Examiners' Report
June 2023

GCSE Combined Science 1SC0 2CF

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June 2023

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Introduction

Paper 2CF is the second of the two Chemistry papers for GCSE Combined Science at Foundation Tier.

The six questions in this paper come from the equivalent GCSE Chemistry paper 2. Most parts of the final two questions in this paper are also found in the equivalent Higher Tier paper.

This paper is targeted at grades up to and including grade 5, with no advance information being provided this year. Ofqual rules stated that the grade boundaries should be set in order to bring a return close to the standards seen in 2019.

The questions on the paper covered a range of skills including chemistry knowledge, application, practical skills and mathematical skills.

There were a large number of blank answers in a lot of papers, with many candidates not even attempting to answer the questions. It is unclear whether this was due to lack of understanding, lack of knowledge or something else.

Those that did attempt the questions showed varying levels of knowledge and skills, which is what would be expected.

Question 1 (a)

The first question on the paper required candidates to give the molecular formula of a compound from its displayed formula.

Overall, it was well answered, with the most common response being H_4C rather than CH_4. Where marks were lost, it was usually due to using lower case letters or superscript numbers.

Question 1 (b)

This question required candidates to match two named compounds (carbon dioxide and methane) to their displayed formula.

Most candidates were able to match carbon dioxide to its formula, but there was less success with methane. It was quite common to see methane linked to the formula for hydrogen sulfide.

Question 1 (c)

Questions asking for the completion or drawing of a dot and cross diagram are commonly seen in chemistry exams, and the quality of responses has improved with time.

Many candidates gave a good attempt at the dot and cross diagram for hydrogen sulfide and a good number of responses scored at least 1 mark for drawing a shared pair of electrons between the hydrogen and sulfur atoms. About half of these then went on to add the correct number of electrons to the outer shell of the sulfur atom and score the second mark as well.

Candidates could not score any marks without including the shared pair of electrons.

Sometimes it was difficult to determine whether electrons had been crossed out or not. Candidates should be encouraged to redraw the whole diagram if they need fewer electrons anywhere and they haven't been drawn in pencil.

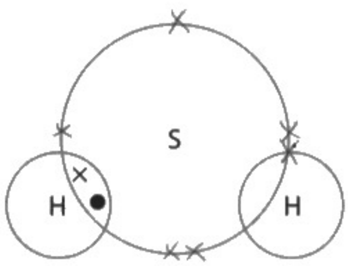
(c) Figure 2 shows information about the number of electrons in the outer shell of each of the different atoms in a molecule of compound **C**.

symbol of element	number of electrons in outer shell of the atom
H	1
S	6

Figure 2

Use the information in Figure 2 to complete the dot and cross diagram for a molecule of compound **C**.

(2)



ResultsPlus
Examiner Comments

This response did not score any marks as there is no shared pair of electrons indicated.

Shared pairs of electrons should be clearly indicated either within or on the lines of the overlap area.

(c) Figure 2 shows information about the number of electrons in the outer shell of each of the different atoms in a molecule of compound **C**.

symbol of element	number of electrons in outer shell of the atom
H	1
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Figure 2

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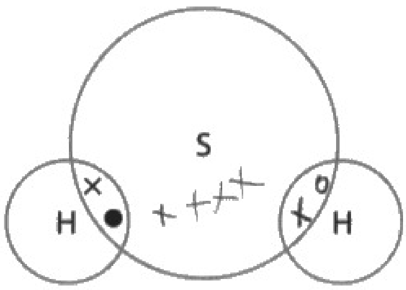

ResultsPlus
Examiner Comments

This response scored 1 mark for the shared pair of electrons.

The candidate has correctly identified that the sulfur atom needs 4 more electrons to complete it, but has not put these electrons onto the shell and therefore has not scored the second mark.

ResultsPlus
Examiner Tip

Ensure that electrons that are not in the overlap area are clearly marked on the shells.

(c) Figure 2 shows information about the number of electrons in the outer shell of each of the different atoms in a molecule of compound **C**.

symbol of element	number of electrons in outer shell of the atom
H	1
S	6

Figure 2

Use the information in Figure 2 to complete the dot and cross diagram for a molecule of compound **C**.

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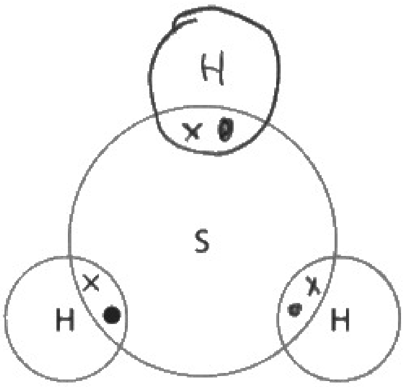


ResultsPlus
Examiner Comments

This response scored 1 mark for the correct shared pair of electrons.

The additional shared pair added by the candidate does not negate the first marking point.

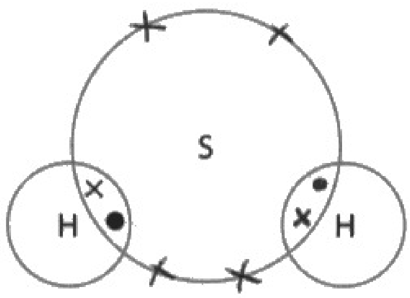
(c) Figure 2 shows information about the number of electrons in the outer shell of each of the different atoms in a molecule of compound **C**.

symbol of element	number of electrons in outer shell of the atom
H	1
S	6

Figure 2

Use the information in Figure 2 to complete the dot and cross diagram for a molecule of compound **C**.

(2)



ResultsPlus
Examiner Comments

An example of a fully correct response, scoring both marks.

It does not matter where the 4 sulfur electrons are placed on the shell as long as they are not within the shared areas.

Question 1 (d)

Candidates were required to identify the numbers of each type of subatomic particle present in an atom of phosphorus given the atomic number and relative atomic mass.

A wide range of different answers and marks were awarded, but most candidates attempted this question and scored at least 1 mark with many scoring 2 or 3 marks.

The most common mistake was that candidates would either mix up the number of neutrons and electrons, or simply state the number of neutrons as 31.

Some candidates were not able to recall the link between subatomic particles and the information about atomic number and relative atomic mass.

(d) The atomic number of phosphorus, P, is 15.

One atom of phosphorus has a relative atomic mass of 31.

Give the number of protons, neutrons and electrons in this atom of phosphorus.

(3)

number of protons = ~~4~~ 2

number of neutrons = 8

number of electrons = 5

ResultsPlus
Examiner Comments

Rather than calculating the numbers of subatomic particles in the atom, the candidate has given the electron configuration of an atom of phosphorus.

(d) The atomic number of phosphorus, P, is 15.

One atom of phosphorus has a relative atomic mass of 31.

Give the number of protons, neutrons and electrons in this atom of phosphorus.

(3)

number of protons = 15

number of neutrons = 31

number of electrons = 15

ResultsPlus
Examiner Comments

This response has correctly identified that the number of protons and electrons in an atom is equal and has scored 2 marks.

