



General Certificate of Secondary Education
2012

Science: Double Award (Non-Modular)

Paper 2
Foundation Tier

[G8402]

TUESDAY 12 JUNE, MORNING

Centre Number

71

Candidate Number



TIME

1 hour 30 minutes.

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 fifteen** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 110.

Quality of written communication will be assessed in Question **14(b)**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A Data Leaflet which includes a Periodic Table of the Elements is provided.

For Examiner's
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Total
Marks



1 Some chemicals have symbols on their containers.

(a) What name is given to these symbols? Circle the correct answer.

health danger hazard [1]

(b) Give **two** reasons why symbols are used on containers of harmful chemicals, instead of words.

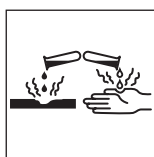
1. _____

2. _____ [2]

(c) Below are four of the symbols placed on harmful chemicals.



A



B



C



D

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(i) Sodium cyanide is a **poisonous** chemical. Which symbol **A**, **B**, **C** or **D** should be placed on a bottle of sodium cyanide?

_____ [1]

(ii) Complete the following sentence about sulphuric acid.

A bottle of sulphuric acid with symbol **B** contains a substance

which is _____ . [1]

Examiner Only

Marks Remark

2 This question is about changes of state. Choose from the words and phrases below to complete each sentence.

condenses **freezes** **decreases** **sublimation**
increases **boils** **gives out** **taken in**
melts **given out** **compressible**

- (a) When water is heated it _____ to form steam and energy is _____. [2]
- (b) When solid iodine is heated it changes directly into a gas and this is called _____. [1]
- (c) Gases are used in aerosol sprays as they are _____. [1]
- (d) The volume of a gas _____ when the temperature is raised. [1]

Examiner Only

Marks Remark

3 The properties of some metals are given below.

Metal	Melting temperature/ $^{\circ}\text{C}$	Electrical conductivity	Relative cost	Density g/cm^3	Relative strength
aluminium	660	very good	7.3	2.7	1
copper	1083	excellent	9.2	8.9	2
iron	1535	good	1	7.8	3
silver	962	excellent	1923	10.5	1
zinc	420	good	5.8	7.1	1.5

Use the information in the table to answer the following questions:

(a) Why is copper used for electrical wiring?

_____ [1]

(b) Why is iron used to make nails rather than zinc?

_____ [1]

(c) All metals are conductors of electricity.



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Explain why electrical overhead cables are made of aluminium.

_____ [2]

Examiner Only	
Marks	Remark

- 4 For each part of this question three answers are given. Only one is correct. Circle the correct answer. One has been done for you. You may find your Data Leaflet useful.

The element with the symbol C is:

copper

carbon

chlorine

- (a) The correct symbol for sodium is:

S

Na

So

[1]

- (b) The substance with the formula NO is:

nobelium

nickel

nitrogen monoxide

[1]

- (c) The name of the compound with the formula NaHCO_3 is:

**sodium
carbonate**

**sodium
hydrogencarbonate**

**sodium
hydrogenate**

[1]

- (d) The formula of copper(II) chloride is:

Cu_2Cl

Cu_2Cl

CuCl_2

[1]

- (e) Steam can be written as:

$\text{H}_2\text{O(l)}$

$\text{H}_2\text{O(g)}$

$\text{H}_2\text{O(s)}$

[1]

Examiner Only

Marks

Remark

5 Polythene is a thermosoftening plastic which is used as a packaging material.



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Give **three** reasons why polythene is used as a packaging material.

1. _____
2. _____
3. _____ [3]

Examiner Only	
Marks	Remark

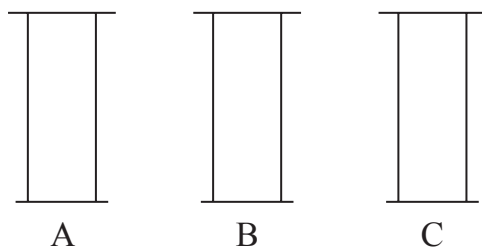
- 6 The table below gives information about the atomic structure of three elements. Complete the table.

