New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012–2013

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

GSS21

TUESDAY 13 NOVEMBER 2012, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
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 your use.
Quality of written communication will be assessed in question **10**.

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

Examiner Only	
Marks	Remark

1 **(a)** Below are four common materials.

nylon : silk : cotton : polythene

Place each material in the correct column of the table below.

Natural	Synthetic

[2]

Most modern watering cans are made from plastic rather than metal.

© iStockphoto / Thinkstock

(b) Give **one** reason why plastic is a better material for making watering cans.

_____

_____ [1]

Examiner Only	
Marks	Remark

2 **(a)** Below are two types of rock and some named examples.

Using lines, match each type of rock with **one** example.

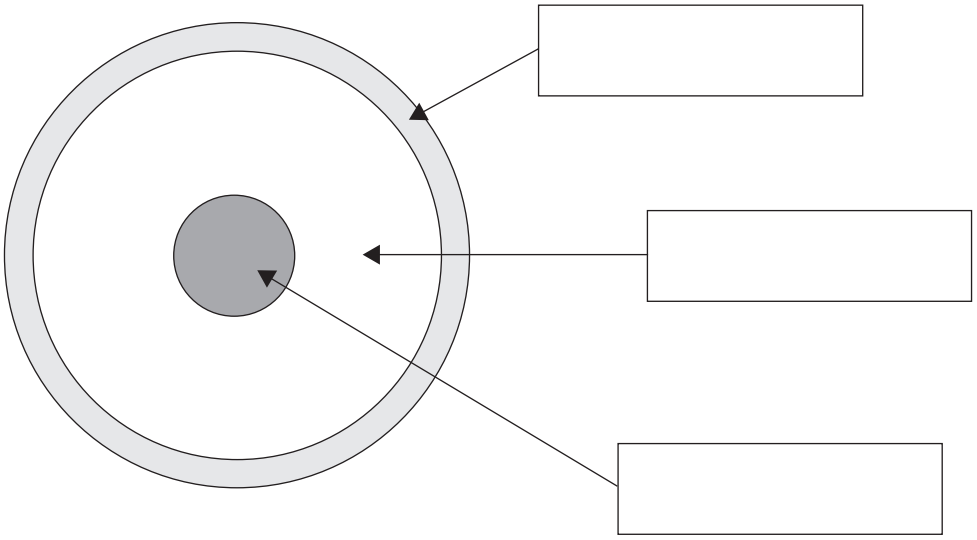
Type of rock	**Example**
Sedimentary	Limestone
Igneous	Granite
	Marble

[2]

(b) Label the structure of the Earth shown below.

Choose from:

volcano : crust : core : skin : mantle



[3]

Examiner Only	
Marks	Remark

3 The table below gives some information about acids and alkalis.

(a) Complete the table.

Choose from:

strong acid : red : strong alkali : yellow

Solution	pH	Colour with Universal Indicator	Type of solution
Milk of Magnesia	8	blue	weak alkali
oven cleaner	13	purple	
lemon juice	5		weak acid

[2]

(b) Complete the following sentence.

A solution with a pH value of 7 is described as _____. [1]

(c) **(i)** Draw the hazard symbol you would expect to see on a strong acid such as hydrochloric acid.

[1]

(ii) Name the hazard symbol found on a bottle of strong acid.

_____ [1]

(d) Give **one** reason why hazard symbols and not just words are put on boxes of chemicals.

