CCEA GCSE SCIENCE: DOUBLE AWARD (NON-MODULAR)

SCIENCE



EXAM QUESTION PACK

PAPER 2 FOUNDATION TIER G8402 PAPERS

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012

Science: Double Award (Non-Modular)

Paper 2
Foundation Tier

[G8402]

G8402

TUESDAY 12 JUNE, MORNING

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	
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10	
11	
12	
13	
14	
15	
Total Marks	

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Examiner Only	
Marks	Remark

1 Some chemicals have symbols on their containers.

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

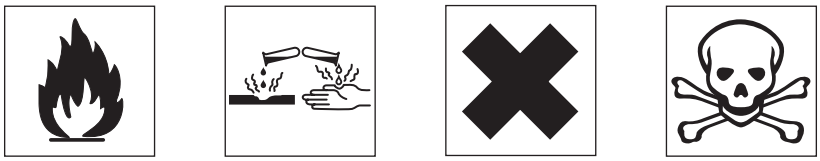
health **danger** **hazard** [1]

(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]

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

Examiner Only	
Marks	Remark

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]

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3 The properties of some metals are given below.

Metal	Melting temperature/°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

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 **Cu2Cl** **$CuCl_2$** [1]

(e) Steam can be written as:

$H_2O(l)$ **$H_2O(g)$** **$H_2O(s)$** [1]

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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

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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		

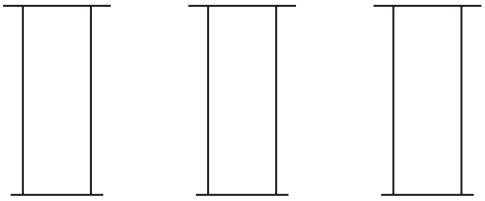
[5]

Examiner Only

Marks	Remark

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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

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Examiner Only	
Marks	Remark

8 **(a)** This part of the question is about solubility.

Complete the sentences below about copper(II) sulphate dissolving in a beaker of water. Choose from the words in the list.

solution **solvent** **solid**

solute **saturated** **saturating**

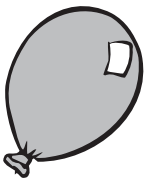
(i) Copper(II) sulphate is acting as a _____ when it dissolves in water. [1]

(ii) Water is acting as a _____ when copper(II) sulphate dissolves in it. [1]

(iii) When no more copper(II) sulphate can dissolve in the water, a

_____ solution has been formed. [1]

(b) This part of the question is about gases. Circle the correct answers.



(i) If a balloon is filled with air, what happens to the mass of the balloon?

it increases **it decreases** **it stays the same** [1]

(ii) If a balloon is filled with warm air and then placed in a fridge what happens to the volume of the air in the balloon?

it increases **it decreases** **it stays the same** [1]

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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	no 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]

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10 Calcium is a reactive Group II metal.

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

1. _____

_____

2. _____

_____

3. _____

_____ [3]

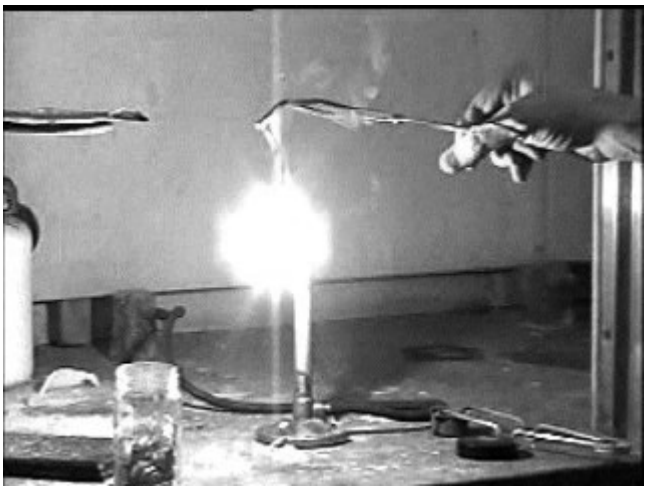
(b) Name the solution formed when calcium reacts with water.

_____ [1]

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Marks	Remark

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11 Magnesium ribbon burns in air with a bright white flame as shown below. The product of the reaction is magnesium oxide.



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(a) Describe the appearance of magnesium oxide.

_____

_____ [2]

(b) Explain why the burning of magnesium in air is described as **oxidation**.

_____

_____ [1]

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Marks	Remark

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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.

calcium oxide + hydrochloric acid → + [2]

Examiner Only

Marks	Remark

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13 Chemical reactions can be classified in different ways.

Examiner Only	
Marks	Remark

(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]

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(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

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(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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14 (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

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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]

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

Examiner Only

Marks	Remark

(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.

Cl_2 + KI → I_2 + KCl [1]

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

_____ [1]

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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]

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(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

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THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

General Certificate of Secondary Education
2012

Science: Double Award (Non-Modular)

Paper 2
Foundation Tier

[G8402]

TUESDAY 12 JUNE, MORNING

MARK SCHEME

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				AVAILABLE MARKS
1	**(a)**	hazard	[1]	
	(b)	Any **two** of: warn of danger/eye-catching/internationally understood (2 × [1])	[2]	
	(c)	**(i)** D	[1]	
		(ii) corrosive **or** equivalent **not** irritant **not** harmful	[1]	5
2	**(a)**	boils [1] taken in [1]	[2]	
	(b)	sublimation	[1]	
	(c)	compressible	[1]	
	(d)	increases	[1]	5
3	**(a)**	(excellent) conductor **of electricity**	[1]	
	(b)	cheaper **or** stronger	[1]	
	(c)	Any **two** of: idea that aluminium has low density/(very) good conductor (of electricity)/ idea of not reacting **ignore** reference to cost **not** idea of not rusting (2 × [1])	[2]	4
4	**(a)**	Na	[1]	
	(b)	nitrogen monoxide	[1]	
	(c)	sodium hydrogencarbonate	[1]	
	(d)	$CuCl_2$	[1]	
	(e)	$H_2O(g)$	[1]	5
5		Any **three** of: low density/flexible/unreactive/low cost idea of waterproof (3 × [1])	[3]	3

AVAILABLE MARKS

6

Symbol	Number of electrons	Number of neutrons	Number of protons	Mass number	Electron arrangement
sodium	11	12	**11** [1]	23	2,8,1
nitrogen	**7** [1]	7	7	**14** [1]	2,5
phosphorus	15	16	15	**31** [1]	**2,8,5** [1]

[5] — 5

7 A pop [1]
B limewater [1], carbon dioxide [1] [2]
C oxygen [1] [4] — 4

8 **(a)** **(i)** solute [1]

(ii) solvent [1]

(iii) saturated [1]

(b) **(i)** it increases [1]

(ii) it decreases [1] — 5

9 **(a)** zinc, lead, copper, silver
Allow [1] if order correct but reversed [2]

(b) displacement (**allow** redox) [1] — 3

10 **(a)** Any **three** from:
calcium sinks **or** sinks and rises
bubbles/gas evolved/fizzing/gas given off
idea of reaction getting faster **not** reaction is fast **not** reaction is slow
idea of solution going cloudy
allow alkaline solution
calcium gets smaller/dissolves/disappears
idea of heat given out/exothermic
(any idea of catching fire or flame is **wrong**)
Ignore reference to hissing or noise
Mark idea of moving across the surface of the water as **wrong**
Accept moves **in** the water and **not** just moves
(3 × [1]) [3]

(b) calcium hydroxide/limewater [1] — 4

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				AVAILABLE MARKS
11	**(a)**	white or grey **not** dark grey – dependent on idea of solid product [1] ash/powder/solid [1]	[2]	
	(b)	idea that oxygen has been added/gained **allow** loss of electrons do **not** allow idea of burning in oxygen, **not** loss of hydrogen	[1]	3
12	**(a)**	reaction complete/constant mass	[1]	
	(b)	carbon dioxide	[1]	
	(c)	calcium chloride [1], water [1]	[2]	4
13	**(a)**	**(i)** 1. combustion **Accept** oxidation	[1]	
		2. photosynthesis	[1]	
		3. neutralisation	[1]	
		4. reduction	[1]	
		(ii) 2	[1]	
	(b)	**(i)** water/steam	[1]	
		(ii) blue [1] to white [1]	[2]	
	(c)	**(i)** lower temperature/slows down higher HCl concentration/speeds up using magnesium powder/speeds up addition of catalyst/speeds up	[1] [1] [1] [1]	
		(ii) gas syringe/appropriate graduated apparatus	[1]	
		(iii) idea of bubbles stopping **or** magnesium all used up/magnesium has disappeared	[1]	
	(d)	**(i)** C	[1]	
		(ii) A	[1]	
		(iii) A	[1]	
		(iv) idea of a fair test	[1]	
	(e)	Any **two** of: good for teeth and bones/good for brewing/nice taste/ tanning leather/prevent heart disease (2 × [1]) do **not** accept just health or contains calcium ions	[2]	20