Symbol	Number of electrons	Number of neutrons	Number of protons	Mass number	Electron arrangement
sodium	11	12		23	2,8,1
nitrogen		7		7	2,5
phosphorus	15	16	15		

[5]

Examiner Only	
Marks	Remark

7 The gas jars A, B and C each contain a different gas.



A pupil carried out some tests on the gases in the gas jars A, B and C.
Complete the table below about the tests for these gases.

Gas jar	Test	Result	Name of gas
A	lighted splint		hydrogen
B		turns milky	
C	glowing splint	relights	

[4]

Examiner Only	
Marks	Remark

- 9 Some students compared the reactivity of four metals. They looked to see if each metal reacted with the nitrate solutions of each of the other three metals. Their results are given in the table below.

nitrate solution metal	lead nitrate	copper(II) nitrate	silver nitrate	zinc nitrate
	lead		reaction	reaction
copper	no reaction		reaction	no reaction
silver	no reaction	no reaction		no reaction
zinc	reaction	reaction	reaction	

- (a) Using the information in the table, arrange the four metals in order of reactivity with the **most reactive** metal first.

1. _____
2. _____
3. _____
4. _____ [2]

- (b) What is the name given to the **type** of exothermic reactions shown in the table above?

Type of reaction _____ [1]

Examiner Only

Marks Remark

10 Calcium is a reactive Group II metal.

(a) Describe **three** things you would observe when **calcium** reacts with water.

1. _____

2. _____

3. _____

_____ [3]

(b) Name the solution formed when calcium reacts with water.

_____ [1]

Examiner Only

Marks

Remark

- 12** Some students investigated the thermal decomposition of calcium carbonate. They heated 10 g calcium carbonate and noted the mass of solid remaining at different times. Their results are shown in the table below.

Time (min)	0	3	6	9	12	15
Mass of solid (g)	10	8.9	6.7	5.8	5.6	5.6

- (a) Why did the students stop heating the calcium carbonate after fifteen minutes?

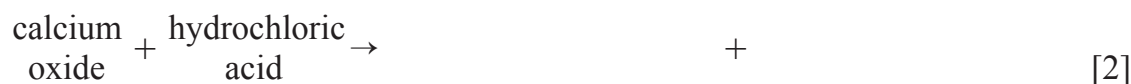
_____ [1]

- (b) Name the gas given off during the thermal decomposition of calcium carbonate.

_____ [1]

Calcium oxide, obtained from the thermal decomposition of calcium carbonate, is used by farmers to neutralise acidic soil.

- (c) Complete the word equation for the reaction between hydrochloric acid and calcium oxide.



Examiner Only

Marks Remark

13 Chemical reactions can be classified in different ways.

(a) (i) Some types of chemical reactions are given in the list below.

combustion **displacement** **neutralization**
reduction **photosynthesis** **oxidation**

Choose the **most** appropriate term from this list to describe each of the following reactions.

1. fossil fuel + oxygen → carbon dioxide + water

_____ [1]

2. water + carbon dioxide → glucose + oxygen

_____ [1]

3. hydrochloric acid + sodium hydroxide → sodium chloride + water

_____ [1]

4. hydrogen + copper oxide → copper + water

_____ [1]

(ii) Which **one** of the reactions 1, 2 or 3 is endothermic?

_____ [1]

Examiner Only

Marks Remark

(b) When hydrated copper(II) sulphate crystals are heated strongly they break down into anhydrous copper(II) sulphate and another compound.

(i) Name the other compound formed in this reaction.

_____ [1]

(ii) Give the colour change which takes place in this reaction.

from _____ to _____ [2]

(c) The reaction between magnesium ribbon and dilute hydrochloric acid can be speeded up or slowed down.

(i) Complete the table below to show whether the reaction speeds up or slows down when a reaction condition is changed. One has been done for you.