_____

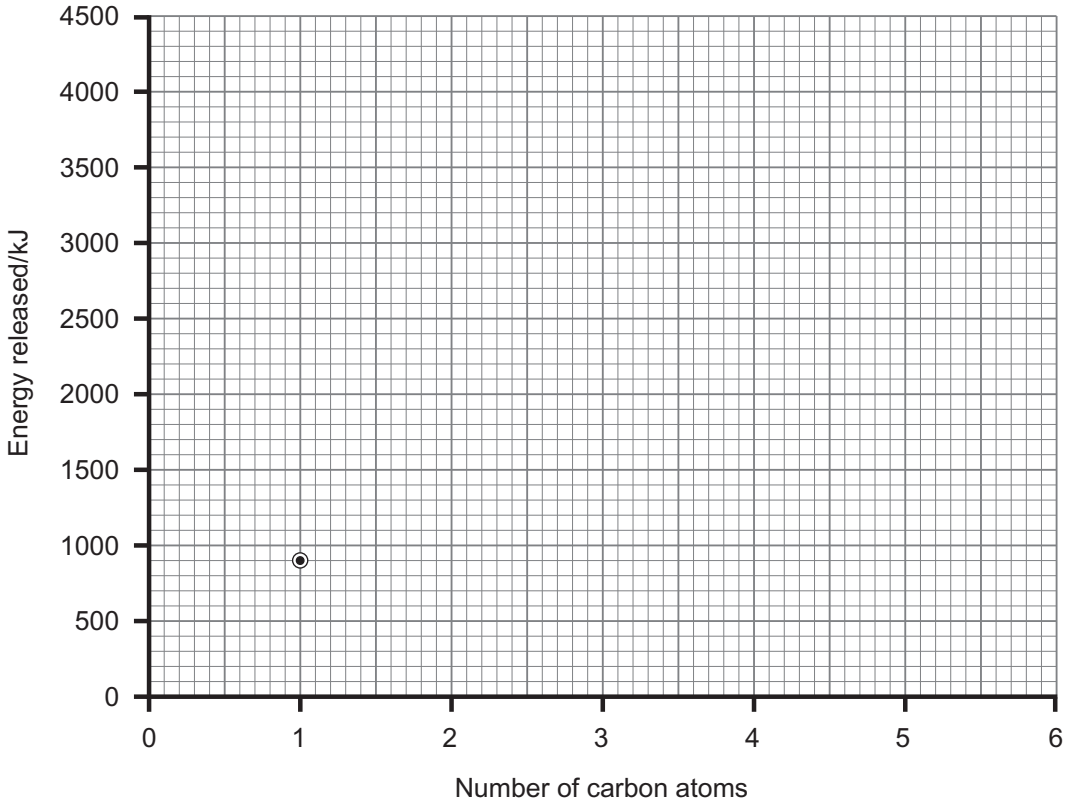
_____ [1]

Examiner Only	
Marks	Remark

4 In an investigation the same amount of each of five hydrocarbon fuels was burnt. The amount of energy released was measured and recorded below.

Fuel	Number of carbon atoms	Energy released/kJ
Methane	1	900
Ethane	2	1500
Propane	3	2200
Butane	4	2900
Pentane	5	3500

(a) Plot and draw a line graph for these results on the grid below. The first point is plotted for you.



[3]

Examiner Only

Marks	Remark

(b) (i) State **one** thing that was done in this investigation to make it a fair test.

_____ [1]

(ii) Describe the trend shown in these results by completing the following sentence.

As the number of carbon atoms in the fuel increases

_____. [1]

(iii) Use the information given to suggest how much energy would be released if hexane, C_6H_{14}, was burnt.

_____ kJ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 **(a)** Complete the following sentences.

Choose from:

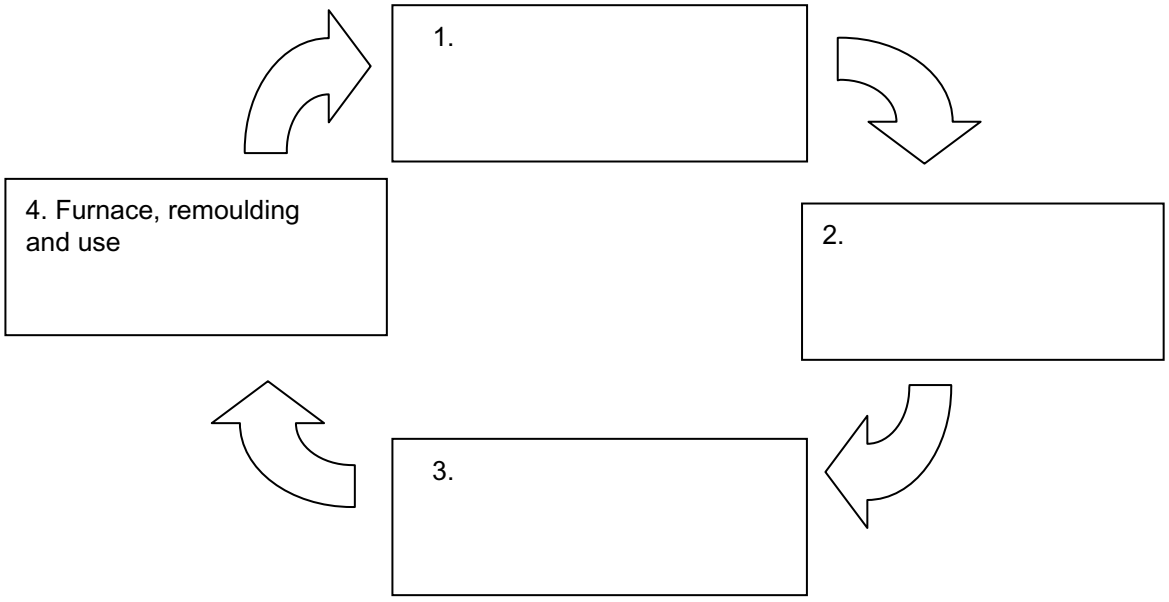
calcium : hydrogen : aluminium : carbon : silver

Hard water is caused by magnesium or _____ compounds.