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					AVAILABLE MARKS
14	**(a)**	chlorine:	reactive **and** green or yellow-green [1]		
		nitrogen:	colourless **and** no (poisonous) [1]		
		helium:	lighter **and** unreactive [1]	[3]	
	(b)	*Appearance:*	Grey/yellow [1] solid (mixture) [1] **or** grey solid (iron) [1] or yellow powder/solid (sulphur) [1]		
		Safety precaution:	Wear safety goggles/carry out in fume cupboard [1]		
		Description:	Mixture **glows** when heated [1] Pungent smell [1]/bad/choking/rotten eggs smell: **not** strong smell **allow** burns with blue flame [1] **allow** idea of sulphur melting [1] Continues to glow when removed from heat [1] Grey/black solid forms [1]		
		Product:	Iron sulphide/iron(II) sulphide [1] FeS [1] (7 × [1]) **allow** up to [6] for appearance, safety At least one product mark needed for [7]	[7]	
		Quality of written communication		[1]	
	(c)	**(i)**	toxic/poisonous gas/stops oxygen getting to body [1] odourless/colourless [1]	[2]	
		(ii)	idea of needing good supply air/oxygen/for complete combustion **or** other correct, e.g. prevents leaks of carbon monoxide/poisonous gas **or** preventing incomplete combustion **not** idea of formation of carbon monoxide	[1]	
		(iii)	idea of global warming/greenhouse effect	[1]	
	(d)	**(i)**	chlorine is poisonous	[1]	
		(ii)	colourless [1] to brown/yellow-brown/orange-brown/red-brown [1]	[2]	
		(iii)	$Cl_2 + \mathbf{2}KI \rightarrow I_2 + \mathbf{2}KCl$	[1]	
		(iv)	bromine	[1]	20

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AVAILABLE MARKS

15 (a) (i) Any **three** of:
he left spaces
elements arranged in order of atomic mass **not** mass or mass number
idea that it had a relatively small number of elements
elements were arranged in Groups
elements were arranged in Periods
metals were separated from non-metals
or other correct, e.g. hydrogen in Group I
Maximum (3 × [1]) [3]

(ii) Any **three** of:
elements arranged in order of increasing atomic number
more elements/more periods
no spaces
idea of some elements having their position changed
(as long as incorrect answer is not given)
noble gases included
Accept idea of actinides **Accept** lanthanides
transition metals between Group II and Group III **or** in a block
or other correct, e.g. hydrogen not in Group I
Maximum (3 × [1]) [3]

(b)

Element	Group	Period	Electronic structure
potassium	**I** [1]	4	**2,8,8,1** [1]
magnesium	II	**3** [1]	**2,8,2** [1]
sulphur [1]	**VI or 6** [1]	3	2,8,6

[6]

(c) (i) all have same number of electrons in their outer shells/all have one electron in their outer shell [1]

(ii) reactivity increases [1]

(iii) iodine [1]

(iv) decreases [1] then increases [1] then decreases for argon [1] [3]
Allow [1] for decreases but **not** for increase alone

(d) (i) magnesium hydroxide **or** magnesium oxide **or** magnesium carbonate [1]

(ii) sulphuric acid [1] 20

Total **110**

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Rewarding Learning

Centre Number

71	

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General Certificate of Secondary Education
2011

Science: Double Award (Non-Modular)

Paper 2
Foundation Tier

[G8402]

G8402

FRIDAY 27 MAY, MORNING

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

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

INFORMATION FOR CANDIDATES

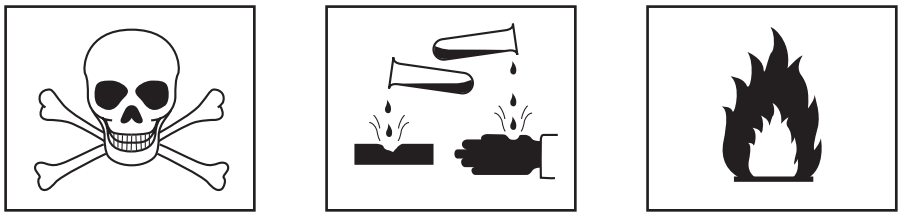
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12	
13	
14	
15	
Total Marks	

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Examiner Only	
Marks	Remark

1 Three hazard symbols (A, B and C) are shown below.



A **B** **C**

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(i) Which symbol **A**, **B** or **C** would you place on a container of petrol?

_____ [1]

(ii) Chlorine gas is poisonous. Which symbol **A**, **B** or **C** should be placed on a cylinder of chlorine gas?

_____ [1]

(iii) Give **two** reasons why symbols are better than words to warn of chemical dangers.

1. _____

2. _____ [2]

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Examiner Only	
Marks	Remark

2 **(a)** In this question, match each use of the material to a **suitable** physical property. One has been done for you.

Material	Physical Property
 Aluminium saucepan	**conductor of electricity**
 Glass bottle	**low density**
 Plastic bag	**conductor of heat**
 Ceramic oven dish	**transparent**
 Copper wire	**high melting point**

[3]

(b) From the list below choose **two** reasons why wool is sometimes used for roof insulation. Put a ring around each choice.

light **waterproof** **burns readily** **heavy** **flexible** [2]

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Examiner Only	
Marks	Remark

3 Choose from the following words to complete the sentences below about solubility.

increases **solution** **solute** **decompose** **compound**

solvent **decreases** **soluble** **dissolve**

Many salts _____ in water and are said to be _____ .

The solubility of a salt _____ when the temperature increases however, the solubility of a gas _____ when the temperature is increased. When a salt dissolves in water a _____ is formed. [5]

4 Chemical substances can be described as either elements, compounds or mixtures. Classify each of the substances below as an element, a compound or a mixture by ticking the correct box in the table below. One has been done for you.

substance	element	mixture	compound
rust			✓
magnesium			
copper carbonate			
sea water			
helium			

[4]

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Examiner Only	
Marks	Remark

5 Non-metals have many uses. Use a line to match each non-metal with a use. The first one has been done for you.

Non-Metal	**Use**
nitrogen	weather balloons
sulphur	fire extinguishers
carbon dioxide	food packaging
ammonia	vulcanising rubber
hydrogen	fertilisers

[3]

6 The answers to this question can all be found by using your Data Leaflet.

For each part of the question three answers are given. Only **one** is correct. Put a ring round the correct answer. One has been done for you.

The element with the symbol **S** is:

silver **sodium** **(sulphur)**

(a) The correct chemical symbol for phosphorus is:

Ph **P** **Po** [1]

(b) The substance with the formula CO is:

copper **cobalt** **carbon monoxide** [1]

(c) The name of the compound with the formula $CaSO_3$ is:

calcium sulphide **calcium sulphite** **calcium sulphate** [1]

(d) The formula of iron(III) hydroxide is:

Fe_3OH **FeOH3** **$Fe(OH)_3$** [1]

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Examiner Only	
Marks	Remark

7 Calcium carbonate (limestone) can be decomposed to give calcium oxide and carbon dioxide.

(a) How could you make calcium carbonate decompose?

_____ [1]

(b) When calcium carbonate decomposes how would you tell that the gas produced is carbon dioxide?

_____

_____

_____ [2]

(c) When calcium carbonate decomposes is the calcium oxide which is formed heavier, lighter or the same mass as the calcium carbonate?

_____ [1]

8 Fossil fuels give out heat when they burn.

(a) Name **three** different fossil fuels.

