



General Certificate of Secondary Education
2013–2014

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]



TUESDAY 25 FEBRUARY 2014, MORNING

Centre Number

71

Candidate Number

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.

Quality of written communication will be assessed in Question **9(b)**.

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) Given below are some materials and their uses.

Using lines, match each material to **one** of its main uses.
The first has been done for you.

Material	Use
polythene	bridges
cotton	clothing
glass	windows
iron	aeroplanes
	plastic bags

[3]

(b) Plastic is used to cover electrical wiring. What properties make plastic suitable for this use?

Circle **two** correct answers.

insulator **conductor** **flexible** **dense**

[2]

(c) Some materials produce new properties when their particle size is reduced.

What name is given to this type of material?

Choose from:

nanomaterial : **natural material** : **smart material**

_____ [1]

Examiner Only	
Marks	Remark

2 (a) Complete the table below about some household substances.

Substance	Chemical present	Acid or alkali
lemon juice		acid
	ethanoic acid	acid
Milk of Magnesia	magnesium hydroxide	

[3]

(b) Nicotine is found in cigarettes. It is a dangerous chemical. The hazard symbol below represents this danger.



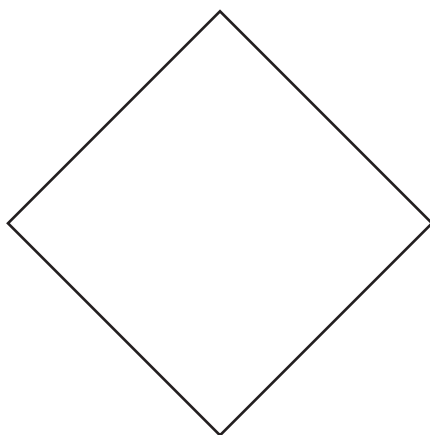
© Crown Copyright

Name this hazard symbol.

_____ [1]

(c) Oven cleaner contains a strong alkali which is corrosive.

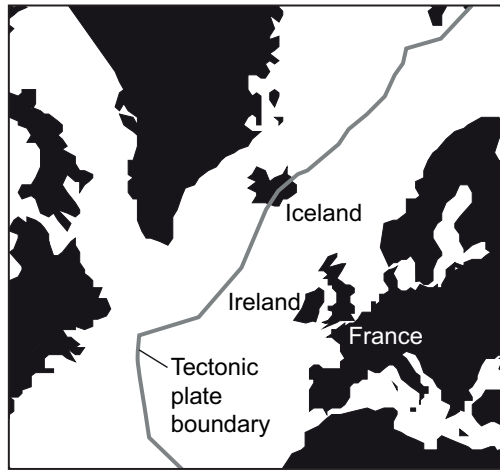
Complete the hazard symbol below to show what you would expect to see on a bottle of oven cleaner.



[1]

Examiner Only	
Marks	Remark

3 The map below gives some information about tectonic plates.

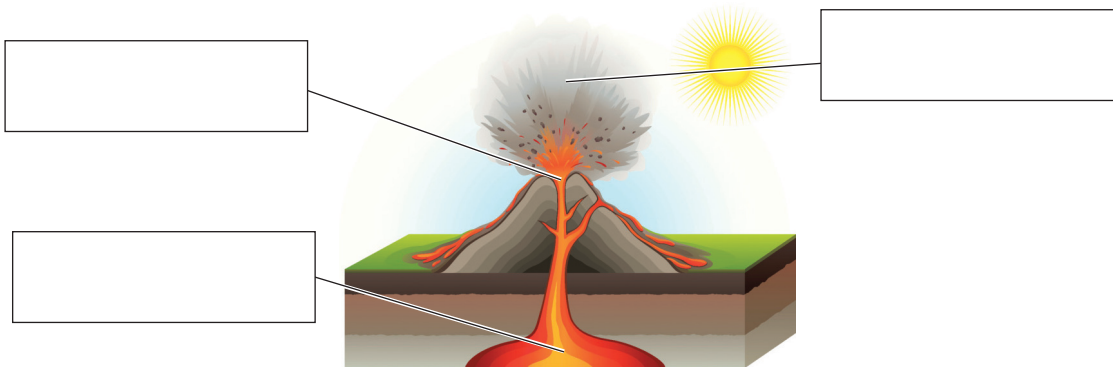


© CCEA

(a) Name the country, labelled above, where you would **most** expect a volcanic eruption to happen. Explain your answer.

