



Rewarding Learning

General Certificate of Secondary Education  
2014

Centre Number

71

Candidate Number

## Double Award Science: Chemistry

Unit C2

Foundation Tier

[GSD51]

ML

TUESDAY 10 JUNE 2014, 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 **4(b)**.

A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

For Examiner's  
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

Total  
Marks

- 1 (a) This part of the question is about oxidation. Complete the sentences below. Choose from the words in the list.

hydrogen

nitrogen

oxygen

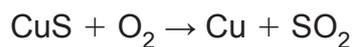
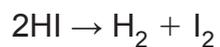
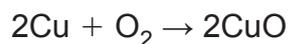
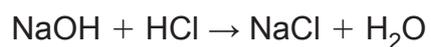
rusting

neutralisation

reduction

- (i) Oxidation is the addition of \_\_\_\_\_  
to a substance, or the removal of \_\_\_\_\_  
from a substance. [2]
- (ii) The reverse of oxidation is called \_\_\_\_\_. [1]

- (b) Below are 5 chemical equations. Tick (✓) the **three** equations which represent oxidation reactions.



[3]

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Marks	Remark

2 (a) The element oxygen is a gas.

Write down two **other** physical properties of oxygen.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

(b) Write down two uses of oxygen gas.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

(c) Oxygen is a reactive element which reacts with both metals and non-metals such as magnesium and sulfur.

Fill in the blank spaces in the table below.

Element	Colour of element	Colour of flame during heating with oxygen	Description of product
sulfur	[1]	[1]	[2]
magnesium	[1]	[1]	[2]

[8]

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Marks Remark

3 (a) This part of the question is about the burning of coal or carbon.

When coal burns in an efficient fire, carbon dioxide gas is produced. Sometimes a faulty fire can produce a lot of carbon monoxide gas.

(i) Why is carbon monoxide gas very dangerous?

\_\_\_\_\_ [2]

(ii) What causes carbon monoxide to be formed in a faulty fire?

\_\_\_\_\_ [1]

(b) This part of the question is about the properties and uses of carbon dioxide.

(i) Some properties of gases are in the list below. Put a circle round **two** of those properties that apply to carbon dioxide gas.

colourless

pungent smell

denser than air

burns

insoluble in water

[2]

(ii) Write down a reason why carbon dioxide is used in fizzy drinks.

\_\_\_\_\_ [1]

(iii) Write down two **other** uses of carbon dioxide.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

(c) Burning coal and other fossil fuels has led to increased levels of carbon dioxide in the atmosphere.

(i) What name is given to the effect of increased levels of carbon dioxide in the atmosphere?

\_\_\_\_\_ effect [1]

Examiner Only	
Marks	Remark

(ii) Write down two ways in which the increasing levels of carbon dioxide in the atmosphere are changing our planet.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

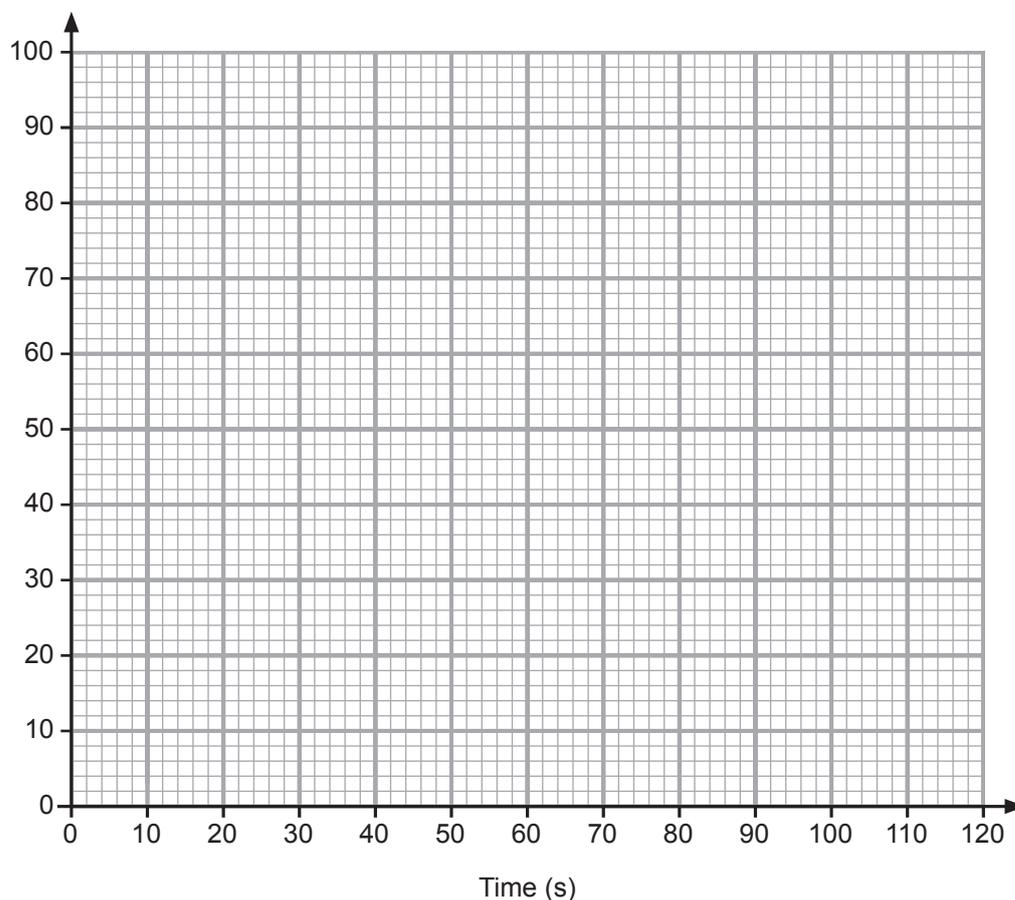


- (c) Magnesium ribbon reacts with dilute hydrochloric acid to produce hydrogen gas. A student measured the volume of gas produced over a period of time. The results are shown in the table below.