_____

_____

_____ [3]

(b) Complete the word equation below to describe what happens when a fossil fuel burns completely in air or oxygen.

fossil fuel + oxygen → + + energy [2]

9 All matter is made up of tiny particles. Use the idea of particles to answer the following questions.

Examiner Only	
Marks	Remark

(a) Why is it that if someone has burned toast in a kitchen you can smell this throughout the house?

_____

_____

_____ [2]

(b) What happens to the water particles when a puddle of water evaporates?

_____

_____ [1]

(c) If you add salt to warm water and stir the mixture the salt dissolves in the water. What has happened to the salt particles?

_____

_____

_____

_____ [2]

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10 Two pupils find a piece of a grey solid which they bring into their science classroom. One pupil thinks the solid is a metal. The other thinks it is not. Describe **two** tests that the pupils could do to prove whether or not the solid is a metal. Complete the table below.

Test	Expected result if solid is a metal	Expected result if solid is a non-metal

[6]

Examiner Only	
Marks	Remark

11 You will need your Data Leaflet to help you answer this question.

(a) List **two** things that the elements beryllium, magnesium and calcium have in common.

_____

_____

_____ [2]

(b) Group VII has five elements: bromine, chlorine, fluorine, iodine and one other element.

(i) What is the common name for Group VII elements?

_____ [1]

(ii) Name the other Group VII element.

_____ [1]

(iii) Which of the Group VII elements is the most reactive?

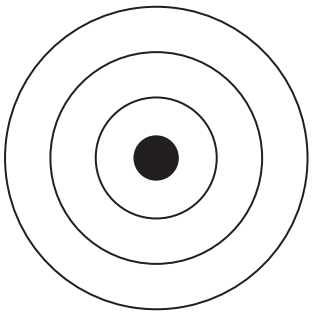
_____ [1]

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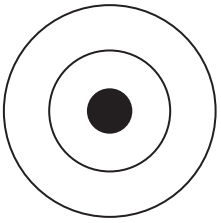
12 Magnesium reacts with fluorine to form the compound magnesium fluoride.

Examiner Only	
Marks	Remark

(a) Complete the diagrams below to show the arrangement of **all** the electrons in a magnesium atom and a fluorine atom.



magnesium atom



fluorine atom [2]

(b) Explain, in terms of the atoms involved, how the electron arrangements change when magnesium fluoride is formed from magnesium and fluorine.

_____

_____

_____

_____

_____

_____ [3]

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Examiner Only	
Marks	Remark

13 **(a)** Chemical reactions occur at different rates or speeds. Choose from the list below to answer the questions which follow.

A copper metal with dilute hydrochloric acid
B sulphuric acid with sodium hydroxide
C an iron gate with oxygen and water
D marble chips with hydrochloric acid
E testing for hydrogen gas using a lit taper

(i) Which reaction, **A**, **B**, **C**, **D** or **E** is slow and continues for years?

_____ [1]

(ii) Which reaction, **A**, **B**, **C**, **D** or **E** is a steady reaction which takes minutes and produces a gas?

_____ [1]

(iii) Which reaction, **A**, **B**, **C**, **D** or **E** will not happen, even after many years?

_____ [1]

(b) A large piece of zinc will react slowly with dilute sulphuric acid. Give **three** things you could do to speed this reaction up.

1. _____

2. _____

3. _____ [3]

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(c) Some metals are more reactive than others. Read the sentences below and answer the questions which follow.

- Iron can displace copper but cannot displace zinc.
- Magnesium can displace iron and zinc but cannot displace calcium.

From these two statements write down whether each of the sentences below is **true** or **false** or **not possible to work out**.

(i) Magnesium can displace copper.

_____ [1]

(ii) Zinc can displace calcium.

_____ [1]

(iii) If the five metals, calcium, copper, iron, magnesium and zinc, are placed in order of reactivity, zinc is in the middle.

_____ [1]

(iv) If lead can displace copper then lead can also displace iron.

_____ [1]

(d) The table below gives some information about the structure of atoms. Complete the table.

Symbol	Number of protons	Number of neutrons	Number of electrons	Mass number	Electron arrangement
Na		12	11	23	2,8,1
Ca	20	20	20		2,8,8,2
Al	13		13	27	
O	8	8		16	2,6

[5]

Examiner Only

Marks	Remark

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14 This question is about some non-metals and their compounds.

Examiner Only	
Marks	Remark

(a) Hydrogen is a gas.

(i) Give **two** other **physical** properties of hydrogen.

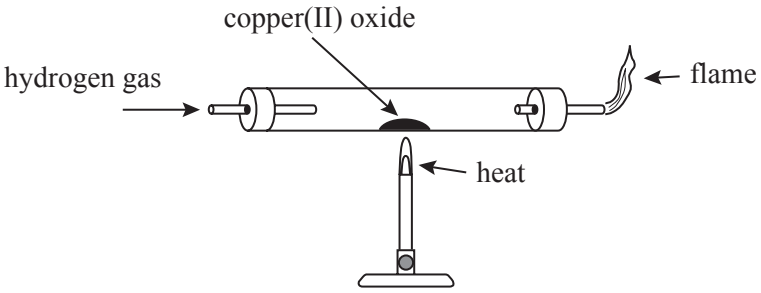
1. _____ [1]

2. _____ [1]

(ii) Give **one** use of hydrogen.

_____ [1]

The diagram below shows how hydrogen can be used to reduce copper(II) oxide.



(iii) Write a balanced symbol equation for the reaction of hydrogen with copper(II) oxide.

_____ [2]

(b) Sulphur is an impurity in coal and oil. When these fuels burn they produce an acidic gas which causes acid rain.

(i) Name this acidic gas which causes acid rain.

_____ [1]

(ii) Circle the pH value which you would expect a lake to have which has been polluted by acid rain.

0 **3** **7** **9** **13** [1]

(iii) Give **one** harmful effect of acid rain.

_____ [1]

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Power stations must control their emissions of acidic gases.



© Greenpeace / Hunt

(iv) Give one way of controlling the emission of gases from power stations.

_____ [1]

(c) The land around Ballymoney, in County Antrim, is very rich in a fuel called lignite. To obtain the lignite a type of mining is used where the surface soil and earth is removed so that the lignite can be taken out.

Describe the advantages and disadvantages of having a lignite mine close to the town of Ballymoney. You will also be marked on the quality of your written communication.

Advantages: _____

_____

_____

_____

Disadvantages: _____

_____

_____

_____ [6]

Quality of written communication [1]

Examiner Only

Marks	Remark

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(d) Two causes of water pollution are the presence of nitrates and phosphates.

(i) Give a main source of nitrates in water.

_____ [1]

(ii) Give a main source of phosphates in water.

_____ [1]

Filtration and chlorination are used in water treatment plants to ensure the water is clean and safe to drink.

(iii) What type of impurities in water cannot be removed by filtration?

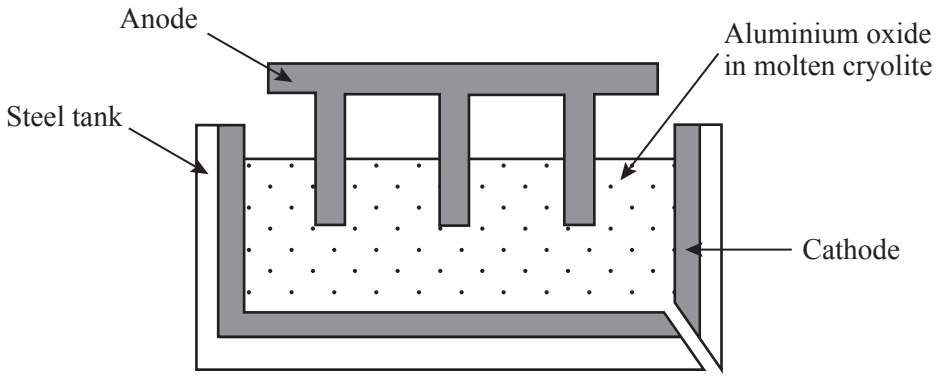
_____ [1]

(iv) How does chlorination help to make water safe to drink?

_____ [1]

Examiner Only	
Marks	Remark

15 Aluminium is manufactured by the electrolysis of molten aluminium oxide as shown in the diagram below.



(a) (i) What material is used to make the electrodes in this electrolysis?