The candidate has not remembered that the relative atomic mass of an atom is equivalent to the total number of protons and neutrons in the nucleus, and has therefore not correctly calculated the number of neutrons.

ResultsPlus
Examiner Tip

An atom always has the same number of protons and electrons.

(d) The atomic number of phosphorus, P, is 15.

One atom of phosphorus has a relative atomic mass of 31.

Give the number of protons, neutrons and electrons in this atom of phosphorus.

(3)

number of protons = 15

number of neutrons = 16

number of electrons = 15

ResultsPlus
Examiner Comments

This response scored full marks.

However, it was not uncommon to see responses with 15 in all three spaces.

Question 2 (a)(i)

This question required the calculation of the difference between two numbers only. A surprising number of candidates did not score here because they had either multiplied the numbers, added them together or correctly calculated the difference between the numbers but then gone on to divide the answer by 2.

Question 2 (b)(i-ii)

Question 2(b)(i) required another calculation of the difference between two numbers, but also needed a sign on the final answer.

Many candidates correctly calculated 8.7 as the answer, but about half of these responses did not include the plus sign to indicate that the temperature had increased.

Some candidates were not able to correctly calculate the value, but still scored 1 mark if they had obtained a positive value and indicated this with a plus sign.

There were a number of responses where the difference was calculated by subtracting the final temperature from the start temperature and therefore giving a negative value.

Question 2(b)(ii) needed candidates to explain which reaction was the most exothermic, with the correct answer being dependent on what the candidate had calculated in part (i).

Often candidates could identify salt C, but explanations were more variable. Rather than stating that salt C had the largest rise in temperature, a good proportion of responses simply quoted the number calculated in part (i), or stated that C had reached the highest temperature.

If candidates had calculated a negative value in part (i), then marks were awarded for identifying A as being the salt with the largest rise in temperature.

Candidates who identified salt B as the most exothermic had obviously confused the negative temperature change with the negative energy change that is seen on reaction profile diagrams for exothermic reactions.

(b) The student repeated the method for three different salts, **A**, **B** and **C**.

The same mass of each salt was used.

Figure 5 shows the temperature readings obtained for the three different salts.

salt	starting temperature of the water in °C	temperature of the mixture after 2 minutes in °C	temperature change in °C
A	20.5	25.6	+5.1
B	20.5	19.8	−0.7
C	20.5	29.2	

Figure 5

(i) Calculate the temperature change for salt **C**.

Include a sign to show if the temperature change is an increase or a decrease.

(2)

29.2 − 20.5 = 8.7

temperature change = 8.7 °C

(ii) Explain which salt produces the biggest exothermic change.

(2)

Salt B produces the biggest exothermic change because it lost heat from the reaction whilst the other two gained heat.

ResultsPlus
Examiner Comments

The candidate has calculated the correct temperature change, but has not added a sign and therefore scored only 1 mark for part (i).

The explanation incorrectly identifies salt B as the most exothermic and the explanation suggests that the candidate has considered the negative sign to refer to the energy lost rather than temperature change as stated in the table.

ResultsPlus
Examiner Tip

Exothermic reactions show an increase in temperature.

(b) The student repeated the method for three different salts, **A**, **B** and **C**.

The same mass of each salt was used.

Figure 5 shows the temperature readings obtained for the three different salts.

salt	starting temperature of the water in °C	temperature of the mixture after 2 minutes in °C	temperature change in °C
A	20.5	25.6	+5.1
B	20.5	19.8	−0.7
C	20.5	29.2	

Figure 5

(i) Calculate the temperature change for salt **C**.

Include a sign to show if the temperature change is an increase or a decrease.

(2)

20.5 − 29.2

temperature change = −8.7 °C

(ii) Explain which salt produces the biggest exothermic change.

(2)

A produces the biggest exotermic reaction as the temperature increases by most, letting out (releasing the most heat.

ResultsPlus
Examiner Comments

The candidate has correctly calculated the value of the temperature, but incorrectly indicated this as negative. Part (i) scored 1 mark.

The explanation given in part (ii) is correct using the result calculated in part (i), along with a correct explanation and therefore both marks were awarded here.

(b) The student repeated the method for three different salts, **A**, **B** and **C**.

The same mass of each salt was used.

Figure 5 shows the temperature readings obtained for the three different salts.

salt	starting temperature of the water in °C	temperature of the mixture after 2 minutes in °C	temperature change in °C
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Figure 5

(i) Calculate the temperature change for salt **C**.

Include a sign to show if the temperature change is an increase or a decrease.

(2)

29.2 − 20.5 = 8.7

temperature change = +8.7 °C

(ii) Explain which salt produces the biggest exothermic change.

(2)

C because it had the biggest change in temperature

ResultsPlus
Examiner Comments

An example of a fully correct response.

Both the value calculated and the sign given are correct, and the candidate goes on to give a concise and correct explanation in the second part of the question.

Question 2 (c)

This question about why polystyrene is more suitable than glass for a practical experiment was poorly answered.

The majority of answers given either related to safety concerns around breakages of glass or suggested that polystyrene could be used at higher temperatures than glass. Some responses suggested the fact that glass is transparent made it unsuitable, or suggested that salt might get stuck to the beaker.

Where candidates did score marks, it was unusual to see both marking points – more commonly the reverse argument was given for the other material.

Occasionally responses were contradictory, stating that polystyrene is an insulator, but that heat would 'get through' it.

(c) Explain why a polystyrene cup is a better container to use for this investigation than a glass beaker.

(2)

Using a glass beaker may be dangerous because as temperatures of the Salt increase, the glass beaker may heat up and Smash, causing injuries.

ResultsPlus
Examiner Comments

It was common to see suggestions that somehow a glass beaker would break at high temperatures.

(c) Explain why a polystyrene cup is a better container to use for this investigation than a glass beaker.

(2)

Polystyrene keeps the temperature longer compared to the glass, meaning the temperature readings in the table are more accurate than if used with a glass cup. Polystyrene cup traps the ~~water smoke inside the cup~~ temperature.

ResultsPlus
Examiner Comments

Although the candidate has the right idea here, there is nothing creditworthy in this response. There are numerous references to the temperature being trapped in the cup rather than the heat energy.

ResultsPlus
Examiner Tip

Temperature and heat are not the same thing.

(c) Explain why a polystyrene cup is a better container to use for this investigation than a glass beaker.

(2)

This is because the polystyrene cup does not conduct ~~heat~~ ~~w~~ heat whereas a glass cup also heats up

ResultsPlus
Examiner Comments

This response scored 1 mark because it gives the same argument for both materials.

Reverse arguments are always accepted, but the same point cannot be credited twice.

(c) Explain why a polystyrene cup is a better container to use for this investigation than a glass beaker.

(2)

Polystyrene is a better container because it insulates heat and keeps the heat inside the cup.

