.4

- (i) Use the information in the table to describe the pattern of change in carbon dioxide levels in the atmosphere between 1750 and 2000.

[2]

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Marks Remark

(ii) What is the relationship between the level of carbon dioxide in the atmosphere and average global temperature?

_____ [1]

(iii) Give one reason for the changing amounts of carbon dioxide in the atmosphere.

_____ [1]

(iv) Give one way our planet is affected by global warming.

_____ [1]

(c) Carbon dioxide is used to make fizzy drinks. Carbon dioxide can be tested for in the laboratory using limewater solution.

(i) Give one physical property that makes carbon dioxide suitable for use in fizzy drinks.

_____ [1]

(ii) What is the name of the substance formed when carbon dioxide dissolves in water?

_____ [1]

(iii) What is observed when carbon dioxide gas is bubbled through limewater solution?

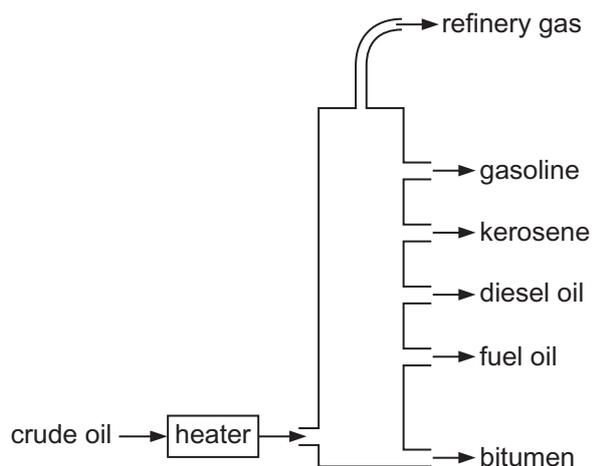
_____ [2]

(iv) What is observed if you continue to bubble carbon dioxide gas through limewater solution?

_____ [1]

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Marks	Remark

- 9 (a) The diagram below shows how crude oil can be separated into useful products:



- (i) What is the name of the separation process shown in the diagram?

_____ [2]

- (ii) Explain how the crude oil is separated into useful products by this method.

_____ [2]

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Marks	Remark

(b) Natural gas is an important fossil fuel that is found in refinery gases. Natural gas is described as a non-renewable fuel.

(i) What is a **fossil fuel**?

_____ [1]

(ii) What element is present in all fossil fuels?

_____ [1]

(iii) Natural gas is described as **non-renewable**. What does this mean?

_____ [1]

(c) Ethanol is a renewable fuel. It is produced from food crops. Distillation is needed in the manufacture of ethanol. Burning ethanol produces less carbon dioxide than burning natural gas, but ethanol is more expensive to produce than natural gas.

(i) Write down one reason why ethanol is used as a fuel.

_____ [1]

(ii) Write down one reason why there could be concerns about replacing natural gas with ethanol as a fuel.

_____ [1]

(iii) Why is hydrogen considered to be a **cleaner** fuel than either ethanol or natural gas?

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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