_____ [1]

(ii) State the products of this electrolysis at the anode and the cathode.

Anode _____ Cathode _____ [1]

(iii) Which electrode must be replaced regularly? Explain why this is necessary.

Electrode _____

Explanation _____

_____

_____ [3]

Examiner Only

Marks	Remark

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(b) This part of the question is about some reactions of Group I metals with water.

Group I
Li
Na
K

(i) What name is given to the Group I metals?

_____ [1]

(ii) What do you observe happening when a small amount of sodium is added to water?

_____

_____

_____

_____

_____

_____ [4]

(iii) Why is the reaction in part **(ii)** carried out with a **small** amount of sodium?

_____ [1]

(iv) Complete the word equation for the reaction of sodium with water.

sodium + water → + [2]

(v) In what way would you expect the reaction of lithium with water to be different to the reaction of sodium with water and why would it be different?

_____

_____ [2]

Examiner Only

Marks	Remark

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(c) This part of the question is also about Group II metals and their compounds.

Examiner Only	
Marks	Remark

(i) When calcium reacts with water the water goes cloudy. What compound has been formed which makes the water go cloudy?

_____ [1]

(ii) Complete the symbol equation below for the reaction of calcium carbonate with hydrochloric acid.

$CaCO_3 + 2HCl \rightarrow$ _____ + _____ + CO_2 [2]

(iii) Magnesium oxide is an ionic solid. This means it will have a high melting point. Give **two** other physical properties you expect a typical ionic solid to have.

_____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

General Certificate of Secondary Education
2011

Science: Double Award (Non-Modular)

Paper 2
Foundation Tier

[G8402]

FRIDAY 27 MAY, MORNING

MARK SCHEME

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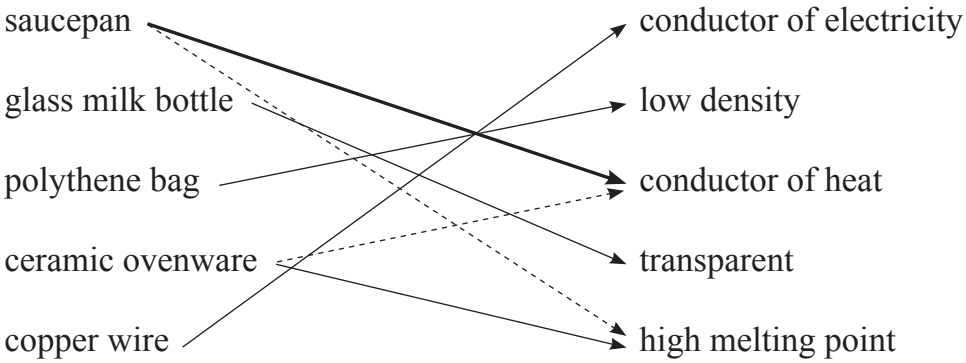
1 **(a)** **(i)** C [1]

(ii) A [1]

(iii) Any two of:
eye catching/internationally recognised/idea that some people cannot read (2 × [1]) [2]

AVAILABLE MARKS: 4

2 **(a)**



⇢ = Alternative correct answer

4 correct [3] 2 or 3 correct [2] 1 correct [1] [3]

(b) light [1] flexible [1] [2]

AVAILABLE MARKS: 5

3 dissolve [1] soluble [1]
increases [1]
decreases [1]
solution [1] [5]

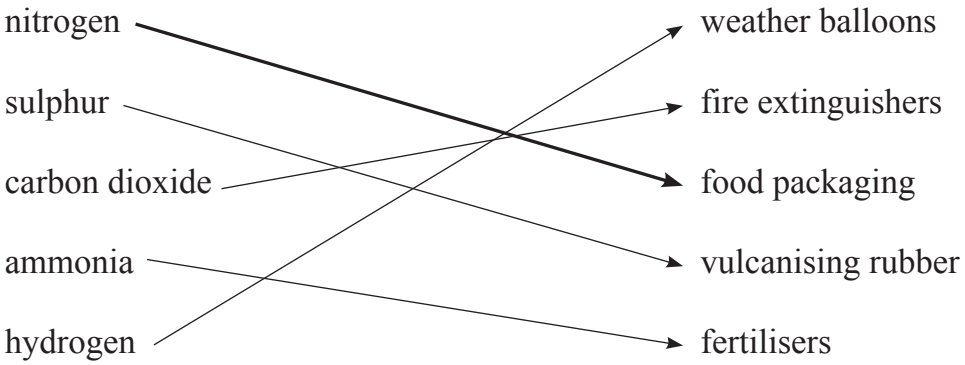
AVAILABLE MARKS: 5

4

Substance	Element	Mixture	Compound
rust			✓
magnesium	✓**[1]**		
copper carbonate			✓**[1]**
sea water		✓**[1]**	
helium	✓**[1]**		

[4]

AVAILABLE MARKS: 4

			AVAILABLE MARKS
5			
	4 correct [3] 2 or 3 correct [2] 1 correct [1]		3
6	**(a)** P	[1]	
	(b) carbon monoxide	[1]	
	(c) calcium sulphite	[1]	
	(d) $Fe(OH)_3$	[1]	4
7	**(a)** heat it **NOT** warm it **NOT** burn	[1]	
	(b) use lime water [1] turns milky [1] **NOT** idea of extinguishing a lit taper	[2]	
	(c) lighter	[1]	4
8	**(a)** Any three of: natural gas/LPG/petrol/diesel/paraffin/candle wax/peat/lignite/coal/coke/oil or other correct (3 × [1])	[3]	
	(b) carbon dioxide [1] water [1]	[2]	5
9	**(a)** idea of particles [1] which move/diffuse [1]	[2]	
	(b) idea that they go into the air [1]	[1]	
	(c) idea that salt particles have separated/broken down [1] and idea that they moved between the water particles [1]	[2]	5

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10 Tests could be linked to:
conductor of heat
conductor of electricity
malleable
ductile
shiny
sonorous
effect on water
i.e. an acceptable test is one which can have a "result" with a metal **NOT** sodium or potassium

Test	Result if metal	Result if non-metal
Acceptable test 2 × [1] e.g. hit with hammer	Acceptable result 2 × [1] ringing sound	Acceptable result 2 × [1] no ringing sound

[6] 6

11 **(a)** Any two of:
same Group (in Periodic Table)/2 outer electrons/valency of 2
accept all are metals
Accept any correct metal properties (2 × [1]) [2]

(b) **(i)** halogen(s)
(ii) astatine
(iii) fluorine [3] 5

12 **(a)** correct 2,8,2 representation for magnesium [1]
correct 2,7 representation for fluorine [1] [2]

(b) loss of 2 electrons by magnesium [1]
gain of 1 electron by fluorine [1]
idea that 2 fluorine atoms are needed (for each magnesium) [1]
reference to loss or gain of atoms loses 1 mark/sharing electrons negates first 2 marks [3] 5

AVAILABLE MARKS

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AVAILABLE MARKS

13 (a) (i) C [1]

(ii) D [1]

(iii) A [1]

(b) Any three of:
heat (the acid)/stir or shake/break up zinc/use more concentrated acid
(3 × [1]) accept add catalyst (copper sulphate) [3]

(c) (i) true [1]

(ii) false [1]

(iii) true [1]

(iv) not possible to work out [1]

(d)

Symbol	Number of protons	Number of neutrons	Number of electrons	Mass number	Electron arrangement
Na	**11 [1]**	12	11	23	2,8,1
Ca	20	20	20	**40 [1]**	2,8,8,2
Al	13	**14 [1]**	13	27	**2,8,3 [1]**
O	8	8	**8 [1]**	16	2,6

[5]

15

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14 (a) (i) Any two of: colourless/odourless/low density/insoluble in water or other correct (2 × [1]) no marks relating to mp or bp [2]

(ii) meteorological balloons/rocket engines/(clean) fuel or other correct e.g. Haber Process or Hydrogenation of fats [1]

(iii) $CuO + H_2$ [1] $\rightarrow$ $Cu + H_2O$ [1] [2]

(b) (i) sulphur dioxide [1]

(ii) 3 [1]

(iii) kills fish/corrodes or damages stonework or buildings (NOT erodes)/destroys or damages or kills vegetation/leaches nutrients from the soil or other correct e.g. corrodes metal [1]