_____ [2]

The diagram below shows a volcanic eruption.



© iStockphoto/Thinkstock

(b) Label the parts of the volcano shown above.

Choose from:

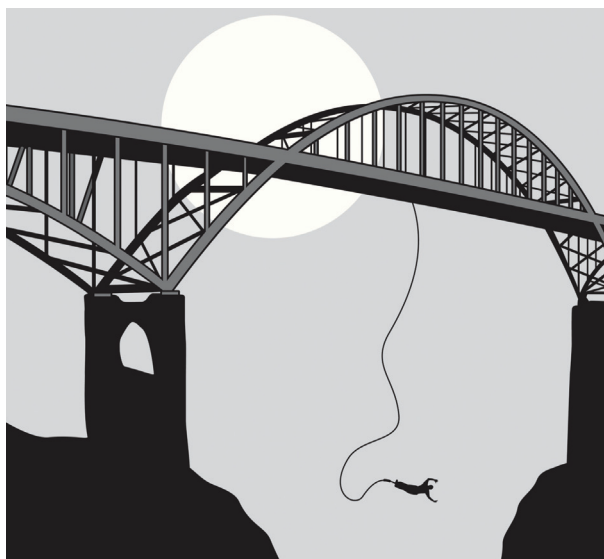
magma : lava : tectonic plate : dust and ash [3]

(c) Name the type of rock formed after a volcanic eruption.

_____ [1]

Examiner Only	
Marks	Remark

- 4 The picture below shows a rope being used in a bungee jump. The rope needs to be strong and have some elasticity.



© iStockphoto/Thinkstock

Some information about polymers that could be used for the rope is given below.

Polymer	Melting point/ $^{\circ}\text{C}$	Effect of sunlight	Other properties	Cost per kg/ \pounds
nylon	220	easily damaged	strong and very elastic	0.6
polyester	260	no damage	strong and quite elastic	2.0
polypropene	160	no damage	strong and not elastic	0.3

Which polymer named in the table would be most suitable to make a bungee rope? Explain your answer.

Polymer _____ [1]

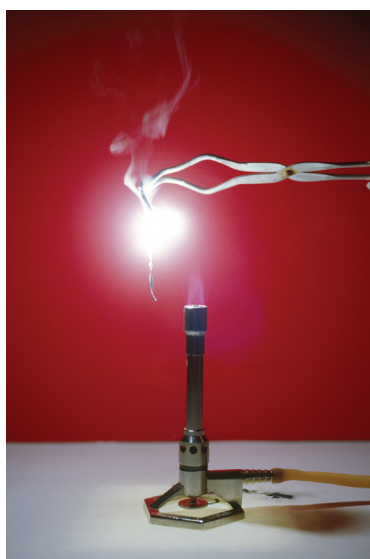
Explanation _____

_____ [2]

Examiner Only

Marks Remark

- 5 The photograph below shows the elements magnesium and oxygen reacting to form magnesium oxide.



© Charles D Winters/Science Photo Library

- (a) Below are some statements about magnesium. Tick (✓) the **two** statements that are correct.

You may find your Data Leaflet useful.

Statement	Tick (✓)
Magnesium is an alkali metal.	
Magnesium is an alkaline earth metal.	
Magnesium is a non-metal.	
Magnesium has an atomic number of 12.	
Magnesium has an atomic number of 24.	

[2]

- (b) Magnesium oxide is described as a compound. What is meant by the term compound?

_____ [2]

Examiner Only

Marks

Remark

(c) What is the chemical formula for magnesium oxide?

Circle the correct answer.



[1]

(d) Magnesium sulfate is another compound of magnesium. The chemical formula for magnesium sulfate is MgSO₄.

(i) How many different elements are in magnesium sulfate?

_____ [1]

(ii) How many atoms are represented in this formula?