<b>Volume of H<sub>2</sub> gas (cm<sup>3</sup>)</b>	0	23	40	58	71	75	78	80	80
<b>Time (s)</b>	0	10	20	40	60	70	80	90	100

- (i) Label the y-axis on the grid below. [1]

- (ii) Use the grid to plot a curve showing the results of the experiment. [3]



- (iii) At what time did the reaction stop?

\_\_\_\_\_ [1]

- (iv) From your graph, how long did it take for 50 cm<sup>3</sup> of hydrogen to be formed?

\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

- 5 (a) To find the order of the reactivity of copper, nickel and zinc, a small amount of each metal was placed into a test tube containing a solution of a salt of one of the other metals. For example, when some copper was added to a test tube containing nickel nitrate solution there was no reaction.

The table below shows the results for the whole investigation.

metal \ salt solution	metal		
	copper	nickel	zinc
copper(II) sulfate		reaction	reaction
nickel nitrate	no reaction		reaction
zinc chloride	no reaction	no reaction	

- (i) From the table, work out the order of reactivity of these three metals from most to least reactive.

Most reactive \_\_\_\_\_  
 ↓  
 Least reactive \_\_\_\_\_ [2]

- (ii) Why could a similar type of investigation **not** be used to find the order of reactivity of calcium, potassium and sodium?

\_\_\_\_\_ [1]

- (iii) Describe the colour change, in the solution, when zinc reacts with the copper sulfate solution.

from \_\_\_\_\_ to \_\_\_\_\_ [2]

- (iv) Zinc can be obtained in the laboratory from zinc chloride solution by displacement with metal X.

Write down the name of a metal that could be used as metal X.

\_\_\_\_\_ [1]

Examiner Only

Marks Remark





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**(Questions continue overleaf)**

7 (a) This part of the question is about the heating of solid calcium carbonate.

(i) Complete the word equation for this reaction.



(ii) The reaction in part (i) is an example of an endothermic change. Which one of the following statements describes an endothermic reaction? Tick (✓) the correct statement.

Gives out heat energy to the surroundings

Takes in heat energy from the surroundings

No change in energy during reaction

[1]

(iii) Put a circle round the term below that best describes the type of reaction that occurs when calcium carbonate is heated.

**thermal cracking**

**displacement**

**neutralisation**

**thermal decomposition**

**photosynthesis**

[1]

(b) Temporary hard water is found in limestone regions.

Explain how water in limestone regions becomes hard.

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[4]

Examiner Only	
Marks	Remark

(c) During the first billion years of the Earth's existence, there was intense volcanic activity that released gases that formed the early atmosphere. The early atmosphere contained over 90% carbon dioxide, 5% nitrogen, 3% sulfur dioxide and traces of hydrogen sulfide, ammonia and methane, but no oxygen. It was hot, smelly and deadly poisonous.

(i) What is the **difference** in percentage composition of nitrogen gas found in the atmosphere today compared to its composition in the early atmosphere?

\_\_\_\_\_ [1]

(ii) One theory suggests that the early atmosphere changed as living organisms evolved. Write down two ways that the carbon dioxide could have been removed from the early atmosphere.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

8 (a) This part of the question is about the physical properties and uses of nitrogen gas.

(i) From the list below tick (✓) the **two** physical properties of nitrogen gas.

very soluble in water

pale green coloured

colourless

odourless

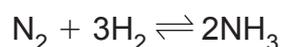
sweet smelling

[2]

(ii) Nitrogen is used in the manufacture of ammonia. Write down one other use of nitrogen.

\_\_\_\_\_ [1]

(b) Ammonia gas is manufactured in the Haber Process by reacting hydrogen with nitrogen:



(i) Fill in the blank spaces in the table below to give the conditions needed for this reaction to occur. Include units where appropriate.

temperature	
catalyst	
pressure	

[3]

(ii) Write down two uses of ammonia.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

Examiner Only

Marks Remark

9 (a) Ethene is a member of the alkene homologous series. Its molecular formula is  $C_2H_4$ .

(i) Write down the name and molecular formula of one other alkene.

Name \_\_\_\_\_ [1]

Molecular formula \_\_\_\_\_ [1]

(ii) When hydrocarbons, such as ethene are completely burnt in air (oxygen) what two compounds are always formed?

\_\_\_\_\_ and \_\_\_\_\_ [2]

(iii) Ethene molecules are able to join together to make a very long chain molecule, called a polymer. What is the name of the polymer formed from ethene?

\_\_\_\_\_ [1]

(iv) Many polymers, such as those used to make plastic bottles, are non-biodegradable. Write down two disadvantages of disposing of polymers in landfill sites.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

(b) (i) Ethanol is used in alcoholic drinks. Write down one other use of ethanol.

\_\_\_\_\_ [1]

(ii) Drinking alcohol, in large quantities or over a long period of time, can have harmful effects. Describe two harmful effects that can arise from drinking alcohol.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_ [2]

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**THIS IS THE END OF THE QUESTION PAPER**

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Marks	Remark

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