ResultsPlus
Examiner Comments

This 2 mark response states that polystyrene is an insulator and then links it to the idea that the heat will not escape through the cup.

Question 3 (a)

The candidates who attempted this question almost always scored the mark with the vast majority of 0 mark answers here being those that had not been attempted at all.

It was rare to see an error as any bar height between 94% and 96% was accepted (+/ – half a square), although occasionally the bars were just a little too high or too low.

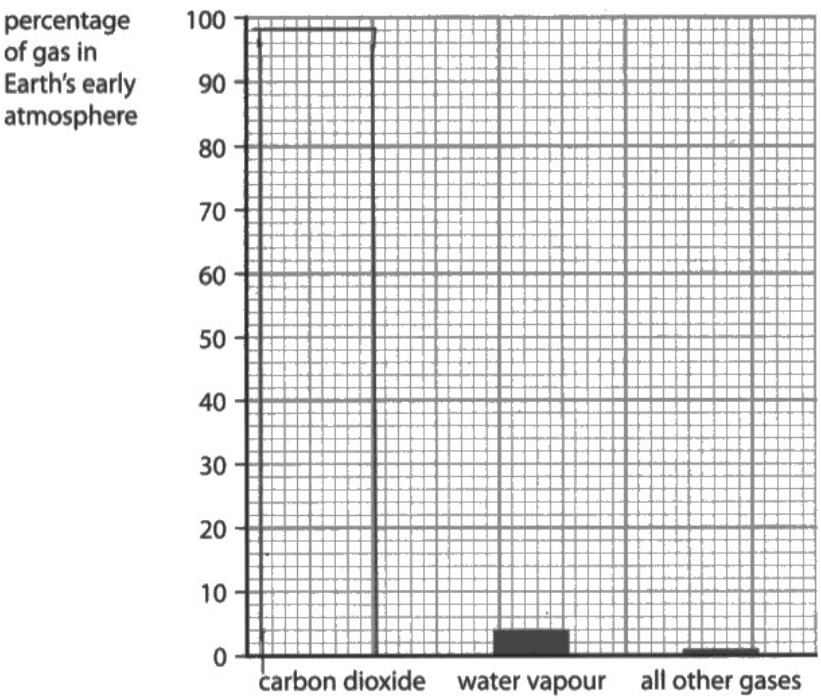
3 A scientist produced the information in Figure 6 about the Earth's atmosphere and the Earth's average surface temperature.

Earth's atmosphere 3 billion years ago		Earth's atmosphere today	
gas	%	gas	%
carbon dioxide	95	nitrogen	78.00
water vapour	4	oxygen	21.00
all other gases	1	carbon dioxide	0.04
		all other gases including water vapour	0.96
average surface temperature 3 billion years ago		average surface temperature today	
above 400 °C		20 °C	

Figure 6

(a) Complete the bar chart showing the composition of the Earth's atmosphere 3 billion years ago by adding a bar to show the percentage of carbon dioxide.

(1)



ResultsPlus
Examiner Comments

The width of the bar was not important. However, the height of this bar indicates 98% which is incorrect.

3 A scientist produced the information in Figure 6 about the Earth's atmosphere and the Earth's average surface temperature.

Earth's atmosphere 3 billion years ago		**Earth's atmosphere today**	
gas	**%**	**gas**	**%**
carbon dioxide	95	nitrogen	78.00
water vapour	4	oxygen	21.00
all other gases	1	carbon dioxide	0.04
		all other gases including water vapour	0.96
average surface temperature 3 billion years ago		**average surface temperature today**	
above 400 °C		20 °C	

Figure 6

(a) Complete the bar chart showing the composition of the Earth's atmosphere 3 billion years ago by adding a bar to show the percentage of carbon dioxide.

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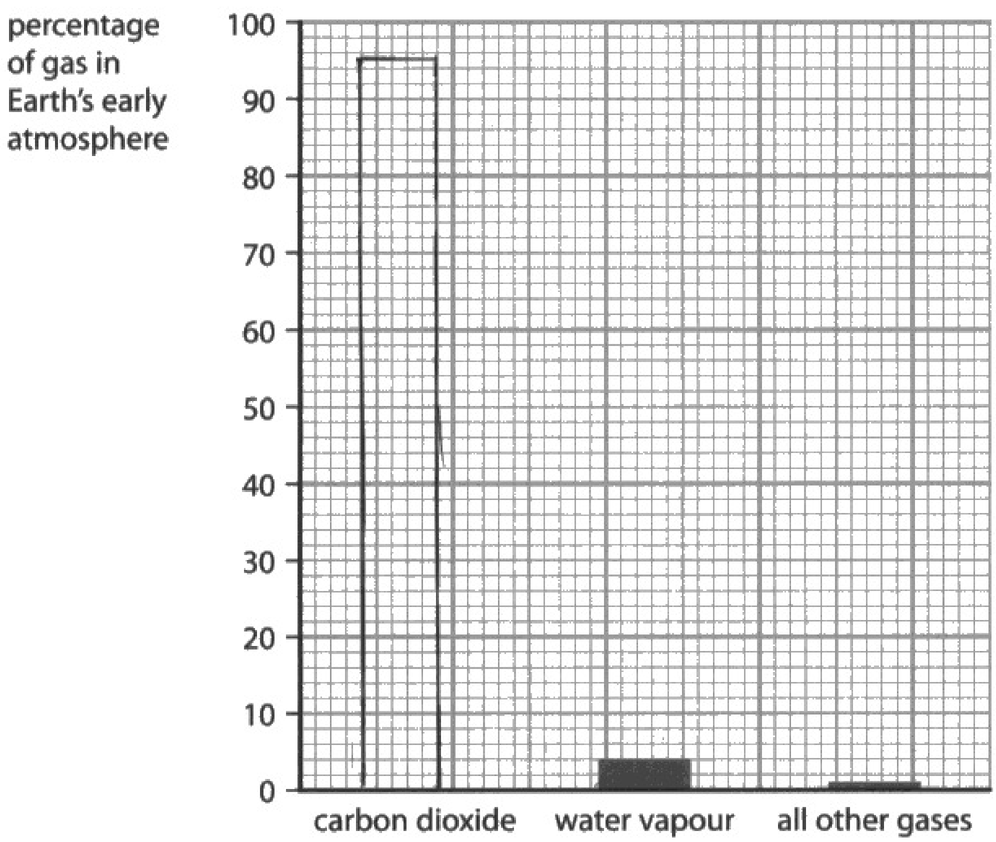


ResultsPlus
Examiner Comments

This is a good example of a correctly plotted bar.

Many were plotted at either 94% or 96%.

ResultsPlus
Examiner Tip

Draw bars on a bar chart using a pencil and ruler.

Question 3 (b)(i)

Most candidates used the data to correctly determine that the temperature of the Earth has decreased over time. Where candidates got the answer wrong, they stated that the temperature has increased.

Question 3 (b)(ii)

There were a number of different points candidates could make here that were creditworthy. In spite of this, over half of candidates did not score any marks at all for this question.

