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General Certificate of Secondary Education 2015–2016

# Science: Single Award

Unit 2 (Chemistry)

**Foundation Tier** 



[GSS21]

\*GSS21\*

## **THURSDAY 19 MAY 2016, MORNING**

TIME

1 hour.

### **INSTRUCTIONS TO CANDIDATES**

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in blue or black ink only. **Do not write with a gel pen.** 

Answer all eleven questions.

#### **INFORMATION FOR CANDIDATES**

The total mark for this paper is 60.

Quality of written communication will be assessed in Question 7.

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 included in this question paper.



1 (a) Given below are some hazard symbols and their names. Using lines, match each symbol to its name.

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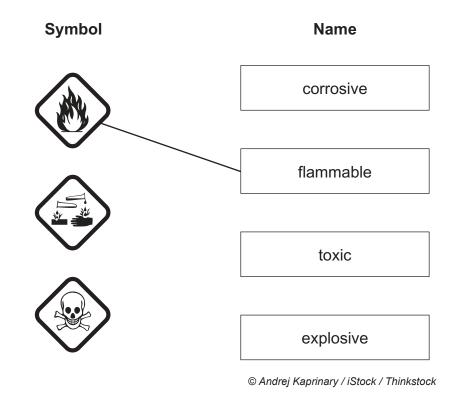
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One has been done for you.



**(b)** Given below is information about three household substances. Complete the table.

Choose from:

citric acid : ethanoic acid : sodium hydroxide

Household substance	Chemical name
cleaning products	ammonia
oven cleaner	
vinegar	

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2	(-)	Commiste the follow	.i	-:I	
2	(a)	Complete the follow	ving sentences about crude	OII.	
		Crude oil is a fossil	fuel. It is formed from plants	and animals that died	
		millions of years ag	o. Crude oil is a	of many	
		different hydrocarbo	ons. Hydrocarbons are comp	oounds that contain only the	
		·		·	[3]
		elements	and		[3]
	(b)	•	ed into different chemicals babout the different fractions	by fractional distillation. Comp of crude oil and their uses.	lete
		Choose from:			
		noroffin	bitumen	notrol	
		paraffin	bitumen	petrol	
		© Science Photo Library	Naphtha used for making of Diesel used as fuel in cars  Fuel oil used for central he	used as fuel in cars chemicals used for fuel in jet engines and lorries	[2]
	(0)		rugen each fraction allows th	nom to be congreted using th	•
	(C)		ween each fraction allows to ve? Circle the correct answe	nem to be separated using the er.	9
		melting point	: freezing point	: boiling point	[1]
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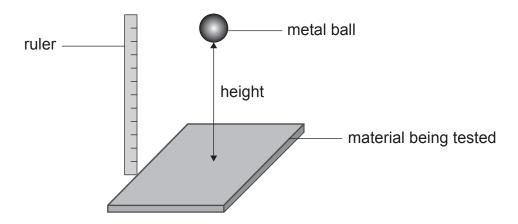
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**3** A student investigated the strength of four different materials using the apparatus shown below.



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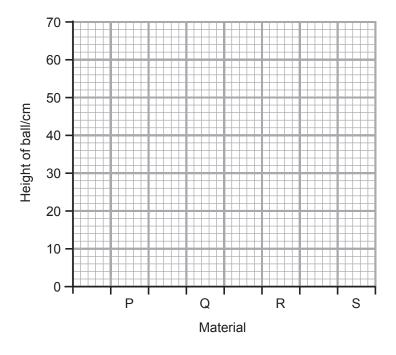
The height the ball was dropped from was increased until the material cracked when hit.

The results are shown below.

Material	Height of ball/cm
Р	44
Q	32
R	65
S	24



(a) Use the information in the table to complete the bar chart below.



(b) Which material (P, Q, R or S) is the strongest?

\_\_\_\_\_[1]

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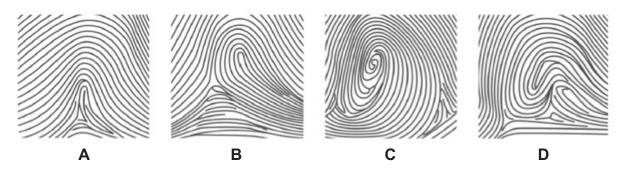
(c) Give two things the student needed to do to make this investigation a fair test.

1. \_\_\_\_\_

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4 Four types of fingerprints used by forensic scientists are shown below.



© GCSE Science Single Award for CCEA: Foundation and Higher Tier by James Napier, Alyn McFarland and Roy White. (ISBN: 9781444195729) "Reproduced by permission of Hodder Education".