Nano-sized particles of _____ are used in sterilising sprays.

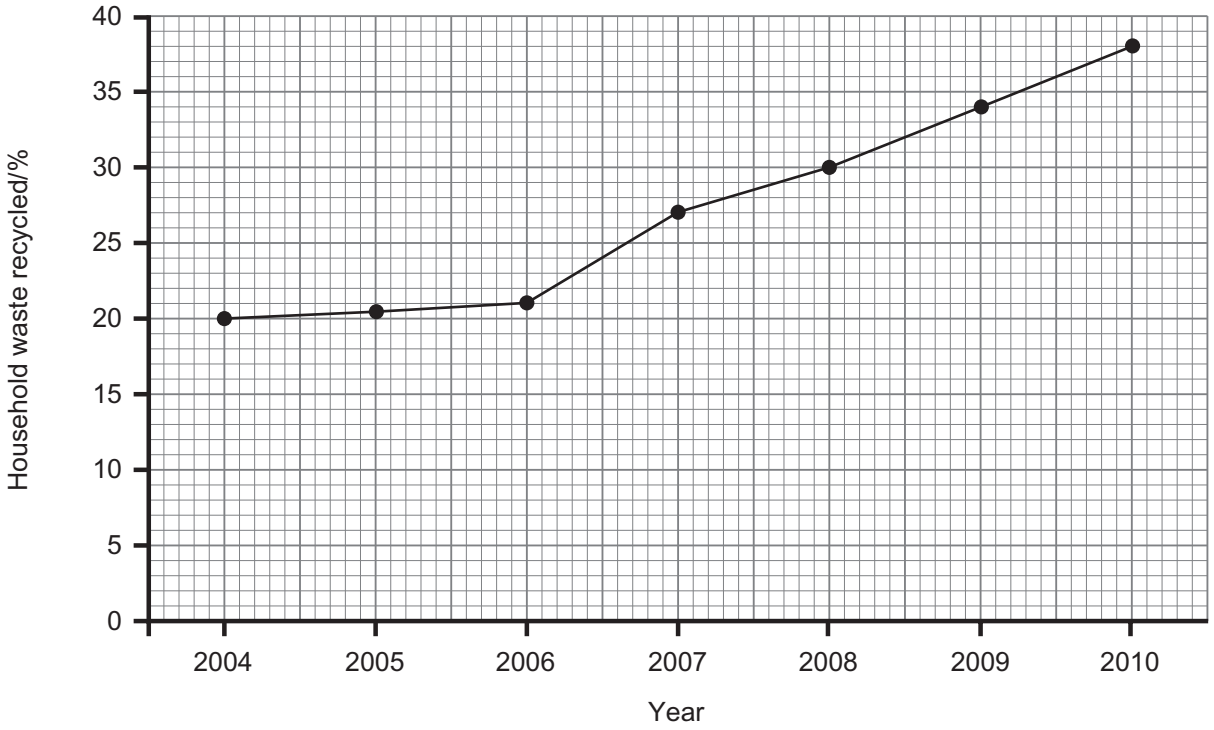
Coal is a fossil fuel that is mainly made of _____. [3]

(b) Complete the following diagram showing the steps in recycling glass.



[3]

6 The graph below shows the percentage of household waste in Northern Ireland that has been recycled over seven years.



Use the graph and your knowledge about recycling to answer the following questions.

Examiner Only	
Marks	Remark

(a) Calculate the increase in the percentage of waste recycled between 2004 and 2010.
(Show your working out.)

_____ % [2]

(b) Suggest the year that local councils first provided recycling bins to households. Explain your answer.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

7 Some students compared the reactivity of four metals (cobalt, iron, copper and magnesium) by adding a small amount of each to sulfate solutions of the other metals. If there was a reaction they used a tick (✓), for no reaction they used (✘).

The results are shown below.

