



Rewarding Learning

General Certificate of Secondary Education  
2015–2016

Centre Number

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Candidate Number

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## Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

THURSDAY 19 MAY 2016, MORNING

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MV18

### Time

1 hour, plus your additional time allowance.

### 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.**

Complete in blue or black ink only.

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 at the end of each question 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. [2 marks]

One has been done for you.

**Symbol**

**Name**



corrosive



flammable



toxic

explosive

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

Complete the table. [2 marks]

Choose from:

**citric acid : ethanoic acid : sodium hydroxide**

| <b>Household substance</b> | <b>Chemical name</b> |
|----------------------------|----------------------|
| cleaning products          | ammonia              |
| oven cleaner               |                      |
| vinegar                    |                      |

2 (a) Complete the following sentences about crude oil.  
[3 marks]

Crude oil is a fossil fuel. It is formed from plants and animals that died millions of years ago. Crude oil is a \_\_\_\_\_ of many different hydrocarbons.

Hydrocarbons are compounds that contain only the elements \_\_\_\_\_ and \_\_\_\_\_.

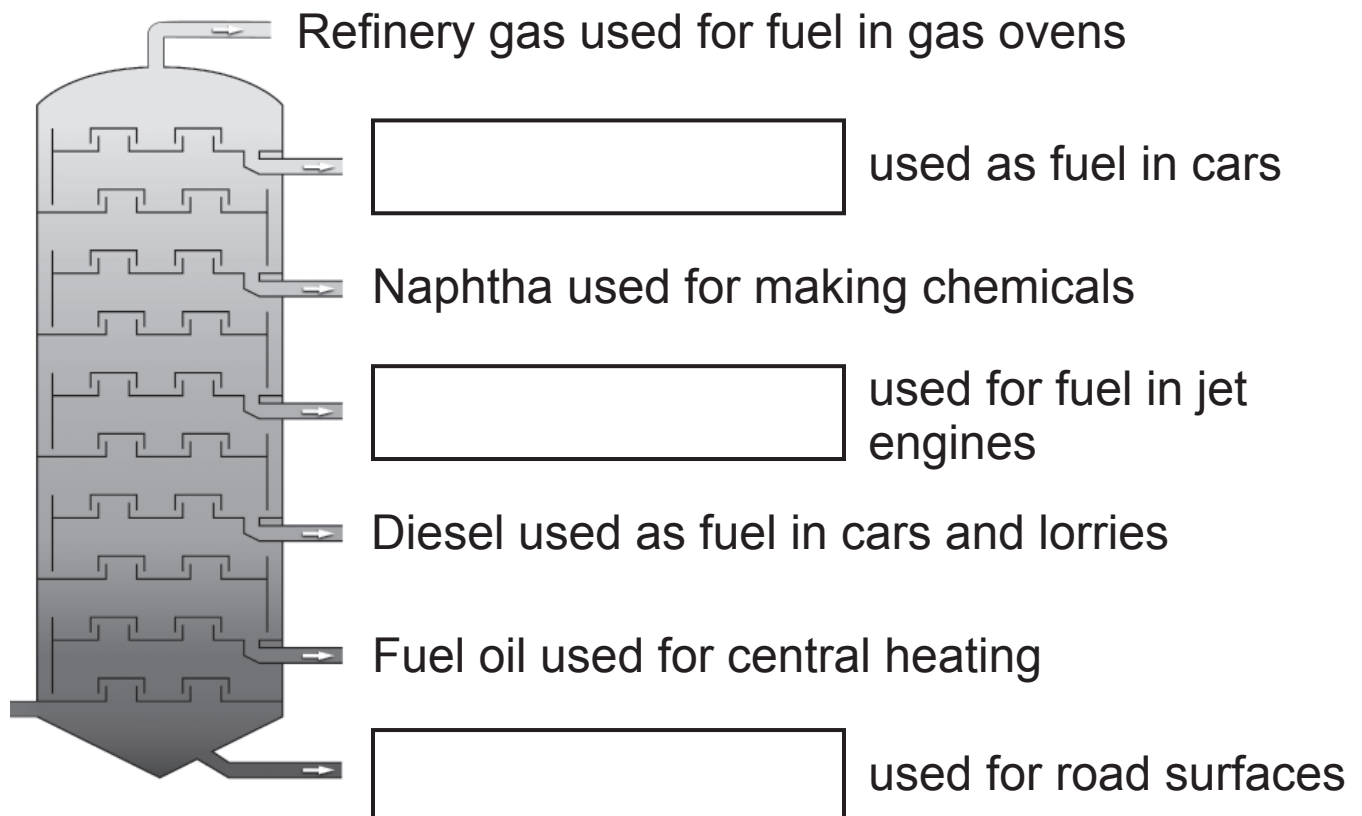
(b) Crude oil is separated into different chemicals by fractional distillation. Complete the diagram below about the different fractions of crude oil and their uses.  
[2 marks]