_____ [1]

Examiner Only

Marks

Remark

6 The table below shows information about three different rocks.

	Limestone	Granite	Sandstone
Cost of quarrying	low	high	low
Usefulness as building material	good	good	good
Usefulness as a raw material for the chemical industry	very good	poor	poor
Ease of cutting it into shape	easy	difficult	easy
Effect of acid rain and weather	slowly reacts	no effect	very little effect

(a) Which **two** of the rocks named above are sedimentary rocks?

_____ and _____ [1]

(b) Which rock would be best to cut and use as garden paving slabs? Explain fully your answer.

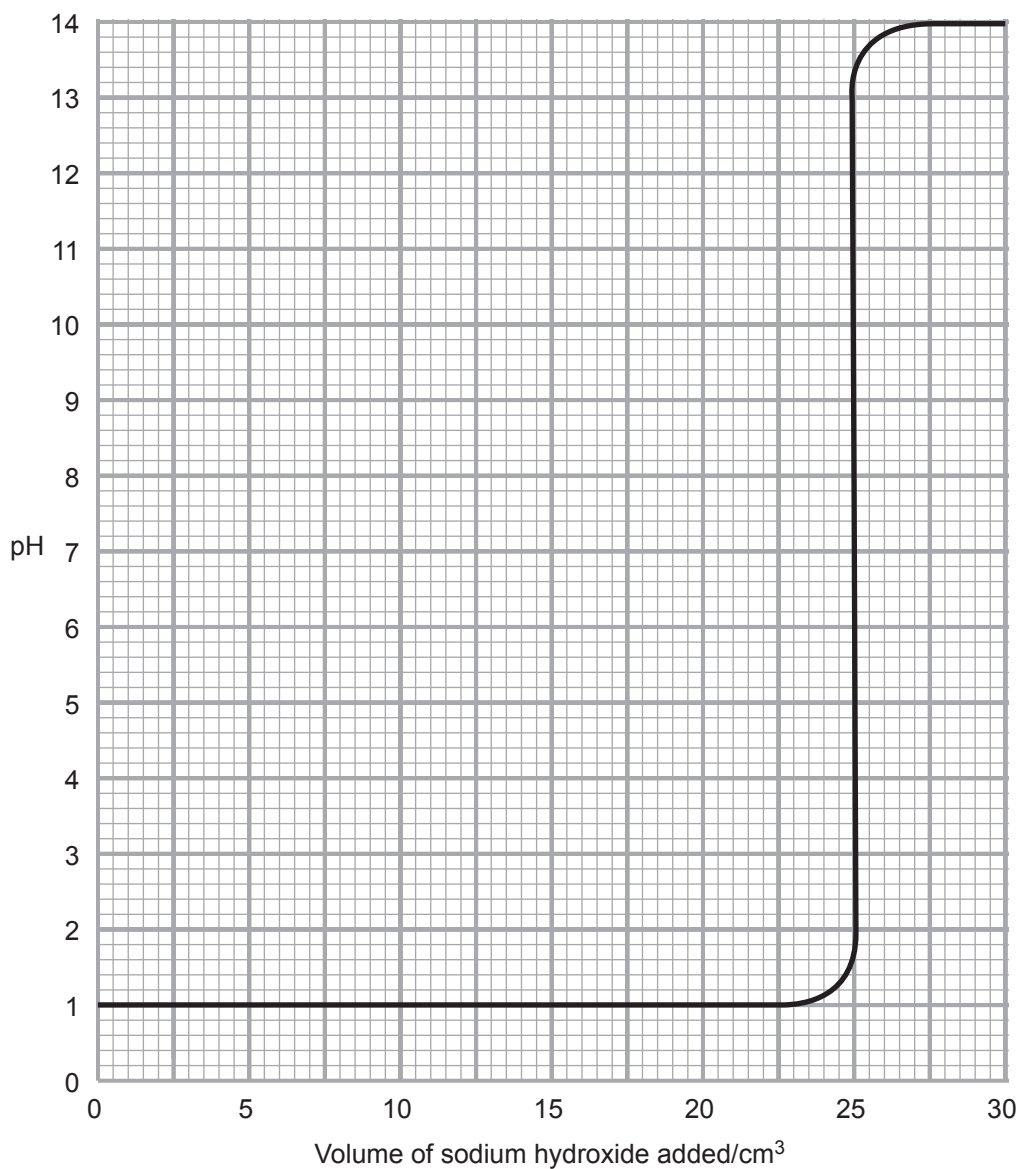
 _____ [3]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

- 7 A student was asked to investigate how the pH changed during the reaction between hydrochloric acid and sodium hydroxide. Sodium hydroxide solution was added to 25 cm³ of dilute hydrochloric acid and the pH was recorded using a pH sensor.

