

Ce	ntre Number
71	
Cano	didate Number

General Certificate of Secondary Education 2013

# **Double Award Science: Chemistry**

Unit C2

**Foundation Tier** 

[GSD51]



**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.

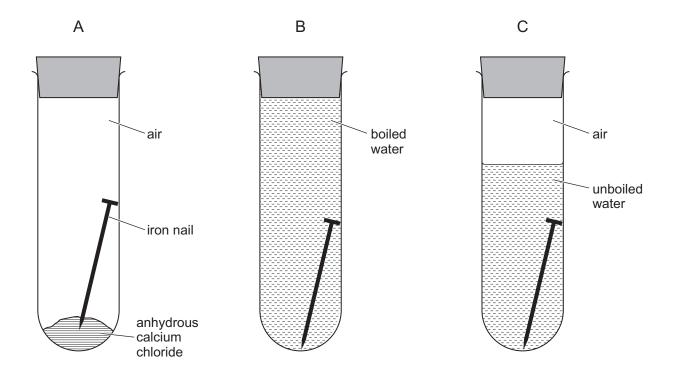
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question. Quality of written communication will be assessed in Question **6(a)**. A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

For Exa	miner's only
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

Total	
Marks	

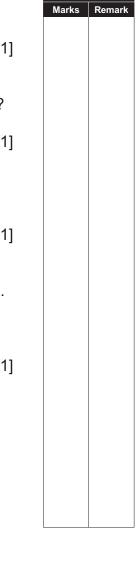
1 (a) An experiment was carried out to investigate the conditions needed for iron nails to rust.

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



				[1]	
(ii)	Look at test tube A. Wh	ny was <b>anhydrou</b> s	s calcium chloride use	d?	
				[1]	
(iii)	(iii) What <b>two</b> 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]	

Look at test tube B. Why was the water boiled?



Examiner Only

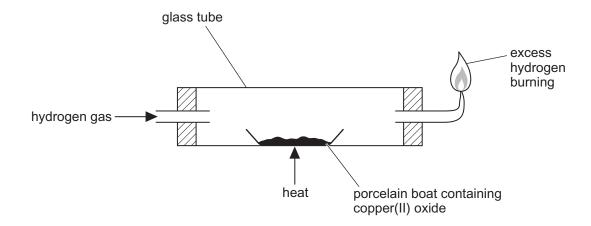
(b)	Write down two suitable methods that could be used to prevent the
	bars of an iron gate from rusting.

Examin	er Only
Marks	Remark

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.

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

Examin	er Only
Marks	Remark

(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.

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

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

rate = 
$$(time)^2$$

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

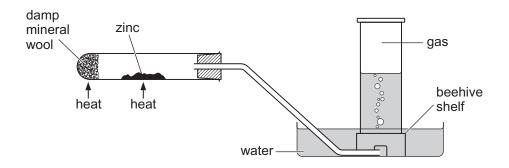
[1]

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

Examiner Only

Marks Remark

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 ste	steam	with steal	acts with	reacts	zınc	wnen	produced	IS	aas	vvnat	(1)
--	-------	------------	-----------	--------	------	------	----------	----	-----	-------	-----

[1]
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(ii) Why is the damp mineral wool heated?

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

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

- (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.

$$Mg + O_2 \longrightarrow$$

[2]

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

Examin	er Only
Marks	Remark

(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 +

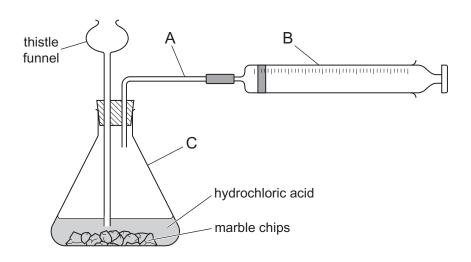
[1]

