



Rewarding Learning

General Certificate of Secondary Education
2014–2015

Centre Number

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Candidate Number

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Science: Single Award

Unit 2 (Chemistry)
Higher Tier



[GSS22]

WEDNESDAY 25 FEBRUARY 2015, MORNING

TIME

1 hour 15 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 ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.
Quality of written communication will be assessed in Questions **4** and **10(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 included for your use.

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

- 1 (a) Stomach ache can be caused by too much hydrochloric acid in the stomach. Indigestion tablets can be used to reduce the amount of acid in the stomach as they contain calcium carbonate.



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- (i) Complete the word equation for this reaction.



[2]

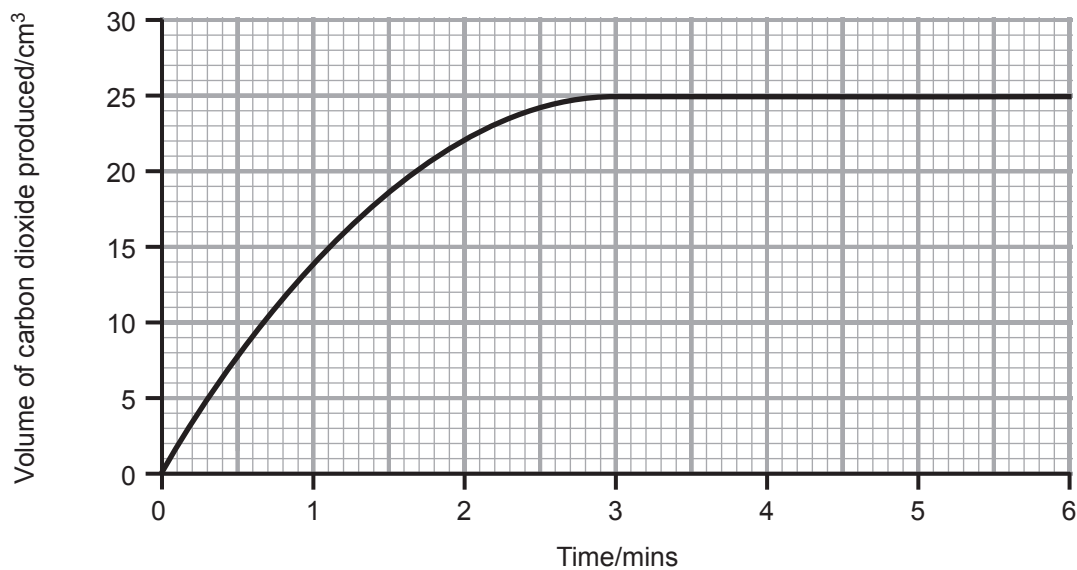
- (ii) What name is given to this type of reaction?

_____ [1]

Examiner Only	
Marks	Remark

Some hydrochloric acid is added to excess calcium carbonate.
The graph below shows how the volume of carbon dioxide produced changes with time.

Examiner Only	
Marks	Remark



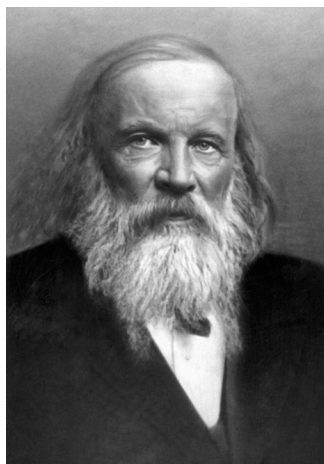
(b) Describe fully the trend shown by these results.

[2]

(c) Describe the test for carbon dioxide.

[2]

- 2 In 1869 the scientist pictured below put the sixty known elements into a Periodic Table.



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- (a) Name the scientist pictured above.

_____ [1]

- (b) Name the unreactive **group** of elements not included in his table because they had not been discovered by 1869.

_____ [1]

- (c) Sodium is in Group 1 of the modern Periodic Table.

- (i) Complete the table below to show the number of each different particle in a sodium atom.

You may find your Data Leaflet helpful.

	Number of protons	Number of neutrons	Number of electrons
sodium (Na)			

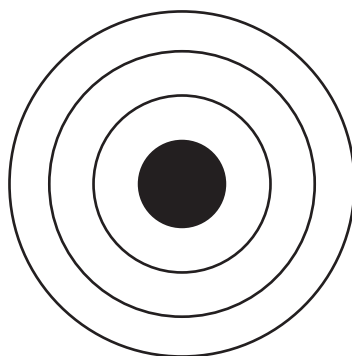
[3]

Examiner Only

Marks

Remark

- (ii) Complete the diagram below to show the electronic structure of a sodium atom.



sodium atom

[1]

- (d) When sodium is added to water there is a violent reaction during which it moves on the water surface.