Choose from:

**paraffin**

**bitumen**

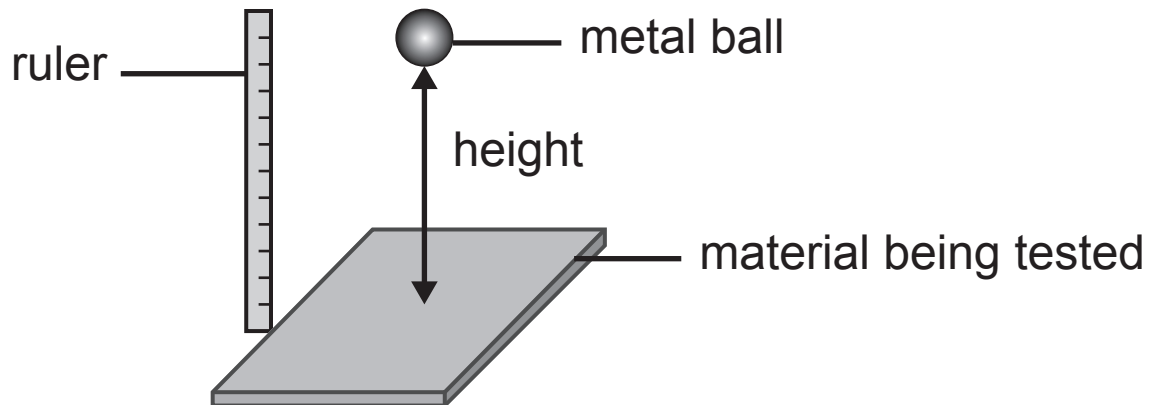
**petrol**



**(c)** What difference between each fraction allows them to be separated using the method shown above?  
Circle the correct answer. [1 mark]

**melting point : freezing point : boiling point**

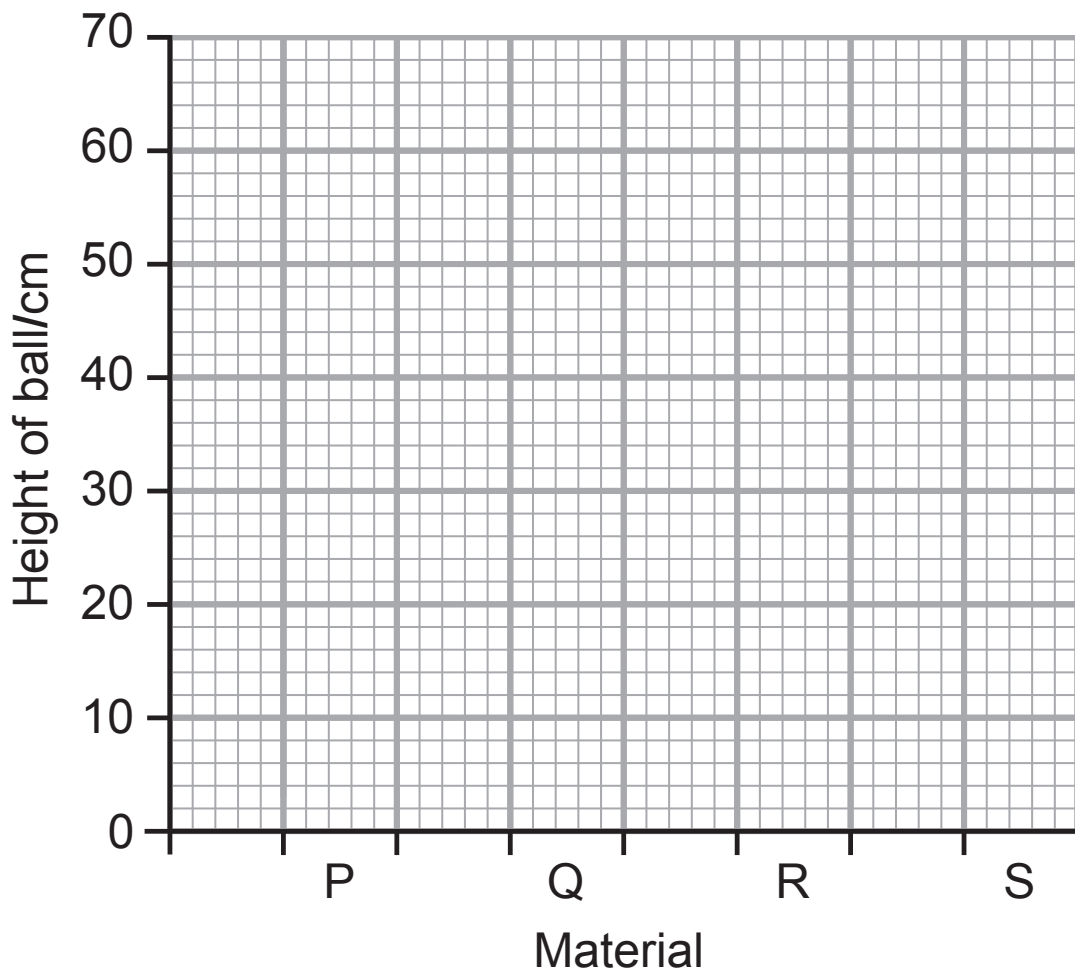
- 3 A student investigated the strength of four different materials using the apparatus shown below.



