



Centre Number

71	
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Candidate Number

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General Certificate of Secondary Education
2011

Science: Double Award (Non-Modular)

Paper 2
Foundation Tier

[G8402]



FRIDAY 27 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 **14(c)**.

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.

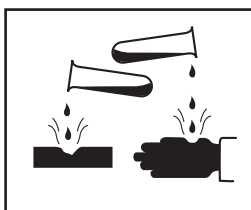
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
Total Marks	



1 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]

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



Aluminium saucepan



Glass bottle



Plastic bag



Ceramic oven dish



Copper wire

Physical Property

conductor of electricity

low density

conductor of heat

transparent

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]

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]

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 CaSO₃ is:

calcium sulphide

calcium sulphite

calcium sulphate

[1]

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

Fe₃OH

FeOH₃

Fe(OH)₃

[1]

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]

Examiner Only	
Marks	Remark

- 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]

- 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]

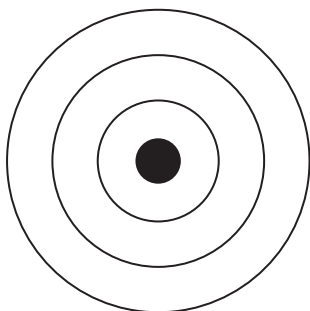
- (iii)** Which of the Group VII elements is the most reactive?

_____ [1]

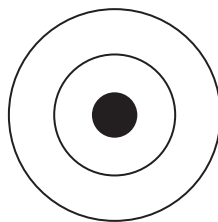
Examiner Only	
Marks	Remark

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

(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]

Examiner Only	
Marks	Remark

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]

(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

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.

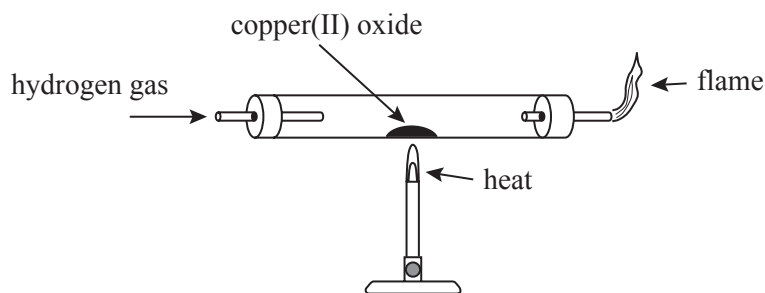
1. _____ [1]

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]

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: _____

Quality of written communication _____ [6]

Quality of written communication _____ [1]

Examiner Only

Marks Remark

(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?

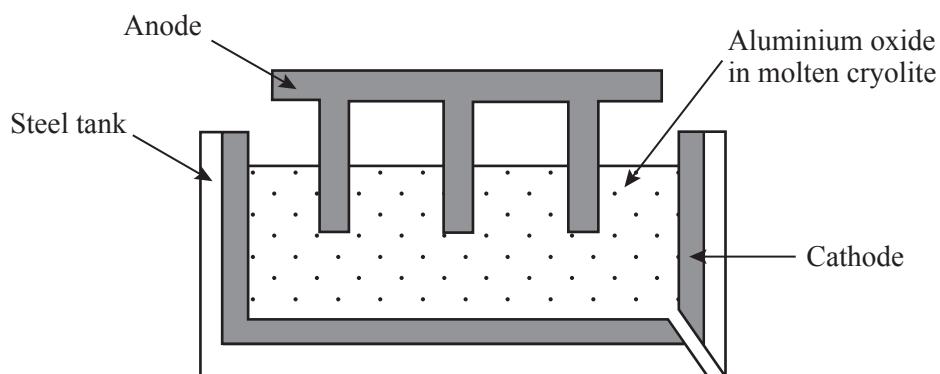
_____ [1]

(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

- (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]

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Marks

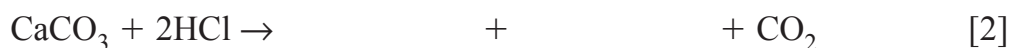
Remark

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

(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.



(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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Marks

Remark

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