(iv) idea of scrubbers/filters/use low sulphur fuels/desulphonation **NOT** use of alternative energy sources [1]

(c) advantages (allow up to four of): use of lignite as a fuel/providing jobs/cheap (fuel)/helping local economy/allow improved transport links/or other correct
disadvantages (allow up to four of): loss of habitat/eyesore/noise pollution/dust pollution/using up natural resource or other correct (max 6 × [1])
QWC mark for clear articulation – NOT just list [1] [7]

(d) (i) fertilisers/slurry [1]

(ii) fertilisers/detergents [1]

(iii) soluble or dissolved
allow bacteria/germs/microbes [1]

(iv) idea of killing bacteria/germs NOT cleaning
accept sterilises [1]

AVAILABLE MARKS

20

				AVAILABLE MARKS
15	**(a)**	**(i)**	carbon/graphite [1]	
		(ii)	anode – oxygen, cathode – aluminium both needed [1]	
		(iii)	anode [1] idea that it reacts with oxygen **NOT** wears away/ erodes [1] forming carbon dioxide [1] [3]	
	(b)	**(i)**	alkali metals **NOT** alkaline [1]	
		(ii)	Any four of: bubbles/effervescence/fizzing NOT just "gas" hissing or similar sound metal floating/on surface forming a ball/melting or similar metal getting smaller/disappearing/dissolving moving around idea of catching fire/sparks/yellow-orange flame exothermic reaction idea of alkaline solution remaining/turns purple with pH indicator idea of very vigorous reaction (4 × [1]) [4]	
		(iii)	idea of reactivity of sodium [1]	
		(iv)	sodium + water → sodium hydroxide [1] + hydrogen [1] [2]	
		(v)	slower or similar [1] lithium is less reactive [1] correct reference to position in Group 1 [1] Any 2 points of 3 [2]	
	(c)	**(i)**	calcium hydroxide slaked lime [1]	
		(ii)	$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$ [1] [1] [2]	
		(iii)	Any two of: hard/brittle/crystalline/does not conduct electricity when solid (2 × [1]) allow idea of solubility allow conducts when molten [2]	20
			Total	**110**

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010

Science: Double Award (Non-Modular)

Paper 2
Foundation Tier

[G8402]

G8402

WEDNESDAY 26 MAY, MORNING

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 **13(a)**.
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	

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Examiner Only	
Marks	Remark

1 This question is about man-made materials.

(a) The following list contains natural and man-made materials. Complete the table showing the materials that are man-made and those that are natural. One has been done for you.

wood **plastic** **silk** **cotton**

glass **aluminium** **nylon**

man-made material	natural material
nylon	

[3]

(b) Select from the following list to complete the sentences below:

strength **easy to mould** **transparent** **brittle**

low melting point **a conductor** **high melting point**

(i) Bridges are made of iron because of its _____ and low cost.

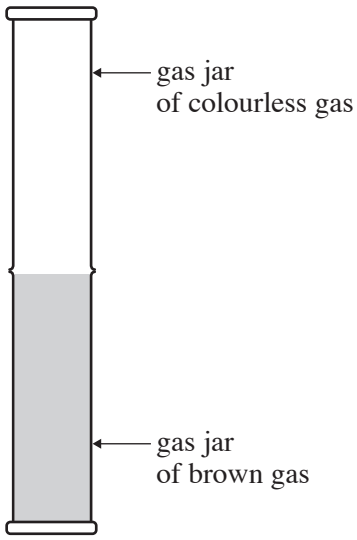
(ii) Glass is used in oven doors as it is _____ and easy to clean.

(iii) Ceramic oven dishes have a _____ and this allows the food to be cooked fairly quickly. [3]

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Examiner Only	
Marks	Remark

2 Two gas jars, one filled with a brown gas and another with a colourless gas were placed together as shown in the diagram.



(a) (i) Describe what you would see starting to happen in the two gas jars.

_____

_____ [1]

(ii) Describe what you would eventually see in the two gas jars.

_____

_____ [1]

(b) Circle a word from the following list that describes the process that has happened to the gases.

distillation **oxidation** **diffusion** **evaporation** [1]

(c) If the temperature was increased how would the time for the process change? Circle the correct answer.

It would stay the same **It would take longer**

It would take less time [1]

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Examiner Only	
Marks	Remark

3 For each of the statements below three answers are given. Only **one** is correct. Circle the correct answer. One has been done for you. You may find your Data Leaflet helpful.

The element with the symbol **N** is:

nitrogen neon niobium

(i) The correct chemical symbol for sulphur is:

Su **S** **Na** [1]

(ii) The alkali with the formula $Ca(OH)_2$ is:

calcium hydride **calcium oxide** **calcium hydroxide** [1]

(iii) The correct chemical formula for magnesium carbonate is:

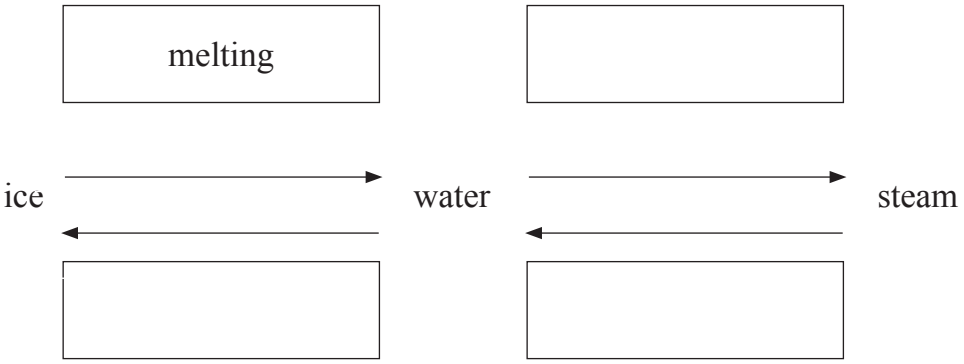
$MgCO_3$ **$MgCo_3$** **$MGCO_3$** [1]

(iv) The name of the compound with the formula Li_2SO_4 is:

lithium sulphite **lithium sulphate** **lithium sulphide** [1]

4 The diagram below shows how H_2O changes from solid to liquid to gas.

Fill the missing spaces to name the processes involved in the changes of state.



[3]

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5 Elements exist as solids, liquids or gases.

(a) Which of these is the correct definition of an element? Tick (✓) the correct answer.

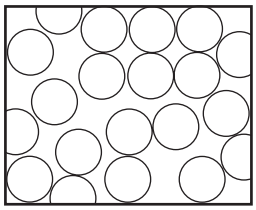
An element is a pure substance containing one type of molecule ☐

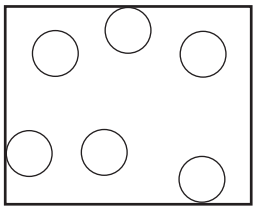
An element is a pure substance containing one type of atom ☐

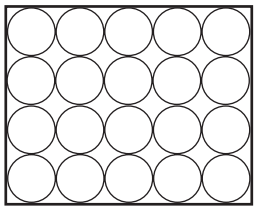
An element is a pure substance containing one type of compound ☐

[1]

(b) The diagrams below show the arrangement of particles in a solid, a liquid and a gas. Label each diagram correctly.







_____ _____ _____

[2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 For each of the questions below three possible answers are given but only **one** is correct. Circle the correct answer. One has been done for you.