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 |
|----------|-------------------|
| P        | 44                |
| Q        | 32                |
| R        | 65                |
| S        | 24                |

(a) Use the information in the table to complete the bar chart below. [2 marks]



(b) Which material (P, Q, R or S) is the strongest? [1 mark]

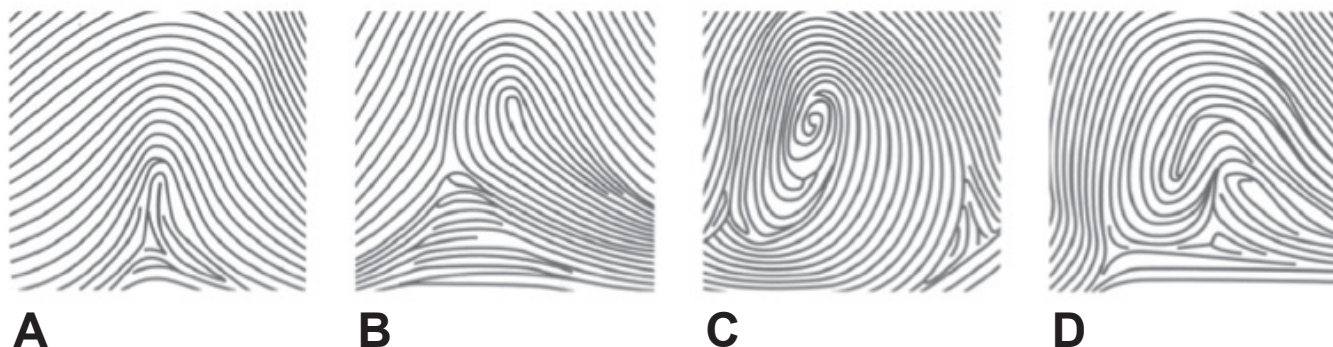
\_\_\_\_\_

(c) Give **two** things the student needed to do to make this investigation a fair test. [2 marks]

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

2. \_\_\_\_\_

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



(a) Which of the fingerprints (**A**, **B**, **C** or **D**) is: [2 marks]

1. an 'arch' type? \_\_\_\_\_

2. a 'whorl' type? \_\_\_\_\_

(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.  
[2 marks]

Order \_\_\_\_\_



(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. [2 marks]

| <b>Metal ion</b> | <b>Flame colour</b> |
|------------------|---------------------|
| copper           | blue-green          |
| potassium        |                     |
|                  | orange/yellow       |

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

| Plastic | Properties                                                                                 |
|---------|--------------------------------------------------------------------------------------------|
| A       | tough, fairly hard, light, good water resistance                                           |
| B       | tough, heavy, not flexible, good electrical insulator                                      |
| C       | 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 |

Use this information to answer the following questions.