Answers were often confusing and contradictory and it was surprisingly very common to see candidates state that water vapour had evaporated from the Earth's atmosphere. Other misconceptions included that the water vapour had turned into nitrogen and oxygen, or that plants had removed it from the atmosphere.

Some candidates gave their answers relating to present day climate issues and increasing temperatures.

It was unusual to see correct responses referring to cooling and condensation at all, with the most common correct answers being about rain and forming oceans.

(ii) The Earth's atmosphere 3 billion years ago contained much more water vapour than today's atmosphere.

Explain what happened to the water vapour.

(2)

Water vapour has evaporated due to ~~the~~ global warming and climate change.

ResultsPlus
Examiner Comments

A significant number of responses suggested that the water evaporated, with many linking this to ideas around global warming rather than using the information given in the question.

Many candidates did not seem to understand that water vapour is already a gas.

ResultsPlus
Examiner Tip

Water vapour is already a gas and therefore cannot evaporate. Evaporation is the change of state from a liquid to a gas.

(ii) The Earth's atmosphere 3 billion years ago contained much more water vapour than today's atmosphere.

Explain what happened to the water vapour.

(2)

it evaporated and turned into oceans and rivers

ResultsPlus Examiner Comments

Contradictory responses like this were also common.

(ii) The Earth's atmosphere 3 billion years ago contained much more water vapour than today's atmosphere.

Explain what happened to the water vapour.

(2)

The earth started to cool, this allowed the water vapour to condense, forming oceans/seas.

ResultsPlus Examiner Comments

The most able candidates were able to give a clear explanation that linked the marking points together. This response includes three of the marking points with no contradictions.

Question 3 (c)(i)

Most candidates were correctly able to identify photosynthesis from its description, although there were a number of candidates who gave respiration as their answer.

Question 3 (d)(i)

Candidates were required to find the difference between two numbers and then round their answer to the nearest whole number.

Overall, candidates scored well on this question with the most common error being a lack of rounding the final answer. However, some candidates attempted to round their answers and did not get to the final correct answer.

In some cases, the numbers from the table were rounded and then the difference was calculated but this early rounding gave a final value of 46, which was not accepted. Occasionally the correct calculation was shown, but incorrectly evaluated.

(d) Many people are concerned by the increasing amount of carbon dioxide in the atmosphere.

(i) The amount of carbon dioxide in the atmosphere is measured in parts per million (ppm).

Figure 7 shows the amount of carbon dioxide in the atmosphere in June 2001 and in June 2021.

	amount of carbon dioxide in ppm
June 2001	371.17
June 2021	416.56

Figure 7

Calculate the increase in the amount of carbon dioxide, in ppm, from June 2001 to June 2021.

Give your answer to the nearest whole number.

(2)

416.56 - 371.17

= 45.39 ↑

= 46

increase in amount of carbon dioxide = 46 ppm

ResultsPlus
Examiner Comments

This example scored 1 mark. The difference has been correctly calculated, but the answer has been rounded up rather than down.

Had the answer been given as 46 without working, then no marks would have been awarded.

(d) Many people are concerned by the increasing amount of carbon dioxide in the atmosphere.

(i) The amount of carbon dioxide in the atmosphere is measured in parts per million (ppm).

Figure 7 shows the amount of carbon dioxide in the atmosphere in June 2001 and in June 2021.

	amount of carbon dioxide in ppm
June 2001	371.17
June 2021	416.56

Figure 7

Calculate the increase in the amount of carbon dioxide, in ppm, from June 2001 to June 2021.

Give your answer to the nearest whole number.

(2)

416.56 − 371.17 = 45.39

↳ 50.00

increase in amount of carbon dioxide = 50.00 ppm

ResultsPlus
Examiner Comments

This response scored 1 mark for calculating the correct answer, but it has been rounded incorrectly to the nearest 10 rather than the nearest whole number.

ResultsPlus
Examiner Tip

Make sure working out for all calculations is clearly shown.

(d) Many people are concerned by the increasing amount of carbon dioxide in the atmosphere.

(i) The amount of carbon dioxide in the atmosphere is measured in parts per million (ppm).

Figure 7 shows the amount of carbon dioxide in the atmosphere in June 2001 and in June 2021.

	amount of carbon dioxide in ppm
June 2001	371.17
June 2021	416.56

Figure 7

Calculate the increase in the amount of carbon dioxide, in ppm, from June 2001 to June 2021.

Give your answer to the nearest whole number.

(2)

416.56 − 371.17 =

increase in amount of carbon dioxide = 45.39 ppm

ResultsPlus
Examiner Comments

This response scores 1 mark for correctly calculating the difference, but no attempt has been made to round the answer.

(d) Many people are concerned by the increasing amount of carbon dioxide in the atmosphere.

(i) The amount of carbon dioxide in the atmosphere is measured in parts per million (ppm).

Figure 7 shows the amount of carbon dioxide in the atmosphere in June 2001 and in June 2021.

	amount of carbon dioxide in ppm
June 2001	371.17
June 2021	416.56

Figure 7

Calculate the increase in the amount of carbon dioxide, in ppm, from June 2001 to June 2021.

Give your answer to the nearest whole number.

(2)

416.56 - 371.17 = 45.39

increase in amount of carbon dioxide = 45 ppm

ResultsPlus
Examiner Comments

This response scores 2 marks for a correct calculation which is then correctly rounded to 45.

Question 3 (d)(ii)

This question did not score as well as expected. It became obvious that many candidates were not aware of the differences between cause and effect – there were a lot of responses that gave examples of processes that would add carbon dioxide to the atmosphere, without mention of any effects.

Some responses were not relevant, suggesting that the planet may lose oxygen or that humans and animals would die from breathing difficulties. Other responses were not specific enough to score the mark such as more plants, pollution or fires.

(ii) State **one** possible effect that could be caused by the increasing amount of carbon dioxide in the atmosphere.

(1)

one possible effect that could be Cawsed be less oxygen on earth

ResultsPlus
Examiner Comments

Many incorrect responses indicated that increasing CO_2 levels would lead to a decrease in oxygen.

(ii) State **one** possible effect that could be caused by the increasing amount of carbon dioxide in the atmosphere.

(1)

Burning fossil fuels

ResultsPlus
Examiner Comments

The number of responses that gave causes of increased CO_2 in the atmosphere was surprisingly high. These responses did not score as the question specifically asked about effects.

(ii) State **one** possible effect that could be caused by the increasing amount of carbon dioxide in the atmosphere.

(1)

global warming

ResultsPlus
Examiner Comments

More able candidates could identify global warming or give examples of the consequences of global warming and scored a mark.

(ii) State **one** possible effect that could be caused by the increasing amount of carbon dioxide in the atmosphere.

(1)

the greenhouse effect and can cause climate change.

ResultsPlus
Examiner Comments

This example scored for correctly mentioning climate change. Greenhouse effect on its own would not have scored as candidates needed to mention **increased** greenhouse effect to score.