The results are shown in the graph below.



(a) Use the graph to give:

- (i) the pH of the hydrochloric acid before adding sodium hydroxide.

_____ [1]

- (ii) the volume of sodium hydroxide required to neutralise the acid.

_____ cm³ [1]

Examiner Only

Marks Remark

(b) The student could also have investigated the pH change using universal indicator solution.

(i) What colour is universal indicator in a neutral solution?

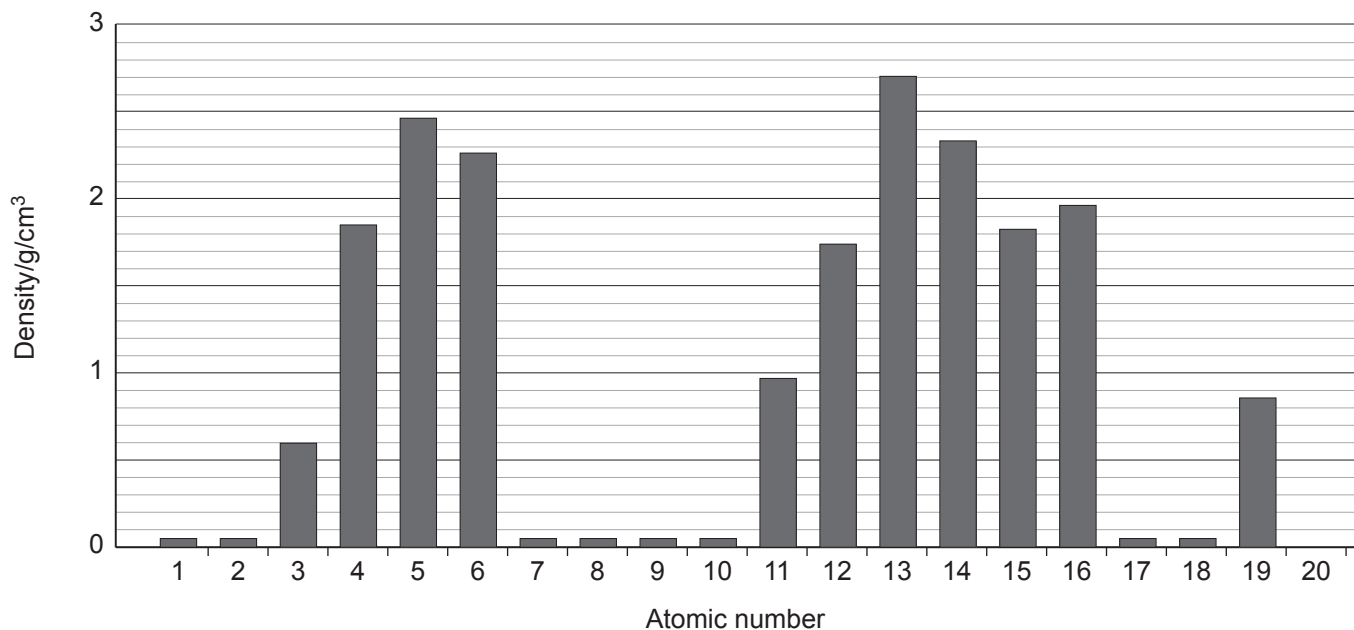
_____ [1]

(ii) Give **one** advantage of using a pH sensor rather than universal indicator in this experiment.

_____ [1]

Examiner Only	
Marks	Remark

- 8 Below is a graph showing the densities of the first nineteen elements of the Periodic Table.



Use the graph and your Data Leaflet to answer the following questions.

- (a) What is the density of the element with atomic number 3?

_____ g/cm³ [1]

- (b) Name the element with the highest density and state the group of the Periodic Table to which it belongs.

