



General Certificate of Secondary Education
2012

Science: Double Award (Modular)

Paper 2
Foundation Tier

[G8202]

TUESDAY 12 JUNE, MORNING

Centre Number

71

Candidate Number



TIME

1 hour.

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 four** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 80.

Quality of written communication will be assessed in Question **3(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	

Total
Marks

1 (a) Some chemicals have symbols on their containers.

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

health danger hazard [1]

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

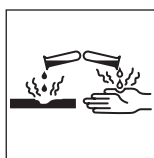
1. _____

2. _____ [2]

Four of the symbols used on containers are shown below.



A



B



C



D

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

_____ [1]

(iv) Which symbol **A**, **B**, **C** or **D** should be placed on a can of petrol?

_____ [1]

(v) 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

(b) 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

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

Examiner Only	
Marks	Remark

(c) 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	medium	2.7	1
copper	1083	excellent	medium	8.9	2
iron	1535	good	low	7.8	3
silver	962	excellent	high	10.5	1
zinc	420	good	medium	7.1	1.5

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

(i) Why is copper used for electrical wiring?

_____ [1]

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

_____ [1]

(iii) All metals are conductors of electricity.



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Explain why electrical overhead cables are made of aluminium.

_____ [2]

Examiner Only

Marks Remark

- (d) 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

- (i) The correct symbol for sodium is:

S

Na

So

[1]

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

nobelium

nickel

nitrogen monoxide

[1]

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

**sodium
carbonate**

**sodium
hydrogencarbonate**

**sodium
hydrogenate**

[1]

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

Cu_2Cl

Cu_2Cl

CuCl_2

[1]

- (v) 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

2 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

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(Questions continue overleaf)

3 (a) Complete the table below about the properties of chlorine, nitrogen and helium.

Gas	Lighter or heavier than air	Reactive or unreactive	Colour	Poisonous
chlorine	heavier			yes
nitrogen	lighter	unreactive		
helium			colourless	no

[3]

This part of the question is about the reaction between sulphur and iron.

(b) When a mixture of sulphur and iron is heated a chemical reaction takes place. Describe what you would observe and state what happens in this reaction. Your answer should include:

- a clear description of what a mixture of iron and sulphur looks like
- a safety precaution that should be taken when heating iron and sulphur
- a clear description of what you would observe when the iron and sulphur are heated
- the name and the chemical formula of the product formed

[7]

Quality of written communication

[1]

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.

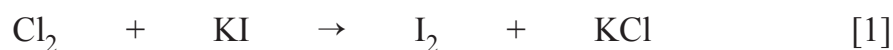
(i) Explain why this reaction must be carried out in a fume cupboard.

_____ [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

4 (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]

THIS IS THE END OF THE QUESTION PAPER

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