Similarly, extreme weather events have always occurred, so candidates needed to state that these have increased in order to score.

Question 4 (b)(i)

Candidates were asked to write a word equation for the reaction between sodium and chlorine.

Many candidates scored at least one mark here and most went on to score both marks. The most common error seen was to add an extra product such as water or oxygen.

Some candidates attempted to write symbol equations, which were almost never correct and so didn't score any marks.

Question 4 (b)(ii)

Candidates found this question particularly challenging and it was very badly answered with almost 90% of candidates scoring no marks at all.

The question highlighted some real issues with scientific literacy. As well as being unable to define a molecule, candidates often used the terms atom, element and particle interchangeably. In spite of the question referring to chlorine, a lot of responses referred to molecules consisting of different elements.

Many candidates seemed to think that molecules are smaller than atoms, or in fact that molecules are subatomic particles.

(ii) Chlorine, Cl_2, is made of simple molecules.

Describe what is meant by the term **molecule**.

(2)

it is the structer of the ~~set~~ atom and includs nutron, eletron, proton.

ResultsPlus Examiner Comments

It was common to see answers that referred to molecules being subatomic particles or something else found in atoms.

(ii) Chlorine, Cl_2, is made of simple molecules.

Describe what is meant by the term **molecule**.

(2)

a molecule is an atom that is formed when a metal and non-metal join together

ResultsPlus Examiner Comments

This response seems to suggest the formation of an ionic bond, but it is also confused in terms of what an atom and a bond is.

ResultsPlus Examiner Tip

Molecules are atoms that are covalently bonded.

(ii) Chlorine, Cl_2, is made of simple molecules.

Describe what is meant by the term **molecule**.

(2)

atoms joined together

ResultsPlus Examiner Comments

The idea of more than one atom or a group of atoms joined together was worth 1 mark.

(ii) Chlorine, Cl_2, is made of simple molecules.

Describe what is meant by the term **molecule**.

(2)

molecule is atoms joined together, for example

covalent bonding causes a molecule to be produced

ResultsPlus
Examiner Comments

Responses that scored 2 marks were very uncommon and often not well expressed.

This is one of the better responses to this question.

Question 4 (b)(iii)

Questions about electrical conductivity are often asked about on chemistry papers, but are not always well answered.

About one quarter of candidates scored some marks on this question about how metals conduct electricity. Too many responses still described an electrical current as being something that moves in the gaps between particles rather than the movement of charged particles. Where candidates scored one mark, it was for correctly identifying electrons without mention of movement.

(iii) Sodium, like all metals, conducts electricity.

Explain how sodium conducts electricity.

(2)

Sodium conducts electricity by allowing the electricity to travel through the tiny gaps in between sodiums molecules

ResultsPlus
Examiner Comments

Responses like this were commonly seen, giving the idea of electricity being something that moves in between particles.

(iii) Sodium, like all metals, conducts electricity.

Explain how sodium conducts electricity.

(2)

sodium has a free electron that conducts that electricity.

ResultsPlus
Examiner Comments

An example of a 1 mark response, correctly identifying free electrons but then not going on to say that these electrons are able to move.

ResultsPlus
Examiner Tip

Electrical current requires both charged particles and movement.

(iii) Sodium, like all metals, conducts electricity.

Explain how sodium conducts electricity.

(2)

• They have delocalised electrons that are free to move.

ResultsPlus
Examiner Comments

An excellent answer recognising that the electrons in metals are delocalised, but then going on to explain that this means they can move.

Question 4 (b)(iv)

Candidates were given the formulae for sodium ions and chloride ions and asked to give the formula of sodium chloride.

Formulae showing the charges of the ions were allowed as long as charges were shown on both ions, and about half of candidates scored the mark.

Too often the ions were shown with a plus sign in between, or a line indicating a covalent bond. Some candidates gave the symbol for sodium as S, in spite of what was given in the question.

(iv) Sodium chloride contains sodium ions, Na^+, and chloride ions, Cl^-.

Use this information to state the formula of sodium chloride.

(1)

$NaCl^+$

ResultsPlus
Examiner Comments

The symbols are correct and in the correct ratio, but the plus sign next to the Cl makes this an incorrect response.

(iv) Sodium chloride contains sodium ions, Na^+, and chloride ions, Cl^-.

Use this information to state the formula of sodium chloride.

(1)

$Na^+ + Cl^-$

ResultsPlus
Examiner Comments

Responses that showed a + or – between the symbols did not score.

(iv) Sodium chloride contains sodium ions, Na^+, and chloride ions, Cl^-.

Use this information to state the formula of sodium chloride.

(1)

NaCl

ResultsPlus
Examiner Comments

Formula of compounds should not show any charges at all, although it was allowed in this instance.

This response shows no charges and is fully correct.

Question 4 (b)(vi)

About a third of candidates were able to correctly identify something that would show the flow of an electric current, with the most common correct answer being a bulb or an ammeter.

The most common incorrect answers were battery or voltmeter, and some candidates stated that arrows should be drawn on the diagram rather than adding any further equipment.

There were also a significant number of random suggestions including test tubes, various indicator papers and thermometers.

(vi) Sodium chloride solution conducts electricity.

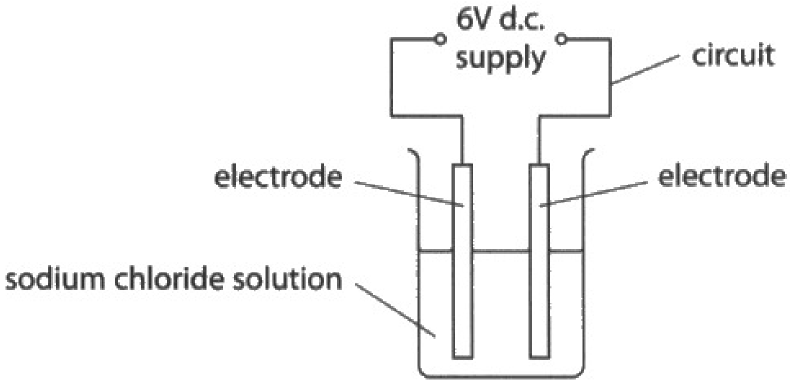


Figure 8

State what can be put into the circuit in Figure 8 to show that a current is flowing.

(1)

Voltmeter

ResultsPlus
Examiner Comments

The most common incorrect answers were voltmeter or battery.

(vi) Sodium chloride solution conducts electricity.