- (i) Give **two** other observations during this reaction.

1. _____

2. _____ [2]

- (ii) Name the alkaline solution formed during this reaction.

_____ [1]

- (e) Potassium and sodium are both in Group 1 of the Periodic Table. Give **two** reasons why these metals are in the same Group.

1. _____

2. _____ [2]

Examiner Only

Marks

Remark

3 (a) Some students investigated the hardness of water in four towns (W, X, Y and Z). The following method was used for each town.

1. Measure 25 cm³ of water and add to a conical flask.
2. Add 1 cm³ of soap solution and shake well.
3. Repeat step 2 until a permanent lather forms.
4. Record the volume of soap solution used.
5. Boil another 25 cm³ of water and repeat steps 1 to 4.

The results are shown below.

Town	Volume of soap solution/cm ³	
	before boiling	after boiling
W	26	1
X	6	6
Y	24	17
Z	1	1

(i) Name a piece of apparatus the students could have used to measure 1 cm³ of soap solution.

_____ [1]

(ii) Suggest **one** way in which the reliability of the results could have been improved.

_____ [1]

(b) What can you conclude about the hardness of the water from Town Y? Explain your answer.

 _____ [2]

(c) Apart from using more soap, give **one** disadvantage of using hard water.

_____ [1]

Examiner Only	
Marks	Remark

- 5 Steel is a common building material made from iron and carbon. Other metals can be added to make alloys of steel.

The table shows some information about iron and steel.

Material	What it contains	Properties	Relative cost
pure iron	iron	soft and weak, rusts easily	low
steel (low carbon)	iron and 0.1% carbon	harder and stronger than iron and easily shaped, rusts easily	low
steel (high carbon)	iron and 1% carbon	harder but more brittle than low carbon steel, rusts easily	low
stainless steel	iron and 18% chromium and 10% nickel	hard and very resistant to rusting	high
titanium steel	iron and 2% titanium	hard and able to withstand very high temperatures	very high
manganese steel	iron and 14% manganese	extremely hard	very high

Use the information in the table to answer the questions that follow.

- (a) Name the alloy of steel that contains the lowest percentage of iron.

_____ [1]

- (b) Titanium steel is used to make parts of a car engine. Give **one** reason why it is suitable for this use.

_____ [1]

Examiner Only

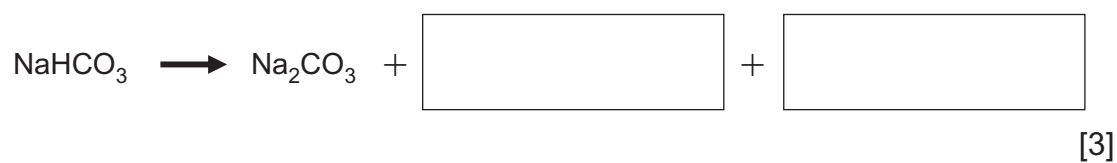
Marks Remark

- 7 Baking soda contains sodium hydrogencarbonate. When it is used in baking cakes, the sodium hydrogencarbonate thermally decomposes.



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- (a) Complete the balanced symbol equation for this reaction.



- (b) Explain fully why this reaction is important in baking cakes.

[2]

Examiner Only

Marks Remark

8 (a) The table below gives information about the colours of four indicators made from plants.

Indicator \ pH	1	2	3	4	5	6	7	8	9	10	11	12
Blueberry	R	R	V	V	G	G	G	G	G	G	G	G
Red Cabbage	P	P	P	V	V	B	B	B	G	G	Y	Y
Grape Juice	R	R	R	R	R	R	G	G	G	G	G	G
Litmus Solution	R	R	R	R	R	R	V	B	B	B	B	B

Key

P	Pink
R	Red
Y	Yellow
G	Green
B	Blue
V	Violet

Examiner Only	
Marks	Remark

(i) What colour would the blueberry indicator be in hydrochloric acid?

_____ [1]

(ii) Name the indicator which would allow you to distinguish between magnesium hydroxide and sodium hydroxide.

_____ [1]

(b) A student wants to add an acid to an alkali and stop at pH7. Name the indicator that they should use. Explain your answer.

 _____ [2]

9 Some alkanes are hydrocarbon fuels.

(a) Complete the table below.

Name of alkane	Molecular formula	Structural formula
	CH_4	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array}$
propane	C_3H_8	
butane		$\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$

[3]

(b) Name the element that alkanes react with when they burn.

_____ [1]

(c) Name the process that makes many small molecules, such as propene, into longer chain molecules, such as polypropene.

_____ [1]

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