/**	Ohra ana waa fili			
(i)	Give one use of limestone.			_ [1]
	Complete the table below which sho negative effects of quarrying limesto done for you.			
	Effect of Quarrying	Positive	Negative	
Produces	s a cheap material with many uses	1		
Disused (	quarries can be used for landfill			
Natural h	abitats are disturbed			
Creates j	obs in the community			
Produces	dust			
Quarries	can be ugly			
				[5]

Gas	Test	Result
oxygen		
hydrogen		

[4]

**(b)** Carbon dioxide gas can be prepared in the school laboratory using the apparatus below:



Name the pieces of apparatus A, B and C

(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.					Examiner Only  Marks Remark
	Wh	en sulfur burns in ai	r it reacts with:			
		nitrogen	hydrogen	oxygen		
	(i)					
		white	blue	black	[1]	
	(ii)	Sulfur is a:				
		yellow gas	yellow solid	white solid	[1]	
	(iii)	When a mixture of	iron and sulfur is h	eated 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 h	as:		
		no smell	a pungent smell	a pleasant smell	[1]	
	(vi)	Sulfur dioxide caus	es:			
		acid rain	hard water	dry ice	[1]	
	(vii	Sulfur is sometimes	S:			
		removed from fuels	added to fuels	used as a fuel	[1]	

Town A has a hard water supply and town B has a soft water supply. You are provided with two samples of water, one from town A and the other from town B.		Examin Marks	er Only Remark
(a) Explain what is meant by hard water. Describe a <b>fair</b> test you coul carry out to find which is the hard water sample.	d		
In this question you will be assessed on your written communication skills including the use of specialist scientific terms.	;		
	_ [6]		

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6

(b)	The	water in town A is hard water.		Examin Marks	er Only Remark
	(i)	Name an ion which causes hard water.	[1]		
	(ii)	Why do people think hard water is good for your health?			
			[1]		
	(iii)	Name one industry which benefits from hard water.	[1]		
	(iv)	The water in town B is soft water. It might be less expensive to live in town B. Explain why.			
			[2]		

(a)	Wh	at is the <b>relative atomic mass</b> 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 m of 0.5 moles of zinc oxide. Write the unit in your answer.	ass
		Answer	_ [2]

## **BLANK PAGE**

(Questions continue overleaf)

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

Examin	er Only
Marks	Remark

(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.

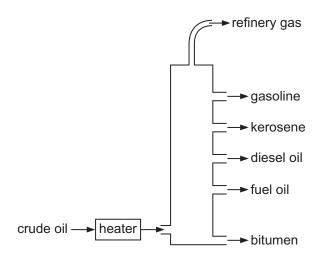
Year	1750	1800	1850	1900	1950	2000
concentration of CO <sub>2</sub> in atmosphere/% by volume	0.027	0.028	0.029	0.030	0.032	0.037
average global temperature/°C	13.3	13.4	13.5	13.6	13.8	14.4

(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]

	(ii)	What is the relationship between the level of carbon dioxide in atmosphere and average global temperature?	Marks Remark
			[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)		bon dioxide is used to make fizzy drinks. Carbon dioxide can be ed for in the laboratory using limewater solution.	}
	(i)	Give one physical property that makes carbon dioxide suitable use in fizzy drinks.	for
			[1]
	(ii)	What is the name of the substance formed when carbon dioxid dissolves in water?	е
			[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]

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

Examiner Only			
Marks	Remark		



(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]

	ural gas is an important fossil fuel that is found in refinery gase ural gas is described as a non-renewable fuel.	S. Examiner 0  Marks Re
(i)	What is a <b>fossil fuel</b> ?	
		_ [1]
(ii)	What element is present in all fossil fuels?	
		_ [1]
(iii)	Natural gas is described as <b>non-renewable</b> . What does this mean?	
		[1]
		_ , ,
is no less exp	anol is a renewable fuel. It is produced from food crops. Distillated in the manufacture of ethanol. Burning ethanol produces carbon dioxide than burning natural gas, but ethanol is more ensive to produce than natural gas.  Write down one reason why ethanol is used as a fuel.	ition
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