(a) Which plastic (**A**, **B**, **C**, **D** or **E**) would be best for making a toy boat?

Give the **most** important reason for your choice.

[2 marks]

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(b) Which plastic (**A**, **B**, **C**, **D** or **E**) would be best for making a container for carrying acid? Explain your choice.

[2 marks]

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**(c)** Low density polythene is used to make plastic shopping bags and to cover electrical cables. Suggest which of the plastics (**A**, **B**, **C**, **D** or **E**) could be low density polythene. [1 mark]

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- 6 Below is an outline of the Periodic Table showing the position of some elements.

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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 mark]

- (b) Which element (**A**, **B**, **C**, **D** or **E**) is: [3 marks]

- sodium? \_\_\_\_\_
- a noble gas? \_\_\_\_\_
- in the same Group as boron? \_\_\_\_\_

- (c) Complete the following sentence to describe a **trend** in the Periodic Table. [1 mark]

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

7 Describe why and how earthquakes occur. [6 marks]

Your answer should include:

- an explanation of the process;
- the name of the scale used to measure earthquakes and what the readings tell us about earthquakes.

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

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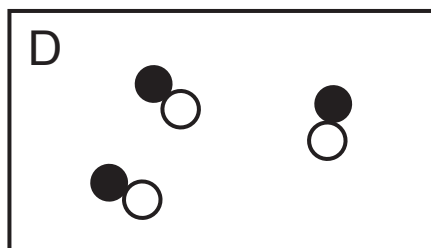
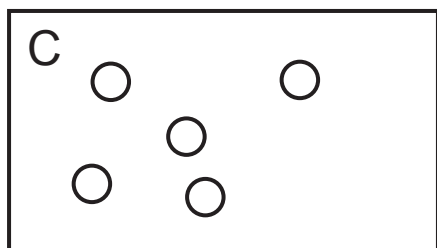
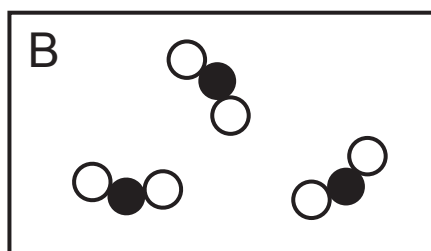
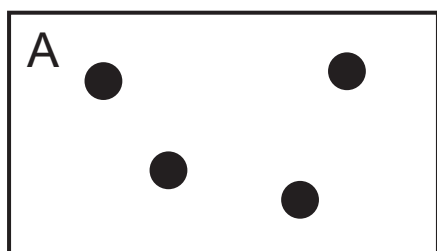
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8 Below are some particle diagrams. They represent elements or compounds.



(a) Which of the diagram(s) (**A**, **B**, **C** or **D**) show elements?  
Explain your answer. [2 marks]

Diagram(s) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(b) Suggest which diagram (**A**, **B**, **C** or **D**) could represent the compound carbon monoxide (CO). [1 mark]

\_\_\_\_\_

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**(Questions continue overleaf)**

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

| Molecule | Number of carbon atoms | Melting point/ $^{\circ}\text{C}$ | Boiling point/ $^{\circ}\text{C}$ | Energy released per gram when burned/kJ |
|----------|------------------------|-----------------------------------|-----------------------------------|-----------------------------------------|
| methane  | 1                      | - 182                             | - 162                             | 56                                      |
| ethane   | 2                      | - 183                             | - 89                              | 52                                      |
| propane  | 3                      | - 188                             | - 42                              | 51                                      |
| butane   | 4                      | - 138                             | 0                                 | 50                                      |
| pentane  | 5                      | - 130                             | 36                                | 49                                      |

- (i) Calculate the energy released when 100 grams of propane is burned. [1 mark]

\_\_\_\_\_ kJ

- (ii) Calculate the difference between the melting points of the molecules with the most and least carbon atoms. [1 mark]

\_\_\_\_\_  $^{\circ}\text{C}$



(iii) Describe the trend between the number of carbon atoms and a molecule's boiling point. [1 mark]

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(b) Complete the word equation below for the burning of propane. [1 mark]

propane +  → carbon dioxide + water

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

| Indicator \ pH | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| methyl purple  | P | P | P | P | G | G | G | G | G | G  | G  | G  | G  | G  |
| thymol blue    | Y | Y | Y | Y | Y | Y | Y | Y | B | B  | B  | B  | B  | B  |
| indigo carmine | B | B | B | B | B | B | B | B | B | B  | B  | Y  | Y  | Y  |

**Key:** B = blue G = green P = purple Y = yellow

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

**(a)** What colour is: [2 marks]

1. methyl purple indicator in a strong acid?