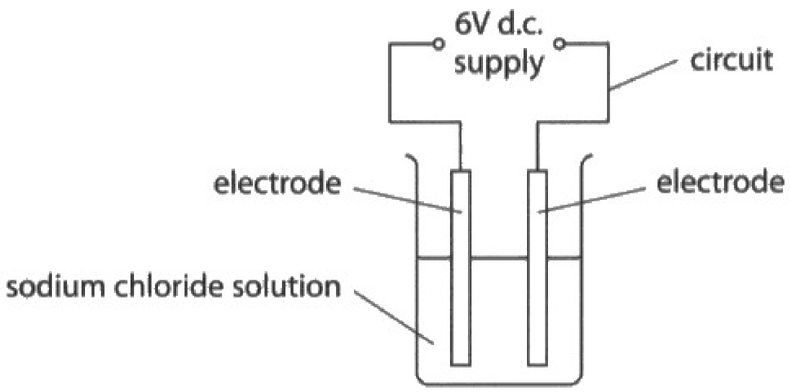


Figure 8

State what can be put into the circuit in Figure 8 to show that a current is flowing.

(1)

Ammeter

ResultsPlus
Examiner Comments

The most common correct answers were ammeter (with a variety of spellings) or bulb.

Light did not score.

Question 4 (c)(i)

Most candidates made an attempt to balance the equation, with about half of the responses scoring the mark.

The number 4 was a common error, and there were attempts by some candidates to add further chemical formulae into the space rather than a number.

(c) Figure 9 shows a flow diagram of how hydrochloric acid can be made.

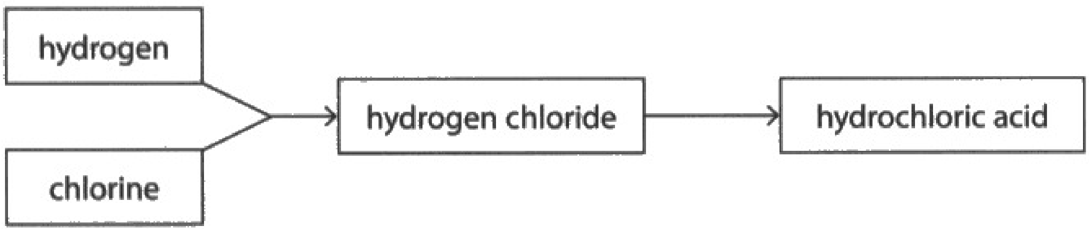


Figure 9

(i) Balance the equation for the reaction between hydrogen and chlorine to form hydrogen chloride.

(1)

$H_2 + Cl_2 \rightarrow$ ....H_2Cl_2.... HCl

ResultsPlus
Examiner Comments

Some candidates attempted to add extra formulae into the equation rather than putting a number into the space.

(c) Figure 9 shows a flow diagram of how hydrochloric acid can be made.

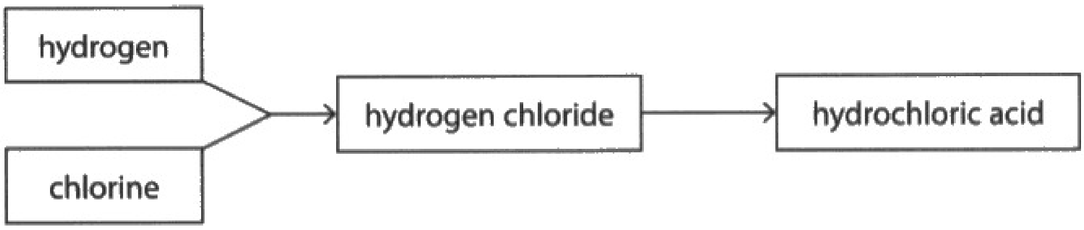


Figure 9

(i) Balance the equation for the reaction between hydrogen and chlorine to form hydrogen chloride.

(1)

$H_2 + Cl_2 \rightarrow$ ....2 HCl

ResultsPlus
Examiner Comments

A lot of candidates balanced the equation correctly.

ResultsPlus
Examiner Tip

Spend some time practising equation balancing.

Question 4 (c)(ii)

This equation was very badly answered, with only a very few candidates scoring the mark.

Candidates did not seem to be aware that there is a difference between hydrogen chloride and hydrochloric acid, with the majority of suggestions being to change the state of the hydrogen chloride in some way (condensing and melting being the most commonly seen ideas). Many candidates suggested adding an acid, or adding more chlorine and some thought that processes such as distillation or electrolysis would work.

(ii) State how hydrogen chloride can be converted into hydrochloric acid.

(1)

Hydrogen chloride can be turned into acid by turning Hydrogen chloride into a liquid

ResultsPlus
Examiner Comments

Many responses stated some sort of change of state with many different possibilities seen. Turning into a liquid was not enough to score as this suggests condensing rather than making it into a solution.

(ii) State how hydrogen chloride can be converted into hydrochloric acid.

(1)

by adding a solution with a PH that is less than seven.

ResultsPlus
Examiner Comments

Some candidates suggested adding acid to the hydrogen chloride, and this was expressed in a number of different ways.

(ii) State how hydrogen chloride can be converted into hydrochloric acid.

(1)

add water.

ResultsPlus Examiner Comments

This is an example of an answer that scored the mark.

Answers that suggested making the hydrogen chloride into a solution also scored.

Question 5 (a)

Candidates were required to plot rate of reaction data and draw a smooth curve to complete a graph.

The mark scheme allowed for some incorrect plotting of data and most attempts at curve drawing. Only lines drawn with rulers, a long way from the data plots or going over the 100 mark were rejected.

Bar charts did not score any marks.

5 A student used the apparatus shown in Figure 10 to investigate the reaction between marble chips and dilute hydrochloric acid.

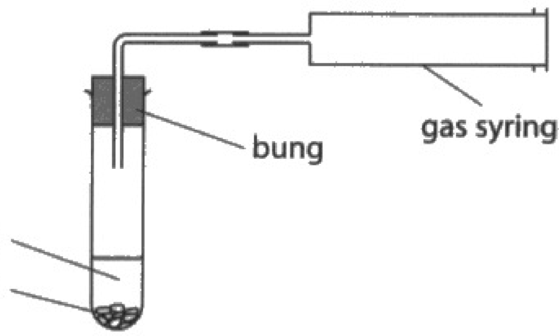


Figure 10

The student recorded the volume of gas every minute as shown in Figure 11.