Which compound do all hydrated substances contain?

hydrogen **water** **oxygen**

(a) When salt is dissolved in water which word describes the salt?

solute **solvent** **solution** [1]

(b) What happens to temporary hard water when it is boiled?

hardness is removed **nothing** **hardness increases** [1]

(c) Why is carbon dioxide described as a "greenhouse gas"?

it is kept in greenhouses **it contributes to global warming** **it is used to make greenhouses** [1]

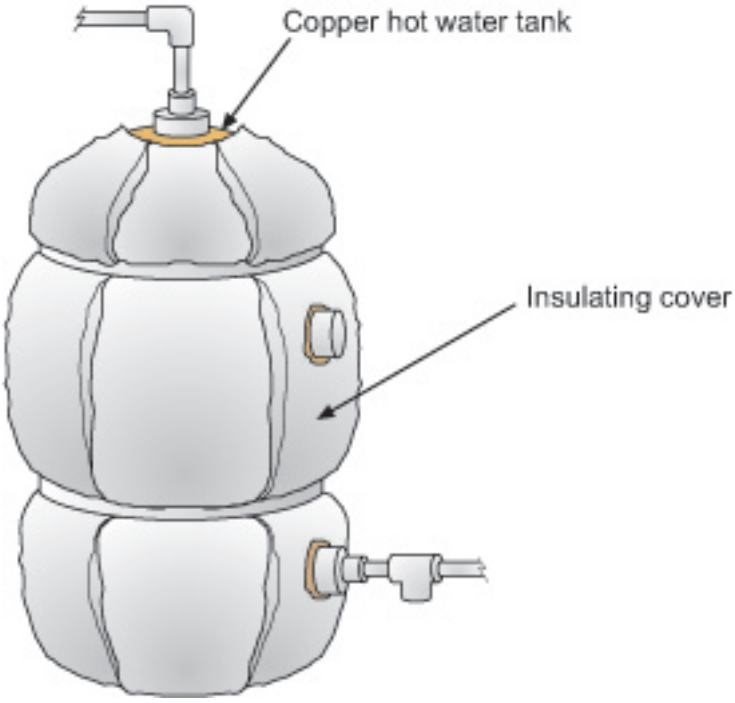
(d) What work is Mendeelev best known for?

the Periodic Table **hazard symbols** **discovering water** [1]

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Examiner Only	
Marks	Remark

7 The diagram below shows a copper hot water tank which has an insulating cover.



(a) Give **two** reasons why copper is used to make hot water tanks.

1. _____

2. _____ [2]

(b) Why should the copper tank be surrounded with an insulating cover?

_____ [1]

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Marks	Remark

8 Magnesium and some of its compounds react with hydrochloric acid. Complete the table to show what is formed in each reaction. Put a tick (✓) in the correct boxes. The first one has been done for you.

reaction	reaction forms			
	a salt	**hydrogen gas**	**water**	**carbon dioxide**
magnesium hydroxide with hydrochloric acid	✔		✔	
magnesium with hydrochloric acid				
magnesium oxide with hydrochloric acid				
magnesium carbonate with hydrochloric acid				

[6]

9 Oxides may be classified as acidic, basic or neutral. Listed below are six oxides:

carbon dioxide **magnesium oxide** **sulphur dioxide**

water (hydrogen oxide) **iron(II) oxide** **carbon monoxide**

From the list of oxides given select:

(a) an acidic oxide _____ [1]

(b) a basic oxide _____ [1]

(c) a neutral oxide _____ [1]

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10 The table below gives some information about atomic and electronic structures.
Complete the table. You may find your Data Leaflet useful.

atom	number of protons	number of electrons	number of neutrons	atomic number	mass number
magnesium	12		12	12	
potassium		19		19	39
boron	5		6		11

[6]

11 Sodium chloride and copper sulphate are typical ionic compounds. They both conduct electricity when molten or in solution. Give three other **physical** properties you would expect for these compounds.

1. _____

2. _____

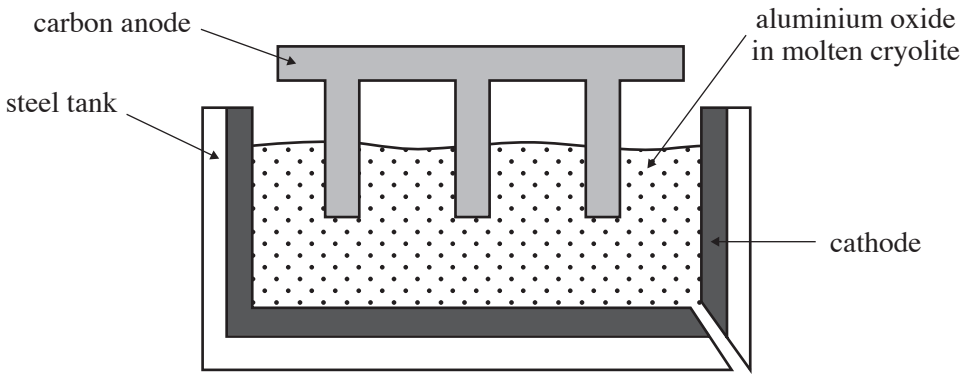
3. _____ [3]

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Marks	Remark

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12 Aluminium metal is extracted from pure aluminium oxide by electrolysis using the cell shown below:



(a) Why are aluminium extraction plants often built where hydroelectric power is available?

_____

_____ [1]

(b) Why is electrolysis used to extract aluminium from aluminium oxide?

_____

_____ [1]

(c) Why do the carbon anodes have to be frequently replaced during the electrolysis?

_____

_____

_____ [2]

(d) How is the aluminium removed from the cell?

_____

_____ [1]

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Marks	Remark

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Marks	Remark

13 (a) Metals are elements which have their own particular properties.

(i) Name **one** metal which is very dense. Choose your answer from the list below.

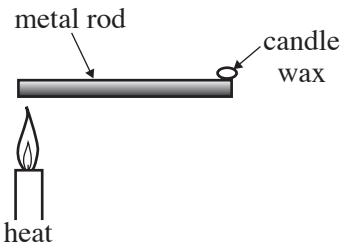
sodium **magnesium** **calcium** **lead**

_____ [1]

(ii) Many metals can be stretched into wires. Circle the correct word, from the three given, which means "**can be stretched into wires**".

ductile **malleable** **lustrous** [1]

(iii) A piece of candle wax was attached to one end of a 30 cm metal rod. The other end of the rod was heated.



(1) What would you expect to happen to the candle wax?

_____ [1]

(2) Why would this happen to the candle wax?

_____

_____

_____ [2]

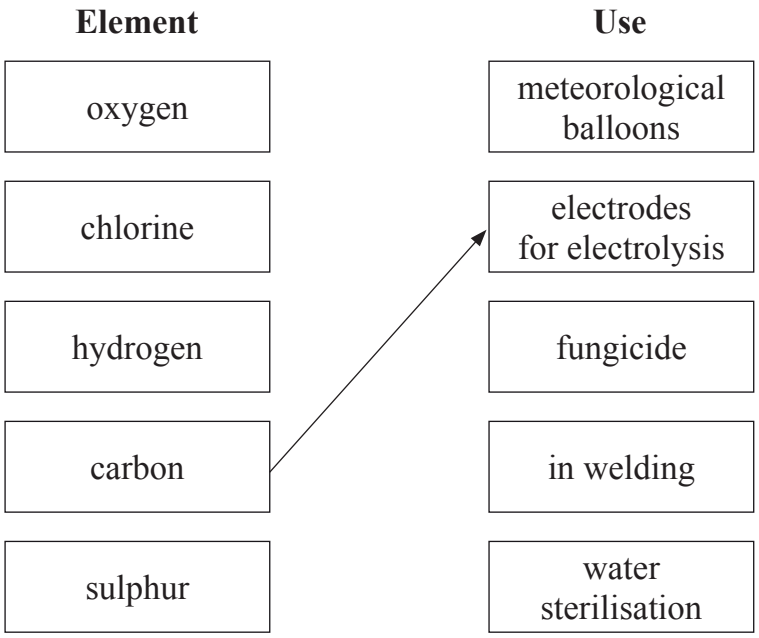
Quality of written communication [1]

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Marks	Remark

(b) Non-metal elements have many different uses.
Draw a line to match each use to the correct element. One has been done for you.

(HINT Only **one** use for each element has been given:)



[3]

(c) Peat or turf is found throughout Ireland. It is dug from the ground, cut into pieces and then dried before being used.

(i) What is peat used for?

_____ [1]

(ii) Give **one** advantage of peat cutting.

_____ [1]

(iii) Give **two** disadvantages of peat cutting.

1. _____

2. _____ [2]

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(d) Chemical reactions can be classified as exothermic or endothermic.

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Marks	Remark

(i) What is the meaning of the term **endothermic**?