Solution / Metal	Cobalt sulfate	Iron sulfate	Copper sulfate	Magnesium sulfate
Cobalt		✘	✓	✘
Iron	✓		✓	✘
Copper	✘	✘		✘
Magnesium	✓	✓	✓	

(a) Use the information in the table and your knowledge to answer the following questions.

(i) Which metal is the most reactive? _____ [1]

(ii) Which metal is the least reactive? _____ [1]

(iii) Give **two** observations you would make when magnesium is added to copper sulfate solution.

1. _____

_____

2. _____

_____ [2]

(b) Complete the word equation for the reaction of magnesium with iron sulfate.

magnesium + iron sulfate ⟶ [ ] + [ ]

[2]

(c) Elements and compounds can be represented by chemical symbols, but they must be written correctly. Give the correct formula for the compounds copper sulfate and magnesium chloride.

(You may find your Data Leaflet helpful.)

Circle the correct answers.

(i) copper sulfate

$CuSO_4$ **CoSu** **$CuSO_2$** **$CUSO_4$** [1]

(ii) magnesium chloride

MGCl **$Mgcl_2$** **MC** **$MgCl_2$** [1]

Examiner Only	
Marks	Remark

8 The table below shows some information about the elements that are found in Period 3 of the Periodic Table.

Name of element	Sodium	Magnesium	Aluminium	Silicon	Phosphorus	Sulfur	Chlorine	Argon
Symbol	Na	Mg	Al	Si	P	S	Cl	Ar
Atomic number	11	12	13	14	15	16	17	18
Melting point/°C	98	639	660	1410	44	113	–101	–189
Boiling point/°C	883	1090	2467	2680	280	445	–35	–186
Metallic character	Metal	Metal	Metal	Semi-metal	Non-metal	Non-metal	Non-metal	Non-metal

Use this information and your knowledge to answer the following questions.

Examiner Only	
Marks	Remark

(a) Name the **metal** which has the highest melting point.

_____ [1]

(b) Describe the trend in the metallic character across Period 3.

_____

_____ [1]

(c) Name an element from the table that is a **gas** at room temperature (25 °C).

_____ [1]

(d) Name the element which is an **alkali metal**.

_____ [1]

(e) What is the electronic configuration of the **semi-metal**?

Circle the correct answer.

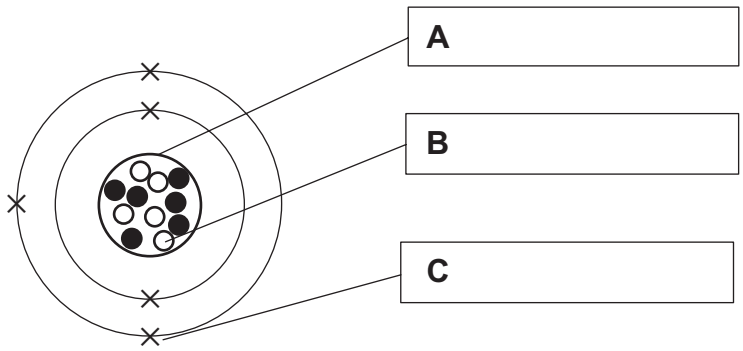
2.8.4 : **2.4.8** : **2.8.6** [1]

(f) Sodium reacts with chlorine to form the compound sodium chloride. What is the formula for **sodium chloride**?

_____ [1]

Examiner Only	
Marks	Remark

9 The diagram shows an atom of boron.



(a) Name the parts labelled **A**, **B** and **C** on the diagram above. [3]

(b) A fluorine atom has nine electrons.

In the space below draw a diagram to show how all the electrons are arranged in an atom of fluorine.

[2]

(c) What is meant by the term **atomic number**?

_____

_____ [1]

Examiner Only	
Marks	Remark

(d) The table below contains information about the structure of four elements **W**, **X**, **Y** and **Z**.

Element	Number of protons	Number of neutrons	Number of electrons
W	2	2	2
X	11	12	11
Y	20	20	20
Z	8	8	8

(You may find your Data Leaflet helpful.)

(i) Calculate the mass number of element **Y**.

_____ [1]

(ii) Name the element **X**.

_____ [1]

(iii) Which element (**W**, **X**, **Y**, **Z**) has six electrons in its outer shell?

_____ [1]

(iv) Which element (**W**, **X**, **Y**, **Z**) is a noble gas?

_____ [1]

Examiner Only

Marks	Remark

10 Flame tests can be used to identify the metal in a compound.

Explain how you would carry out a flame test experiment on solutions of potassium chloride and sodium chloride.

Your answer should include:

- any safety precautions
- the results you would expect to see

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

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Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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