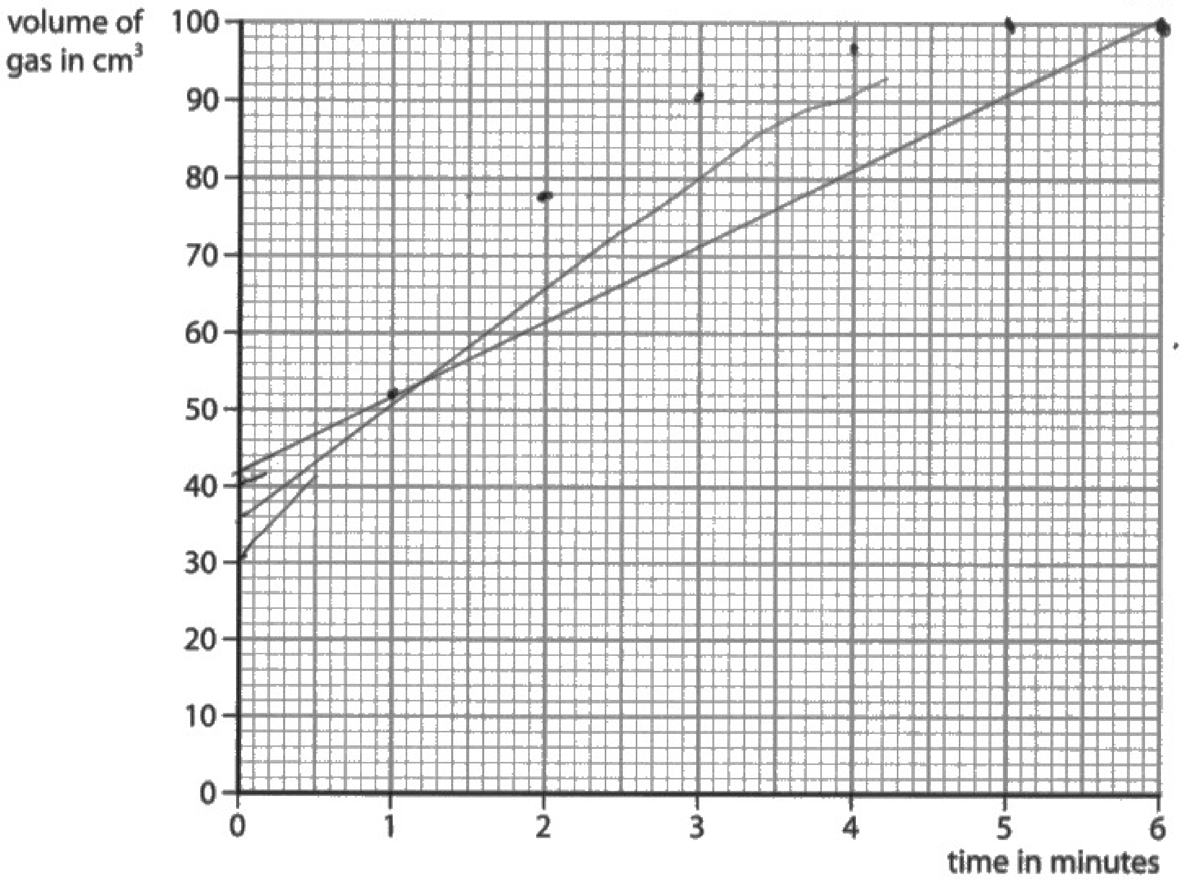
time in minutes	0	1	2	3	4	5	6
volume of gas in cm^3	0	52	78	91	97	100	100

Figure 11

(a) On the grid, plot the results shown in Figure 11.

Draw a curve of best fit.

(3)



ResultsPlus
Examiner Comments

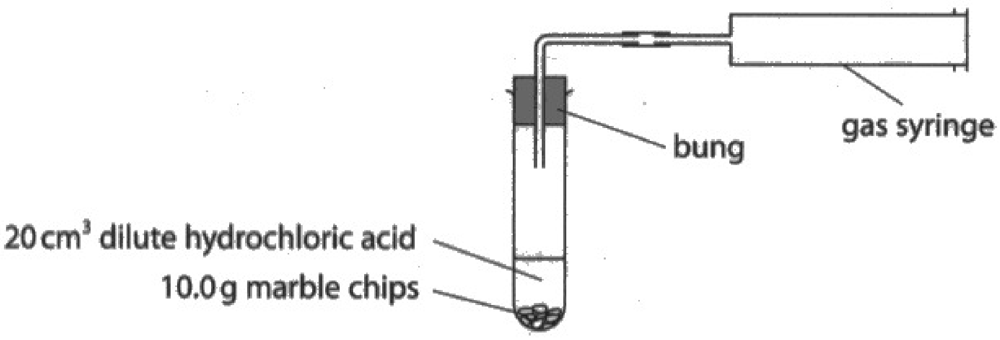
This response scored 2 marks.

The candidate has correctly plotted the points, but then drawn the curve of best fit as a straight line with a ruler.

ResultsPlus
Examiner Tip

A line of best fit is not always one straight line.

5 A student used the apparatus shown in Figure 10 to investigate the reaction between marble chips and dilute hydrochloric acid.



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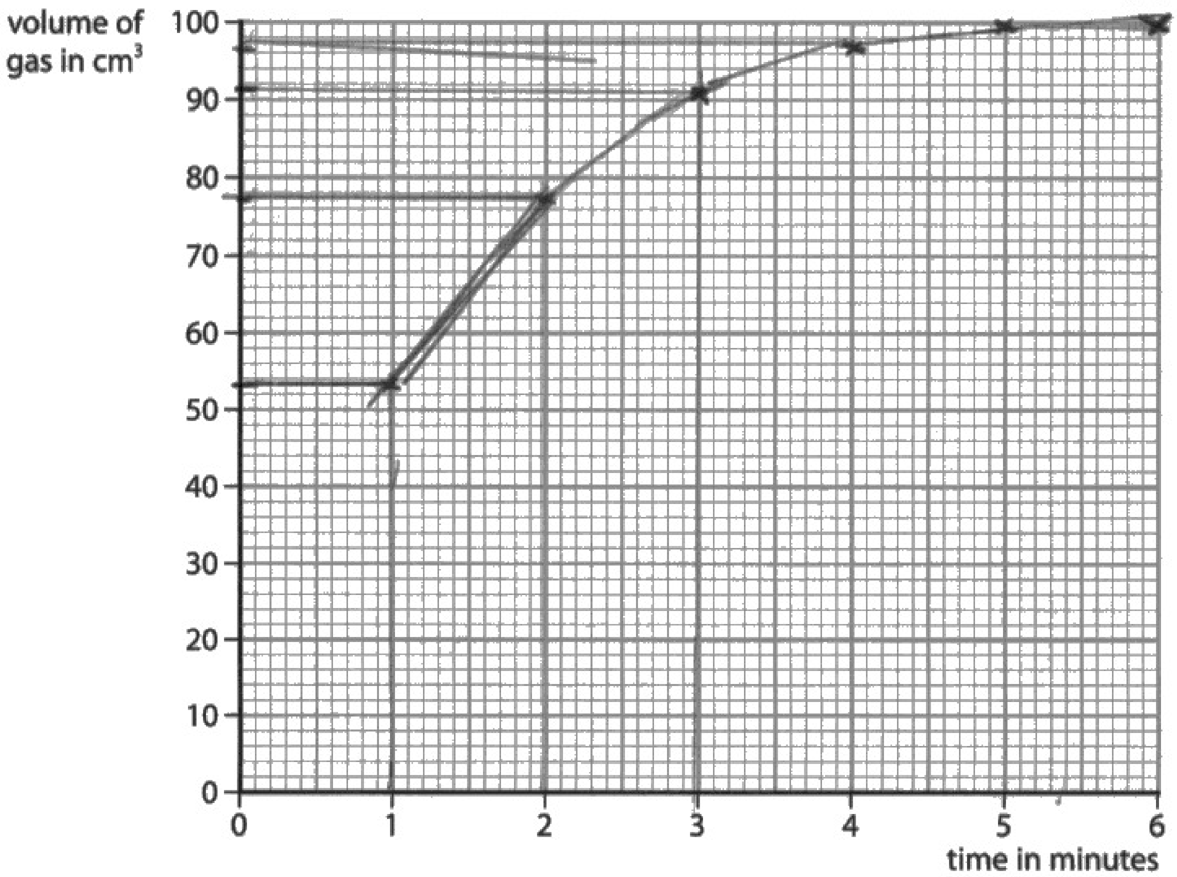
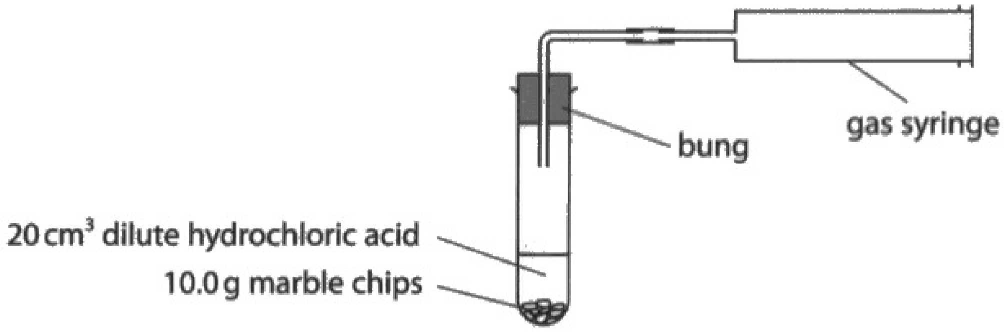