Name _____ Group _____ [2]

- (c) Suggest a value for the density of the element with atomic number 20.

_____ g/cm³ [1]

- (d) What do the elements with the lowest densities have in common?

Tick (✓) the correct answer.

They are all metals.

They are all gases.

They are all in the same group of the Periodic Table. [1]

Examiner Only	
Marks	Remark

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- 10 A student investigated the reaction between sodium hydrogencarbonate and hydrochloric acid. He used the apparatus shown below to measure the mass of the beaker and its contents for seven minutes. The reaction produces carbon dioxide.

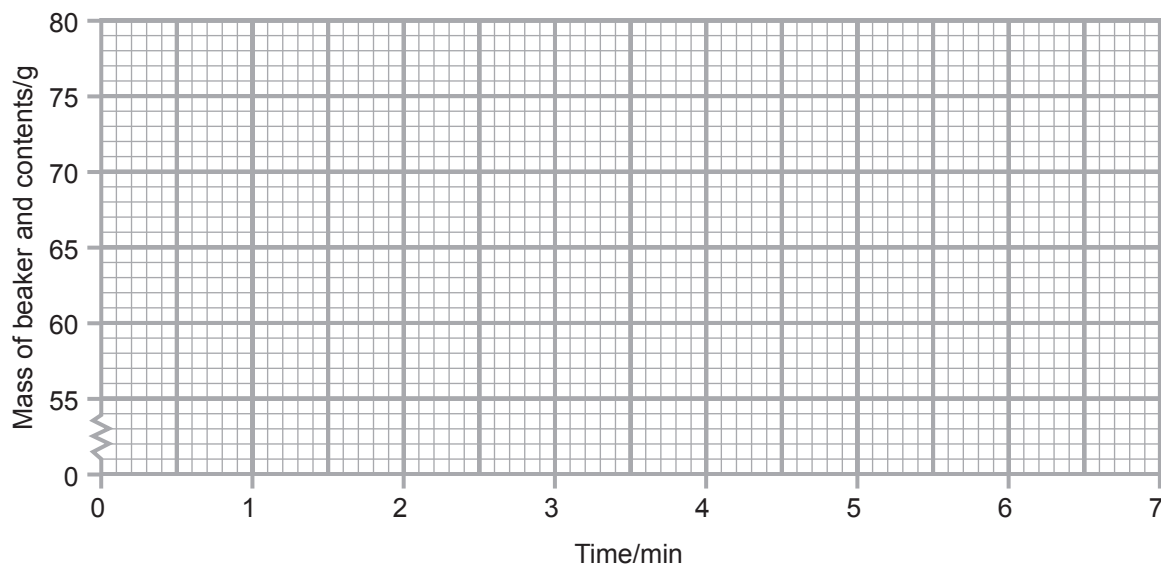


© Andrew Lambert Photography/Science Photo Library

His results are shown in the table.

Time/min	0	1	2	3	4	5	6	7
Mass of beaker and contents/g	80	69	64	61	59	58	58	58

- (a) On the grid below plot these points and draw a curve of best fit.



[3]

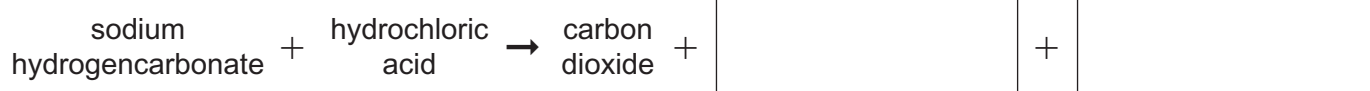
Examiner Only	
Marks	Remark

(b) How did the student know that the reaction was finished?

_____ [1]

Examiner Only	
Marks	Remark

(c) Complete the word equation for this reaction.



[2]

(d) Describe the chemical test used to identify carbon dioxide and include the result you would expect.

_____ [2]

(e) (i) Calculate the change in mass during this reaction.

_____ g [1]

(ii) Explain why the mass changed during the reaction.

_____ [1]

(f) The student repeats the experiment using weaker ethanoic acid rather than hydrochloric acid.

Describe **one** similarity and **one** difference that would be observed during the reactions of each of these acids with sodium hydrogencarbonate.

_____ [2]

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