_____

_____ [1]

(ii) The table below shows the temperature change during a number of reactions.

reaction	reactants	temperature before reaction (°C)	temperature during reaction (°C)
A	iron and sulphur	17	200
B	ammonium carbonate and ethanoic acid	17	14
C	zinc and copper sulphate solution	17	22

Classify the reactions A, B, C as exothermic or endothermic.

Exothermic _____

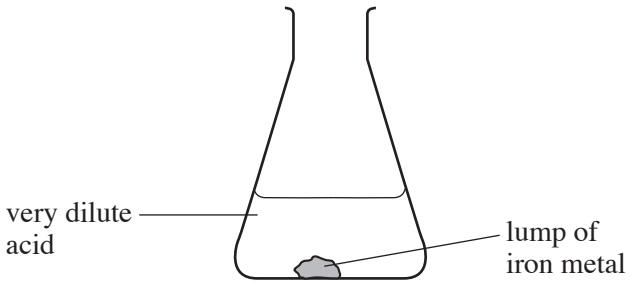
Endothermic _____ [2]

(iii) Complete the following sentence using **either** the word exothermic or endothermic.

All combustion reactions are _____. [1]

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(e) A chemistry teacher was demonstrating the reaction of a lump of iron metal with a very dilute acid.



Unfortunately the reaction was very slow.

Give **three** things the teacher could have done to speed up the reaction.

1. _____

2. _____

3. _____ [3]

Examiner Only	
Marks	Remark

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14 This question is about some non-metals and their compounds.

Examiner Only

Marks	Remark

(a) Complete the table below which describes tests for some common substances.

substance	test	result
hydrogen		pops
carbon dioxide	limewater	
	glowing splint	relights
water	anhydrous copper sulphate	

[4]

(b) Chlorine is a reactive Group 7 element and is composed of **diatomic molecules**.

(i) Explain the meaning of the term **diatomic**.

_____

_____ [1]

(ii) Explain the meaning of the term **molecule**.

_____

_____ [2]

(iii) Chlorine has two isotopes, ^{35}Cl and ^{37}Cl. Complete the table below to show the atomic structure of these two isotopes.

isotope	number of electrons	number of neutrons	number of protons
^{37}Cl	17	20	17
^{35}Cl			

[3]

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Examiner Only	
Marks	Remark

(iv) When chlorine is passed into a solution of potassium bromide a displacement reaction takes place and potassium chloride and bromine are formed.

Describe the colour change which would be observed in this reaction.

Colour of solution at the start _____

Colour of solution at the end _____ [2]

(c) Burning fossil fuels containing sulphur produces a gas, **Z**, which causes acid rain.

(i) Name this gas, **Z**, that causes acid rain to be formed.

_____ [1]

(ii) Give **two** reasons why acid rain is a serious environmental problem.

1. _____

2. _____ [2]

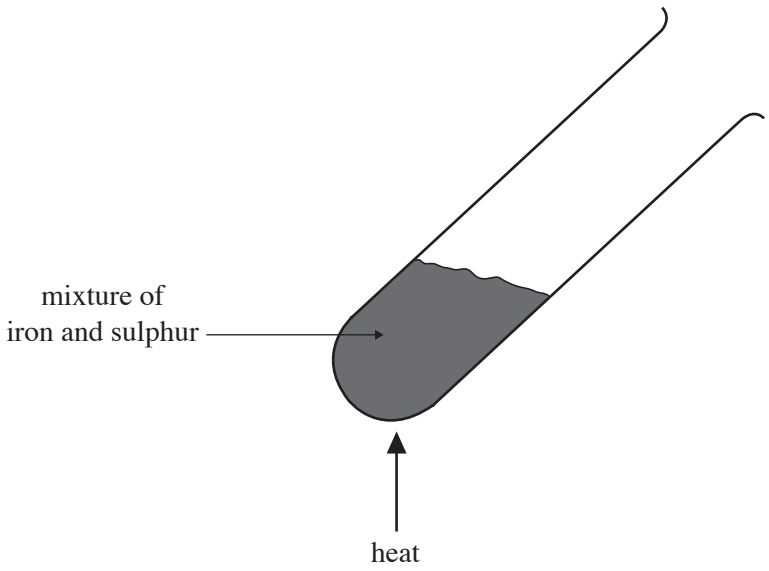
(iii) Give **one** way that fossil fuel power stations which burn fossil fuels can help to reduce the amount of gas, **Z**.

_____

_____ [1]

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(d) When sulphur and iron are heated they react to form a compound, iron(II) sulphide.



(i) Describe the appearance of sulphur.

_____ [2]

(ii) Give **two** things you would observe when iron reacts with sulphur.

1. _____

2. _____ [2]

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Marks	Remark

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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

15 This question is about metals and their compounds. You may find your Data Leaflet useful.

(a) Calcium and magnesium are both alkaline earth metals.

(i) To which Group in the Periodic Table do calcium and magnesium belong?

_____ [1]

(ii) Describe **two** things you would observe happening when a piece of magnesium ribbon is burned in air.

1. _____

2. _____ [2]

(iii) Complete the word equation for the reaction of magnesium with oxygen.

magnesium + oxygen → [1]

(b) Calcium metal reacts with water.

(i) Describe **three** things you would observe happening when calcium is added to water.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

(ii) Give **one** safety precaution which should be taken when carrying out the reaction between calcium and water.

_____ [1]

(iii) Complete the word equation for the reaction of calcium with water.

calcium + water → + [2]

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Marks	Remark

(c) Magnesium reacts very slowly with water but it reacts quite quickly with steam.

(i) What gas is formed when magnesium reacts with steam?

_____ [1]

(ii) What is the other product of the reaction of magnesium with steam?

_____ [1]

(d) Copper sulphate can be made by reacting solid green copper carbonate powder with dilute sulphuric acid.

(i) Describe **two** things you would observe happening when copper carbonate reacts with sulphuric acid.

1. _____

2. _____ [2]

(ii) Why can copper sulphate not be prepared by adding dilute sulphuric acid directly to copper?

_____ [1]

(e) Magnesium powder reacts quite quickly when stirred with copper(II) sulphate solution. Describe the colour change of the solution in this reaction.

(i) From _____ to _____ [2]

(ii) Write a balanced **symbol** equation for the reaction of magnesium with copper(II) sulphate.

_____ [2]

(iii) What **type** of chemical reaction is the reaction between magnesium and copper sulphate?

_____ [1]

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GCSE

Science: Double Award (Non-Modular)

Summer2010

Mark Schemes

Issued: October 2010

Rewarding Learning

General Certificate of Secondary Education
2010

Science: Double Award (Non-Modular)

Paper 2
Foundation Tier

[G8402]

WEDNESDAY 26 MAY, MORNING

MARK SCHEME

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			AVAILABLE MARKS
1	**(a)**		

man-made materials	natural materials
nylon	wood
plastic	silk
glass	cotton
aluminium	

6 correct [3]; 4 or 5 correct [2]; 2 or 3 correct [1] [3]

(b) **(i)** strength [1]

(ii) transparent [1]

(iii) high melting point [1] [3] 6

2 **(a)** **(i)** idea of seeing brown colour move to upper gas jar/idea of mixing [1]

(ii) idea of becoming **evenly** spread/brown throughout/ even colour throughout [1] [2]

(b) diffusion [1] [1]

(c) it would take less time [1] [1] 4

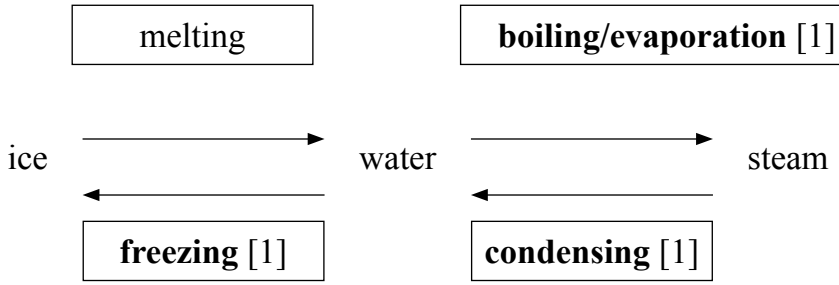
3 **(a)** S [1] [1]

(b) calcium hydroxide [1] [1]

(c) $MgCO_3$ [1] [1]