\_\_\_\_\_

2. indigo carmine indicator in sodium hydroxide?

\_\_\_\_\_

(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 mark]

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

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(c) Most indicators are made from plants. Describe how you would obtain an indicator from red cabbage.  
[3 marks]

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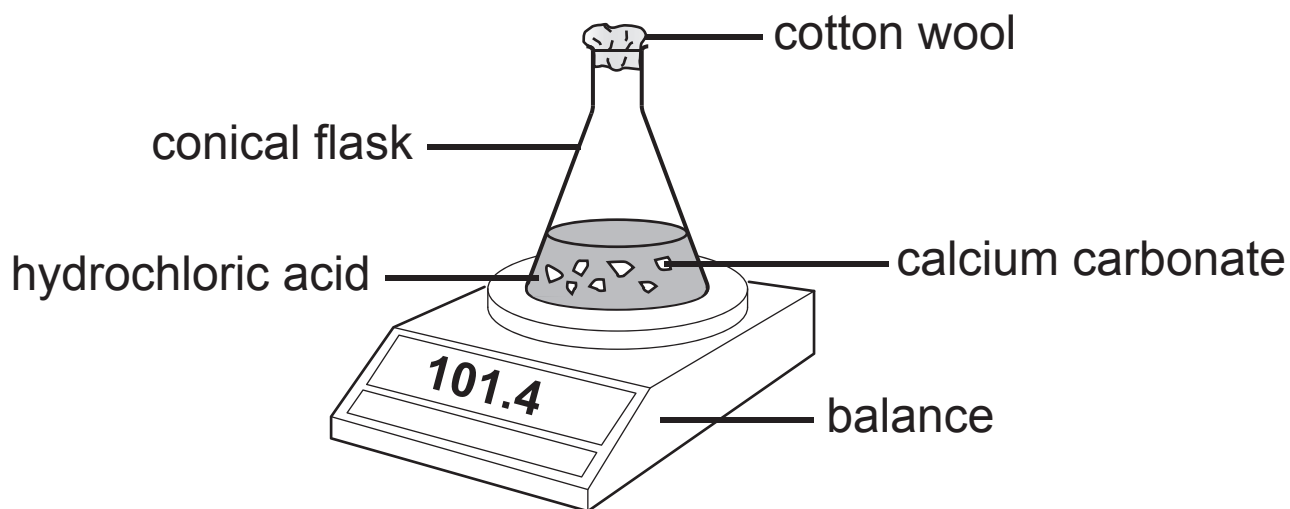
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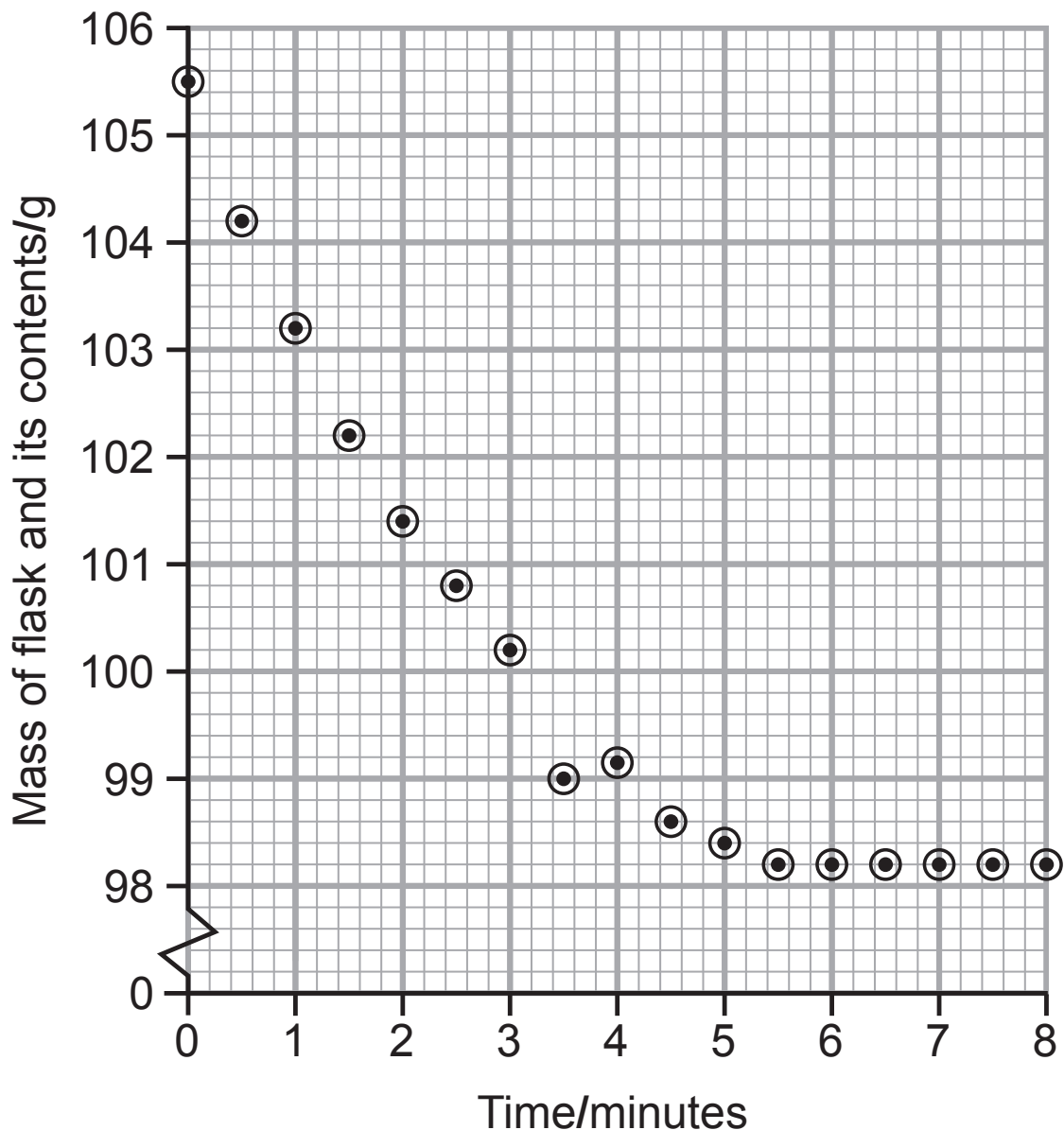
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**11** A student investigated the amount of carbon dioxide released during the reaction between hydrochloric acid and calcium carbonate. He used the apparatus shown below.