(a)	Which	of the	fingerprints	( <b>A</b> ,	В,	C	or <b>C</b>	)	is:
-----	-------	--------	--------------	--------------	----	---	-------------	---	-----

- 1. an 'arch' type? \_\_\_\_\_\_
- 2. a 'whorl' type? \_\_\_\_\_

[2]

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- **(b)** Forensic scientists also use flame tests. The steps to carry out a flame test are shown below but they are **not** in the correct order.
  - **W** Then dip the flame test rod into the test material and put into the blue Bunsen flame.
  - X Clean the flame test rod by dipping it into acid and heating it in a blue Bunsen flame.
  - Y Repeat the cleaning process until there is no colour change.
  - **Z** Record the colour of the flame produced.

Using the letters W, X, Y and Z, give the correct order.

Order		[0]
		171
Oluci		141



(c) A flame test is used to identify the metal ion present in a substance by producing a colour in the Bunsen flame.

Complete the table below.

Metal ion	Flame colour
copper	blue-green
potassium	
	orange/yellow

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**5** The table below shows some properties of five different plastics.

Plastic	Properties					
Α	tough, fairly hard, light, good water resistance					
В	tough, heavy, not flexible, good electrical insulator					
С	tough, not flexible, light, good resistance to chemicals, good electrical insulator					
D	shatters easily, hard, light, good resistance to chemicals					
E	tough, soft, light, very flexible, good resistance to chemicals, good electrical insulator					

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Use this information to answer the following questions.

(a)	Which plastic ( <b>A</b> , <b>B</b> , <b>C</b> , <b>D</b> or <b>E</b> ) would be best for making a toy boat? Give the <b>most</b> important reason for your choice.	
		[2]

(b)	Which plastic ( <b>A</b> , <b>B</b> , <b>C</b> , <b>D</b> or <b>E</b> ) would be best for making a container for carrying acid? Explain your choice.	Э
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Looming	(c)	Low density polythene is used to make plastic shopping bags and to cover electrical cables.
GE Researching I		Suggest which of the plastics ( <b>A</b> , <b>B</b> , <b>C</b> , <b>D</b> or <b>E</b> ) could be low density polythene.
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**6** Below is an outline of the Periodic Table showing the position of some elements.

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	_	Α												
В											С			
									D					Е

You may find your Data Leaflet helpful to answer the questions below.

- (a) Place an X in any position where you would find an alkaline earth metal. [1]
- (b) Which element (A, B, C, D or E) is:
  - 1. sodium? \_\_\_\_\_
  - 2. a noble gas? \_\_\_\_\_
  - 3. in the same Group as boron? \_\_\_\_\_\_[3]
- (c) Complete the following sentence to describe a **trend** in the Periodic Table.

The metallic character of the elements \_\_\_\_\_\_ from left to right across the Periodic Table. [1]



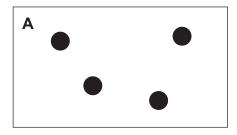
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۲O	ui answei should include.
•	an explanation of the process; the name of the scale used to measure earthquakes and what the readings tell us about earthquakes.
ln inc	this question you will be assessed on your written communication skills cluding the use of specialist scientific terms.

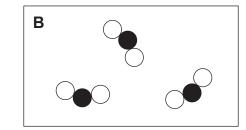
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8 Below are some particle diagrams. They represent elements or compounds.





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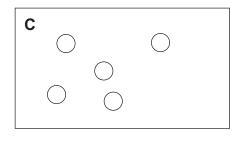
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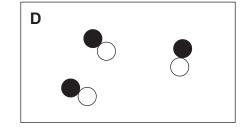
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(a) Which of the diagram(s) (A, B, C or D) show elements? Explain your answer.

Diagram(s)

[2]

**(b)** Suggest which diagram (**A**, **B**, **C** or **D**) could represent the compound carbon monoxide (CO).

\_\_\_\_\_[1]



9 (a) The table below gives information about five hydrocarbon molecules.

Molecule	Number of carbon atoms	Melting point/°C	Boiling point/°C	Energy released per gram when burned/kJ
methane	1	<b>–</b> 182	- 162	56
ethane	2	<b>–</b> 183	- 89	52
propane	3	<b>–</b> 188	-42	51
butane	4	<b>– 138</b>	0	50
pentane	5	<b>– 130</b>	36	49

(i) Calculate the energy released when 100 grams of propane is burned.

\_\_\_\_\_ kJ [1]

(ii) Calculate the difference between the melting points of the molecules with the most and least carbon atoms.

\_\_\_\_\_°C [1]

(iii) Describe the trend between the number of carbon atoms and a molecule's boiling point.

\_\_\_\_\_\_[1]

**(b)** Complete the word equation below for the burning of propane.

propane +  $\longrightarrow$  carbon dioxide + water [1]

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10 The table below gives information about three different indicators and their colours at different pH values.