(d) lithium sulphate [1] [1] 4

4



[3] 3

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			AVAILABLE MARKS
5	**(a)** an element is a pure substance containing one type of atom [1]	[1]	
	(b) liquid gas solid 3 correct = [2]; 1 correct = [1]	[2]	3
6	**(a)** solute [1]	[1]	
	(b) hardness is removed [1]	[1]	
	(c) it contributes to global warming [1]	[1]	
	(d) the Periodic Table [1]	[1]	4

7 **(a)** any **two** of:

idea of being unreactive — **not** good conductor
idea of being malleable/easily moulded — **not** cheap
idea of being rigid/strong
idea of not dissolving in water
idea of not melting
not idea of being cheap

(2 × [1]) [2]

(b) idea that copper conducts **heat**/heat would escape [1] [1] — 3

not insulator

8

reaction	**reaction forms**			
	a salt	**hydrogen gas**	**water**	**carbon dioxide**
magnesium hydroxide with hydrochloric acid	✓	✗	✓	✗
magnesium with hydrochloric acid	✓	✓	✗	✗
magnesium oxide with hydrochloric acid	✓	✗	✓	✗
magnesium carbonate with hydrochloric acid	✓	✗	✓	✓

For each reaction 4 boxes correct = [2]; 3 boxes correct = [1];
2 or 1 correct = [0] (3 × [2]) [6] — 6

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			AVAILABLE MARKS
9	**(a)** carbon dioxide **or** sulphur dioxide [1] accept correct formula	[1]	
	(b) magnesium oxide or iron (II) oxide [1]	[1]	
	(c) water **or** carbon monoxide [1]	[1]	3

10

Atom	Number of protons	Number of electrons	Number of neutrons	Atomic number	Mass number
magnesium	12	**12** [1]	12	12	**24** [1]
potassium	**19** [1]	19	**20** [1]	19	39
boron	5	**5** [1]	6	**5** [1]	11

[6] 6

11 Any **three** of:
hard **not** coloured
brittle
soluble in water
high melting point
solid
crystalline
or other correct
(3 × [1]) [3] 3

12 **(a)** idea of needing a lot of power/keeping costs down [1] [1]

(b) idea that it cannot be obtained by any other method/aluminium is very reactive/idea of cheaper electricity [1] [1]

(c) clear idea that they **react** [1]
with oxygen/to produce carbon dioxide [1] [2]

(d) idea of being tapped off/run off [1]
i.e. that it is liquid **not** just hole in bottom of tank [1] 5

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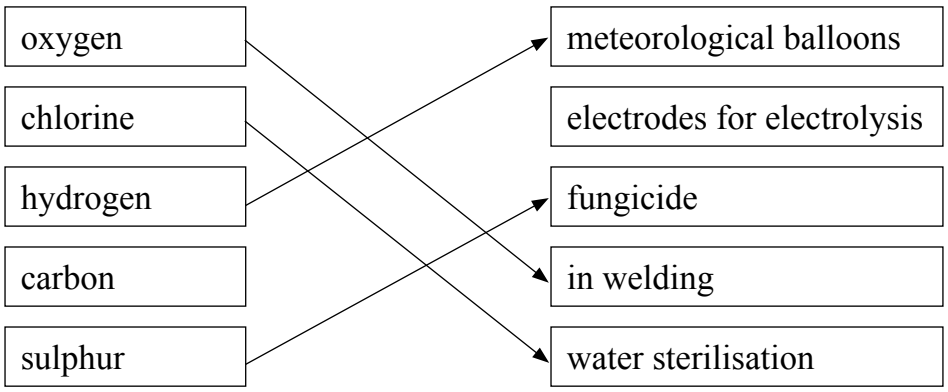
AVAILABLE MARKS

13 (a) (i) lead [1]

(ii) ductile [1]

(iii) 1 idea that it will melt/fall off [1]
metal conducts [1] **heat** [1] allow travelling along the rod for conducting [1] QWC [1] [6]

(b)



4 correct [3]; 2 or 3 correct [2]; 1 correct [1] [3]

(c) (i) use as fuel **or** in gardening [1]

(ii) provides jobs/helps economy/easily extracted/idea of using an available resource/**cheap** fuel [1]
allow idea of "saving" other fuels

(iii) any **two** of:
noise pollution destroys habitats unsightly
idea of flooding dust pollution
uses up natural resources/limited supply
not just pollution – must be qualified (2 × [1]) [4]

(d) (i) idea of taking in heat/energy [1]
not just idea of using heat/energy

(ii) exothermic A and C (both needed) [1]
endothermic B [1]

(iii) exothermic [1] [4]

(e) any **three** of:
stir/shake use smaller pieces of iron/use iron powder
add a catalyst warm the mixture
use more **concentrated** acid/use stronger acid (3 × [1]) [3]
not add more (dilute) acid

20

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AVAILABLE MARKS

14 **(a)** Lighted splint [1] **not** glowing splint
Turns milky/cloudy [1]
Oxygen [1]
Turns blue [1] [4]

(b) **(i)** idea of containing 2 **atoms** [1] [1]

(ii) idea of **two** (or more) atoms [1] idea of chemically combined/ joined/bonded [1] [2]

(iii)

isotope	**number of electrons**	**number of neutrons**	**number of protons**
^{37}Cl	17	20	17
^{35}Cl	**17** [1]	**18** [1]	**17** [1]

[3]

(iv) Colour at start – colourless [1] **not** "clear"
Colour at end yellow/yellow-orange/orange [1] [2]
allow yellow/orange/brown/red-brown or combinations
but **not** red [1]

(c) **(i)** sulphur dioxide [1] [1]

(ii) any **two** of:
Kills fish/corrodes/damages stonework or buildings (**not** erodes)/ destroys or damages or kills vegetation/leaches nutrients from the soil
Or other correct (2 × [1]) [2]
not destroys habitats, **not** make lakes acidic

(iii) idea of scrubbers/desulphonation or low sulphur fuels
not use alternative fuels [1] [1]
not catalytic converters **not** burn less fossil fuel

(d) **(i)** yellow [1] solid/powder or similar [1]
i.e. colour [1] physical state [1] [2]

(ii) any **two** of:
Idea of mixture glowing/continuing to glow when removed from heat/grey or black solid formed or other correct (2 × [1]) [2]
do not accept exothermic
allow idea of pungent smell
allow idea that yellow colour disappears

20

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					AVAILABLE MARKS
15	**(a)**	**(i)**	Group 2 [1]	[1]	
		(ii)	any **two** of: Bright (white) light/white or grey ash or powder or solid formed/ (very) vigorous reaction/allow smoke unless wrongly qualified exothermic reaction (2 × [1]) allow idea that magnesium ribbon disappears	[2]	
		(iii)	magnesium oxide [1]	[1]	
	(b)	**(i)**	any **three** of: Calcium sinks **or** sinks and rises idea of reaction getting faster **not** reaction is fast Bubbles/gas evolved/fizzing Idea of solution going cloudy Calcium gets smaller/dissolves/disappears allow moves in the water and **not** just moves Idea that solution formed is alkaline (3 × [1]) Idea of reaction vessel getting warm/exothermic **Ignore** reference to hissing or noise mark idea of moving across the surface of the water as wrong	[3]	
		(ii)	Wear goggles/use a screen/use a fume cupboard/only small amount of Ca [1]	[1]	
		(iii)	calcium + water → calcium hydroxide [1] + hydrogen [1] apply CM for formula equations 15a(iii)	[2]	
	(c)	**(i)**	Hydrogen [1]	[1]	
		(ii)	Magnesium oxide [1] allow hydrogen through CM if magnesium oxide given in (i)	[1]	
	(d)	**(i)**	Any **two** of: Copper carbonate dissolving/disappearing/getting smaller Blue solution formed Bubbles/gas evolved/fizzing/CO_2 given off Exothermic reaction idea of vigorous/fast reaction (2 × [1])	[2]	
		(ii)	Idea that it does **not** react Idea that copper does **not** react. i.e. that copper is **not** reactive [1]	[1]	
	(e)	**(i)**	blue [1] to colourless [1] **not** clear	[2]	
		(ii)	$Mg + CuSO_4 \rightarrow MgSO_4 + Cu$ [1] [1]	[2]	
		(iii)	displacement/redox [1]	[1]	20
				Total	**110**

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