



General Certificate of Secondary Education
2015

Centre Number

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Candidate Number

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Double Award Science: Chemistry

Unit C2
Foundation Tier

[GSD51]



TUESDAY 9 JUNE 2015, AFTERNOON

TIME

1 hour 15 minutes, 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.

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

Complete in blue or black ink only.

Answer **all nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 90.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question **5(a)**.

A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

9720.03 ML



20GSD5101

- 1 (a) Fossil fuels contain carbon and are non-renewable.
Put a circle round **three** fossil fuels in the list below.

coal sulfur oil
wood peat hydrogen

[3]

- (b) Complete the sentence below. Choose one word from each box.
Put a circle round the two words you have chosen.

During combustion a fuel reacts with

hydrogen
oxygen
sulfur dioxide

to release

carbon
nitrogen
energy

[2]

- (c) This part of the question is about the reactions of oxygen with carbon and copper.

- (i) Write down two observations you could make when carbon is burned in a plentiful supply of oxygen.

1. _____

2. _____ [2]

- (ii) What is the name of the compound formed in the reaction of carbon with excess oxygen?

_____ [1]



(iii) When copper metal is heated in oxygen what compound is formed?
What colour change would you observe in the solid?

Compound _____

Colour change from _____ to _____ [3]

[Turn over

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20GSD5103

- 2 (a) An experiment was done to investigate the effect of soap and the effect of detergent on samples of hard and soft water.

Fill in the results table below for each water sample to show what would be observed in the experiment. Tick the correct answers. One has been done for you.

| Water sample | Soap added and shaken | | Detergent added and shaken | |
|--------------|-----------------------|-----------|----------------------------|-----------|
| | lather | no lather | lather | no lather |
| hard water | | | | |
| soft water | | | ✓ | |

[3]

- (b) Read the passage below about hard water.

Hard water tastes better than soft water. Hard water wastes soap and causes scum when it reacts with soap. It contains calcium ions and so it is good for bones and teeth. Hard water can cause fur or scale to form in kettles and limescale to form in hot water pipes. It is used in brewing beer and it is thought to help prevent heart disease.

Write down two advantages and two disadvantages of living in a hard water region. Use the information given in the passage above.

Advantages:

- _____
- _____

Disadvantages:

- _____
- _____

[4]





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20GSD5105

- 3 (a) (i) Exothermic processes give out heat. Fill in the blanks in the table below to show which processes are exothermic. The first one has been done for you.

| Process | Exothermic Yes/No |
|---|-------------------|
| Ice turning into water | No |
| Petrol burning | |
| Neutralising acid with alkali | |
| Thermal decomposition of copper carbonate | |

[3]

- (ii) When ice turns into water heat is taken in by the ice. The word used to describe heat being taken in during the process is: _____.

[1]

- (iii) Calcium carbonate can be broken down by heating. Complete the word equation below that describes the effect of heat on calcium carbonate.



[2]

- (b) This part of the question is about the quarrying and uses of limestone.

- (i) From the list below. Put a circle round **two** uses of limestone.

fuel

neutralise acidity in soil

building material

manufacture of alcohol

[2]



- (ii) Limestone is taken from the ground by quarrying. Fill in the blanks in the table below to show advantages and disadvantages of quarrying limestone. Tick the correct boxes. The first one has been done for you.

| Quarrying | Advantage | Disadvantage |
|---------------------------|-----------|-------------------------------------|
| produces noise | | <input checked="" type="checkbox"/> |
| provides jobs | | <input type="checkbox"/> |
| affects natural habitats | | <input type="checkbox"/> |
| produces dust | | <input type="checkbox"/> |
| affects the local economy | | <input type="checkbox"/> |

[4]



4 (a) A student prepared some hydrogen gas by reacting a metal with an acid.

(i) Complete the table below to show the test the student could do to prove that the gas is hydrogen and what result the student would expect.

| Test | Result |
|------|--------|
| | |

[2]

(ii) Write down two physical properties of hydrogen gas.

1. _____

2. _____ [2]

(b) Hydrogen gas can be used as a clean fuel.

(i) Write a word equation for the burning of hydrogen in oxygen.

_____ [2]

(ii) Why is hydrogen considered to be a clean fuel?

_____ [2]

(c) Write down one use of hydrogen gas. Do not write about its use as a fuel.

_____ [1]





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20GSD5109

- (b) The atmosphere contains a mixture of gases. How was the early atmosphere formed?

_____ [2]

- (c) The two main gases in the atmosphere make up about 99%.

- (i) Just under 80% of the atmosphere is made up of nitrogen. Which is the second most abundant gas in our atmosphere?

