



General Certificate of Secondary Education
2010

Science: Double Award (Non-Modular)

Paper 2
Foundation Tier

[G8402]



WEDNESDAY 26 MAY, MORNING

Centre Number

71	
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Candidate Number

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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	
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7	
8	
9	
10	
11	
12	
13	
14	
15	

**Total
Marks**

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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

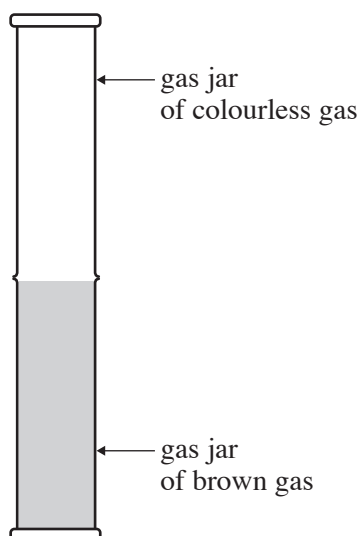
(i) Bridges are made of iron because of its _____ and low cost.

(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]

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]

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 $\text{Ca}(\text{OH})_2$ is:

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

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

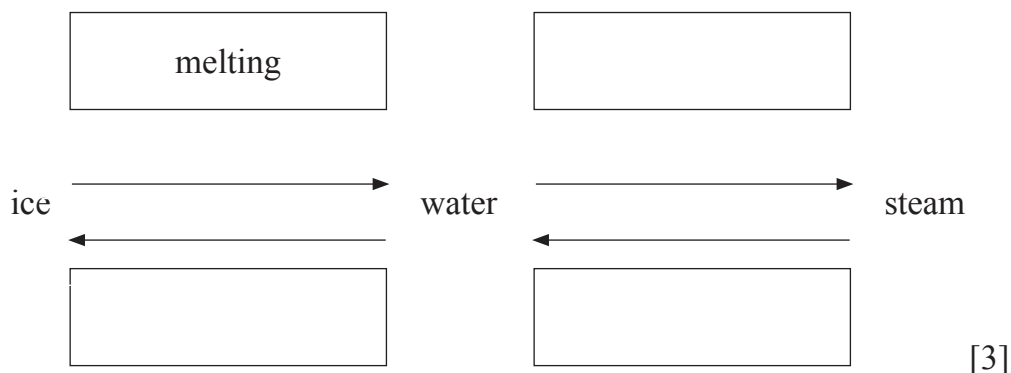
MgCO₃ **MgCo₃** **MGCO₃** [1]

- (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.



Examiner Only	
Marks	Remark

5 Elements exist as solids, liquids or gases.

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

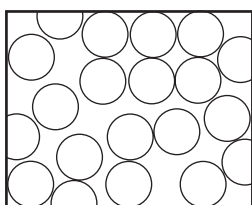
An element is a pure substance containing one type of molecule

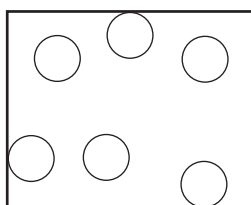
An element is a pure substance containing one type of atom

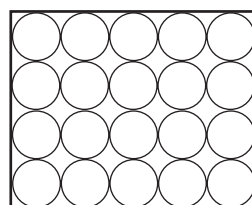
An element is a pure substance containing one type of compound

[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

- 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]

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]

Examiner Only	
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]