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Indicator pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14
methyl purple	Р	Р	Р	Р	G	G	G	G	G	G	G	G	G	G
thymol blue	Υ	Υ	Υ	Υ	Υ	Y	Υ	Υ	В	В	В	В	В	В
indigo carmine	В	В	В	В	В	В	В	В	В	В	В	Υ	Υ	Υ

Key:	B = blue	G = green	P = purple	Y = yellow
_		0		,

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

- (a) What colour is:
  - 1. methyl purple indicator in a strong acid?
  - 2. indigo carmine indicator in sodium hydroxide? \_\_\_\_\_\_ [2]
- **(b)** A scientist is going to add an acid to an alkali. He needs to stop adding the acid when the pH value is 7.
  - (i) What name is given to this **type** of reaction?

    [1]
  - (ii) Explain fully why the scientist would **not** find any of the indicators in the table useful for his experiment.

[2]



ı	indicator from red cabbage.	
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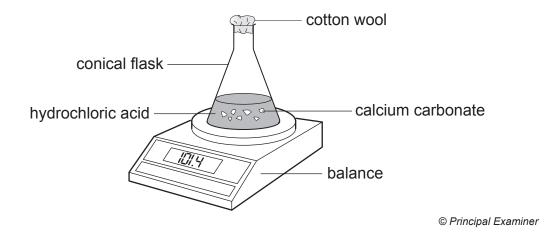
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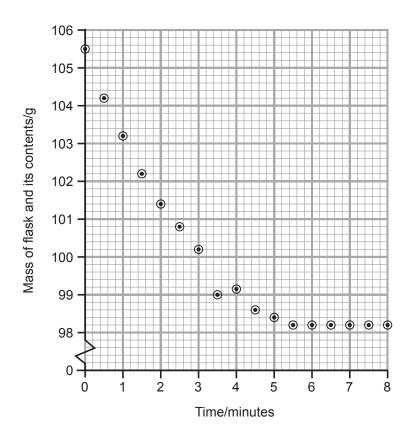


**11** A student investigated the amount of carbon dioxide released during the reaction between hydrochloric acid and calcium carbonate. He used the apparatus shown below.

Remarks



The student measured the mass of the flask and its contents for 8 minutes. The results are shown in the graph below.





(a)	Complete the graph opposite by adding a curve of best fit ignoring any
	anomalous results. [1]
(b)	Describe fully the trend shown in the graph.
	[2]
(c)	Complete the word equation for this reaction.
hydrock acid	
	[2]
(d)	(i) Name the chemical used to test for carbon dioxide.
	[1]
	(ii) Describe the colour change during this test for carbon dioxide.
	[2]
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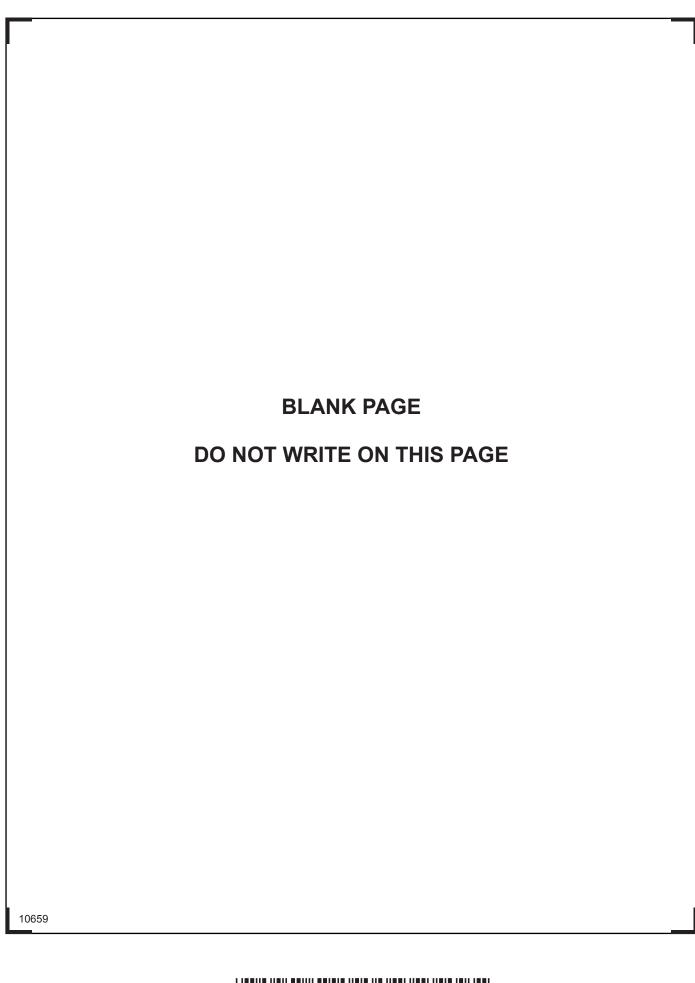
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