_____ [1]

- (ii) Which **one** of the gases below is an atmospheric gas?
Put a circle round the correct answer.

argon

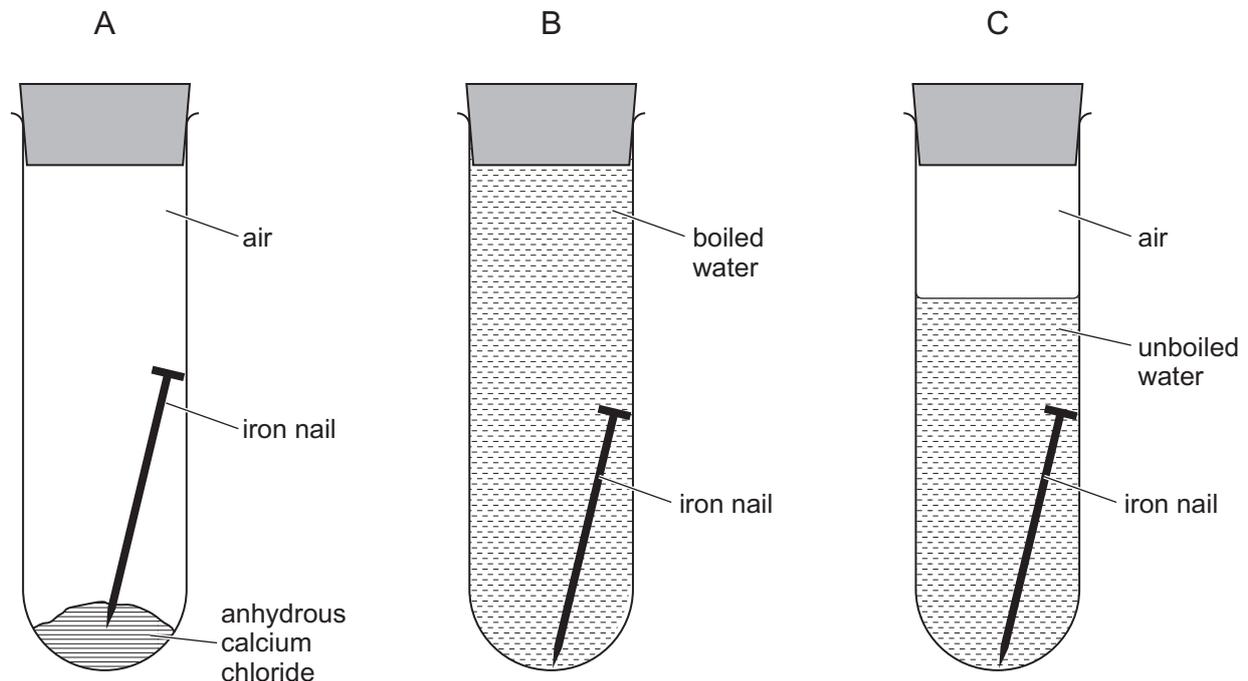
hydrogen

chlorine

[1]



- 6 (a) A student set up 3 test tubes as shown below to investigate the conditions needed for the rusting of iron.



- (i) After a week, which was the only test tube, A, B or C to have a rusty nail?

_____ [1]

- (ii) How did the student make the test fair?

 _____ [1]

- (iii) Why had the water in test tube B been boiled?

_____ [1]

- (iv) What **two** conditions are necessary for the rusting of iron to occur?

_____ and _____ [1]



(b) Magnesium reacts with steam to give two products.

(i) Complete the word equation for the reaction of magnesium with steam.

magnesium + steam → _____ + _____ [2]

(ii) Describe **one** observation you would make during this reaction.

_____ [1]

(c) Magnesium powder reacts quickly with copper(II) sulfate solution.

(i) Describe two things you would expect to **see** happening in this reaction.

1. _____

2. _____ [2]

(ii) What does this reaction tell you about the reactivity of magnesium compared to that of copper?

_____ [1]

(d) This part of the question is about the reaction of iron with sulfur.

When a mixture of sulfur powder and iron filings is placed in a boiling tube and then heated a chemical reaction takes place.

(i) When the mixture is heated an orange-red glow is seen in the boiling tube. What is observed when the heating is stopped?

_____ [2]

(ii) Write a balanced symbol equation for the reaction between iron and sulfur.

_____ [2]

[Turn over



7 This question is about relative atomic mass, relative formula masses and using mole calculations.

(a) What do you understand by the **relative atomic mass** of an element?

[3]

(b) Calculate the relative formula mass of each of the following substances.
(Relative atomic masses: H = 1, O = 16, Na = 23, Al = 27, S = 32)

(i) Sulfur dioxide SO_2

_____ [1]

(ii) Sodium sulfate Na_2SO_4

_____ [1]

(iii) Aluminium hydroxide $\text{Al}(\text{OH})_3$

_____ [1]

(c) Silver nitrate (AgNO_3) has a relative formula mass of 170.

(i) How many moles of silver nitrate are there in 340 g of the substance?

Answer _____ moles [1]

(ii) What is the mass of 0.3 moles of silver nitrate?

Answer _____ g [1]





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20GSD5115

- 8 Calcium carbonate powder reacts with excess dilute hydrochloric acid to form carbon dioxide, water and calcium chloride solution.