Examiner Only	
Marks	Remark

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. _____

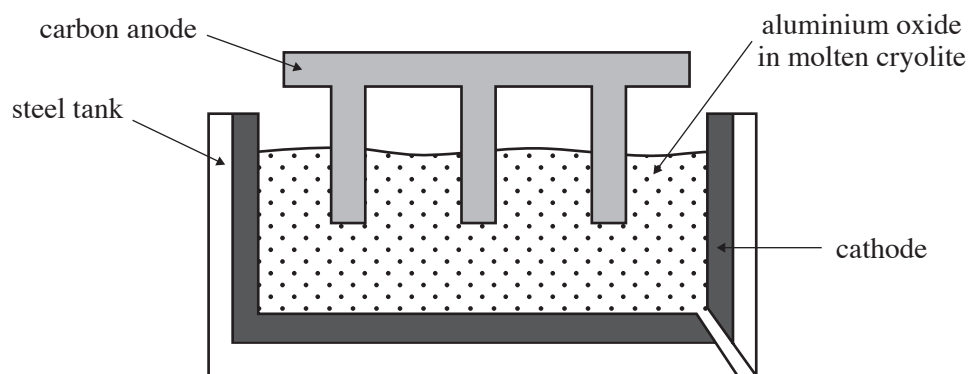
3. _____ [3]

Examiner Only

Marks

Remark

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]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

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

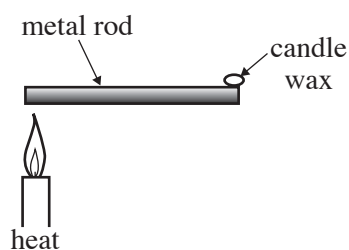
_____ [1]

(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]

Examiner Only

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:)

Element	Use
oxygen	meteorological balloons
chlorine	electrodes for electrolysis
hydrogen	fungicide
carbon	in welding
sulphur	water sterilisation

[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]

Examiner Only	
Marks	Remark

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

(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]

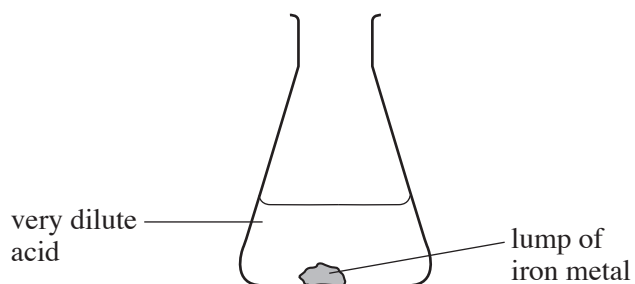
(iii) Complete the following sentence using **either** the word exothermic or endothermic.

All combustion reactions are _____. [1]

Examiner Only

Marks Remark

- (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

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

- (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]

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**.

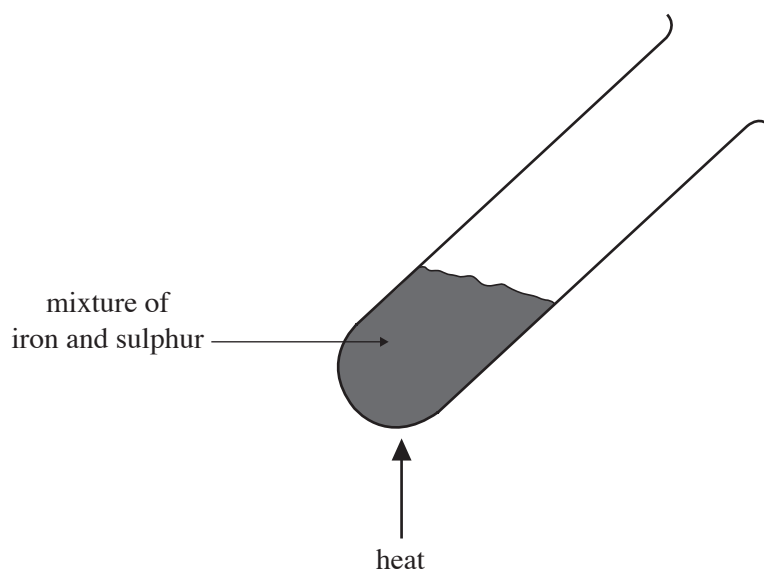
_____ [1]

Examiner Only

Marks

Remark

- (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]

Examiner Only

Marks Remark

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(Questions continue overleaf)

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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THIS IS THE END OF THE QUESTION PAPER

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