Change of condition	speeds up OR slows down
shaking	speeds up
lower temperature	
higher hydrochloric acid concentration	
using powdered magnesium	
addition of a catalyst	

[4]

(ii) Name a piece of apparatus which would be suitable to **measure** the volume of hydrogen given off when magnesium reacts with hydrochloric acid.

_____ [1]

(iii) How could you tell if the reaction between magnesium and dilute hydrochloric acid had finished?

_____ [1]

Examiner Only

Marks Remark

- (d) The hardness of four water samples A, B, C and D was tested. Each sample was shaken with soap solution (10 drops). The tests were then repeated with new samples which had been boiled for two minutes and then shaken with soap solution (10 drops). The results are shown in the table below.

Sample (25 cm ³)	Soap solution added before boiling	Soap solution added after boiling
A	no lather	lather
B	lather	lather
C	no lather	no lather
D	lather	lather

- (i) Which sample A, B, C or D is permanent hard water?

_____ [1]

- (ii) Which sample A, B, C or D is temporary hard water?

_____ [1]

- (iii) Which sample A, B, C or D would give the greatest problem with boiler scale?

_____ [1]

- (iv) Why was the same volume of water used in each experiment?

_____ [1]

- (e) Give **two** advantages of hard water.

1. _____

2. _____ [2]

Examiner Only

Marks Remark

- (c) This part of the question is about carbon, carbon monoxide and carbon dioxide.

It is important to have coal or gas burning stoves regularly serviced. Incomplete combustion of coal or gas means that carbon monoxide is formed as well as carbon dioxide.



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- (i) Explain why carbon monoxide is so dangerous.

[2]

- (ii) Explain why it is important to have coal or gas burning stoves regularly serviced.

[1]

- (iii) Give one harmful environmental effect caused by carbon dioxide.

[1]

Examiner Only	
Marks	Remark

(d) When chlorine is bubbled through a solution of potassium iodide a displacement reaction occurs.

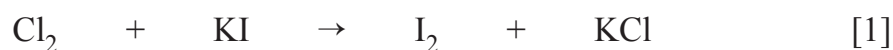
(i) Explain why this reaction must be carried out in a fume cupboard.

_____ [1]

(ii) What colour change is seen when chlorine is bubbled through a solution of potassium iodide?

from _____ to _____ [2]

(iii) Balance the symbol equation for the reaction between chlorine and potassium iodide solution.



(iv) Name another **halogen** that can be displaced by bubbling chlorine through the potassium halide solution.

_____ [1]

Examiner Only

Marks

Remark

15 (a) Mendeleev was responsible for much of the early development of the Periodic Table.

(i) Give **three** features of the Periodic Table developed by Mendeleev.

1. _____

2. _____

3. _____

_____ [3]

(ii) Describe **three** ways in which the modern Periodic Table, as shown in your Data Leaflet, is different from the one Mendeleev developed.

1. _____

2. _____

3. _____

_____ [3]

(b) Complete the table below, which gives some information about elements, their Groups, Periods and electronic structures. You may find your Data Leaflet useful.

Element	Group	Period	Electronic structure
potassium		4	
magnesium	II		
		3	2, 8, 6

[6]

Examiner Only

Marks

Remark

(c) (i) Why do the elements in Group I have similar chemical properties?

_____ [1]

(ii) How does the reactivity of the elements vary as Group II is descended?

_____ [1]

(iii) Which of the Group VII elements, fluorine, chlorine, bromine or iodine is **least** reactive?

_____ [1]

(iv) Describe how the reactivity of the elements in Period 3 varies across the period from sodium to argon.

_____ [3]

(d) Magnesium sulphate is an ionic compound, which can be made by reacting a base with an acid.

(i) Name a suitable base which may be used to prepare magnesium sulphate.

_____ [1]

(ii) Name the acid needed to prepare magnesium sulphate.

_____ [1]

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Marks

Remark

THIS IS THE END OF THE QUESTION PAPER

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