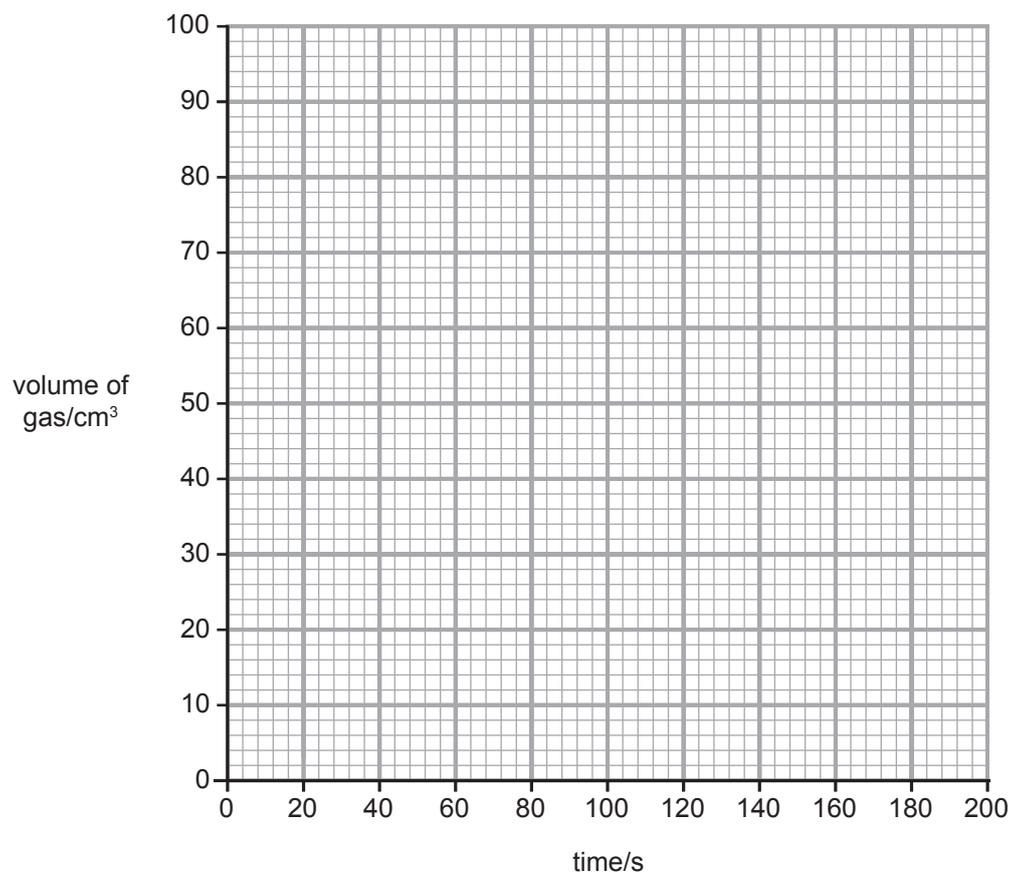
A student investigated the rate of this reaction by measuring the volume of carbon dioxide gas produced over a period of time. The total volume of gas measured at 20 second intervals is recorded in the table below.

| | | | | | | | | | |
|------------------------|---|----|----|----|----|-----|-----|-----|-----|
| Time/s | 0 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 |
| Volume/cm ³ | 0 | 32 | 50 | 66 | 76 | 83 | 87 | 90 | 90 |

- (a) Write down the name of a piece of apparatus that the student could use to measure the volume of gas produced.

_____ [1]

- (b) On the grid below, plot the results given in the table. Draw a curve of best fit. [3]



(c) (i) At what time did the reaction stop?

_____ [1]

(ii) What volume of gas had been collected at 30 seconds?

_____ [1]

(d) The reaction was repeated using the same amount of calcium carbonate and the same amount of excess dilute hydrochloric acid but using a large lump of calcium carbonate instead of the powder.

What effect would this change have on:

(i) the rate of the reaction?

_____ [1]

(ii) the total volume of carbon dioxide produced?

_____ [1]

[Turn over

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20GSD5117

9 (a) A recent spillage of crude oil onto the shores of the USA caused serious environmental problems. It is important that oil spillages are dealt with quickly.

(i) Write down **three** examples of environmental problems caused by oil spillage.

1. _____

2. _____

3. _____

_____ [3]

(ii) How are oil spillages cleaned up?

_____ [1]

(b) The hydrocarbon methane is a major source of energy.

Write a word equation for the combustion of methane in a plentiful supply of air.

_____ [3]



(c) Ethanoic acid shows typical reactions of an acid.

(i) Describe two observations you could make when ethanoic acid is added to solid copper carbonate.

1. _____

2. _____

_____ [2]

(ii) Write down the name of a metal that you could react safely with ethanoic acid to form hydrogen gas.

_____ [1]

(iii) Write down one use of ethanoic acid.

_____ [1]

THIS IS THE END OF THE QUESTION PAPER



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

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| Total Marks | |
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Examiner Number

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