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 above by adding a curve of best fit ignoring any anomalous results. [1 mark]

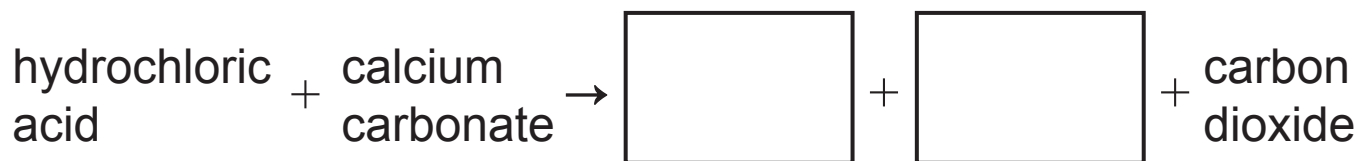
(b) Describe fully the trend shown in the graph. [2 marks]

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**(c)** Complete the word equation for this reaction.  
[2 marks]



**(d) (i)** Name the chemical used to test for carbon dioxide.  
[1 mark]

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**(ii)** Describe the colour change during this test for carbon dioxide. [2 marks]

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**THIS IS THE END OF THE QUESTION PAPER**

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## SOURCES

Q1(a) .....© Andrej Kaprinary / iStock / Thinkstock

Q3.....© Science Photo Library

Q4.....© 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".

Q11.....© Principal Examiner

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|-------------------------|-------|
| Question Number         | Marks |
| 1                       |       |
| 2                       |       |
| 3                       |       |
| 4                       |       |
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| <b>Total Marks</b> |  |
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Examiner Number

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