ResultsPlus
Examiner Comments

A number of candidates did not use the first data point of 0,0.

Whilst this would not lose a plotting mark providing that the rest of the points were correctly plotted, the curve of best fit did not score if it did not start at the origin.

5 A student used the apparatus shown in Figure 10 to investigate the reaction between marble chips and dilute hydrochloric acid.



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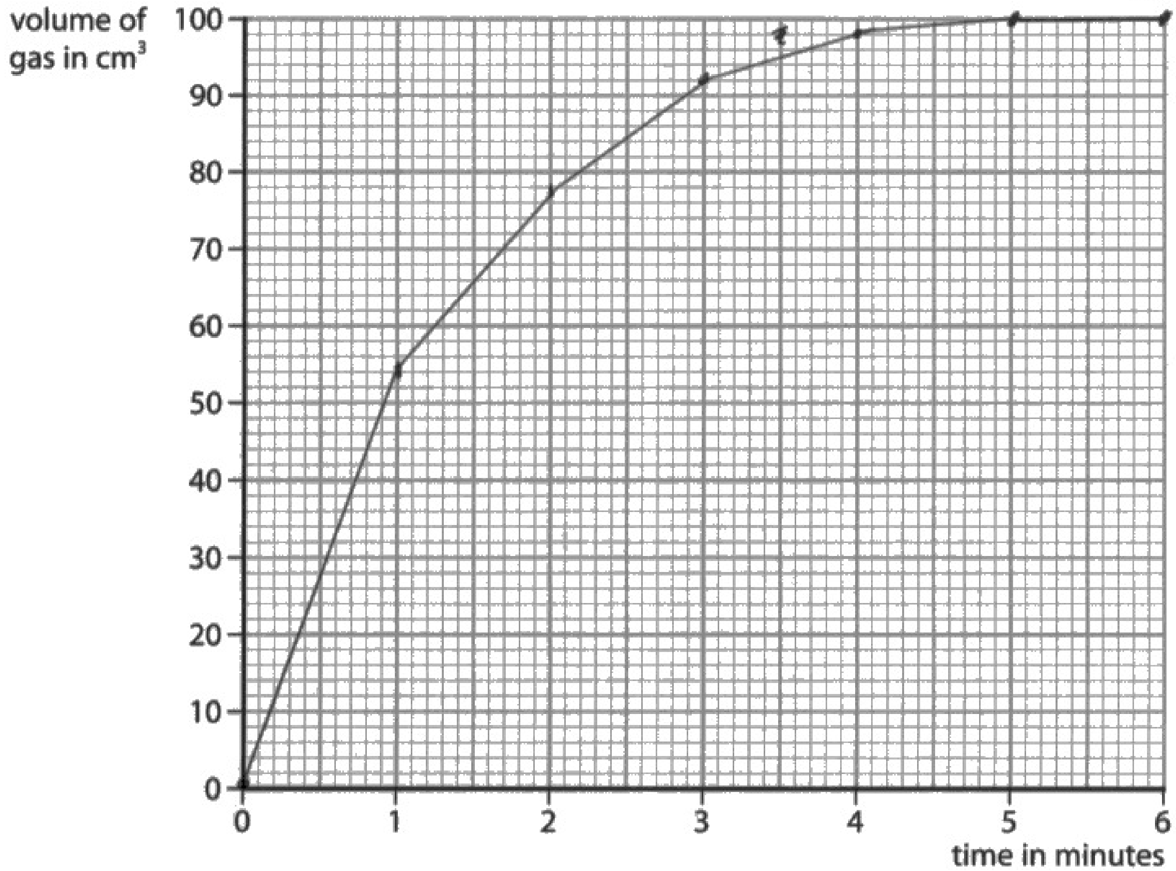
(3)



ResultsPlus
Examiner Comments

Joining the points with straight lines and a ruler was not credited.

ResultsPlus
Examiner Tip

A curve of best fit should be one single line, drawn freehand.

5 A student used the apparatus shown in Figure 10 to investigate the reaction between marble chips and dilute hydrochloric acid.

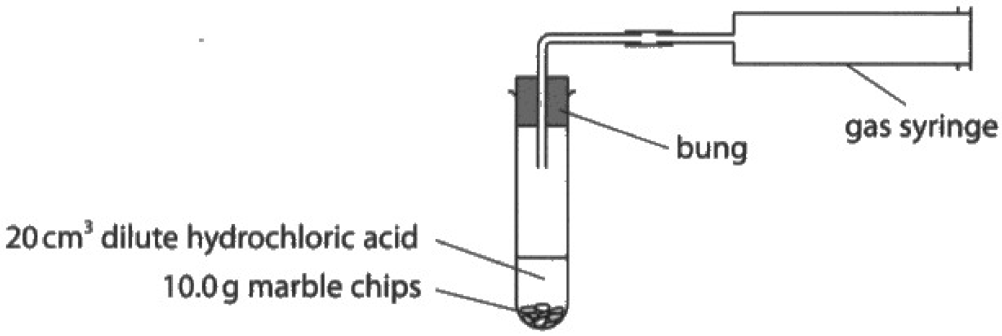


Figure 10

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Figure 11

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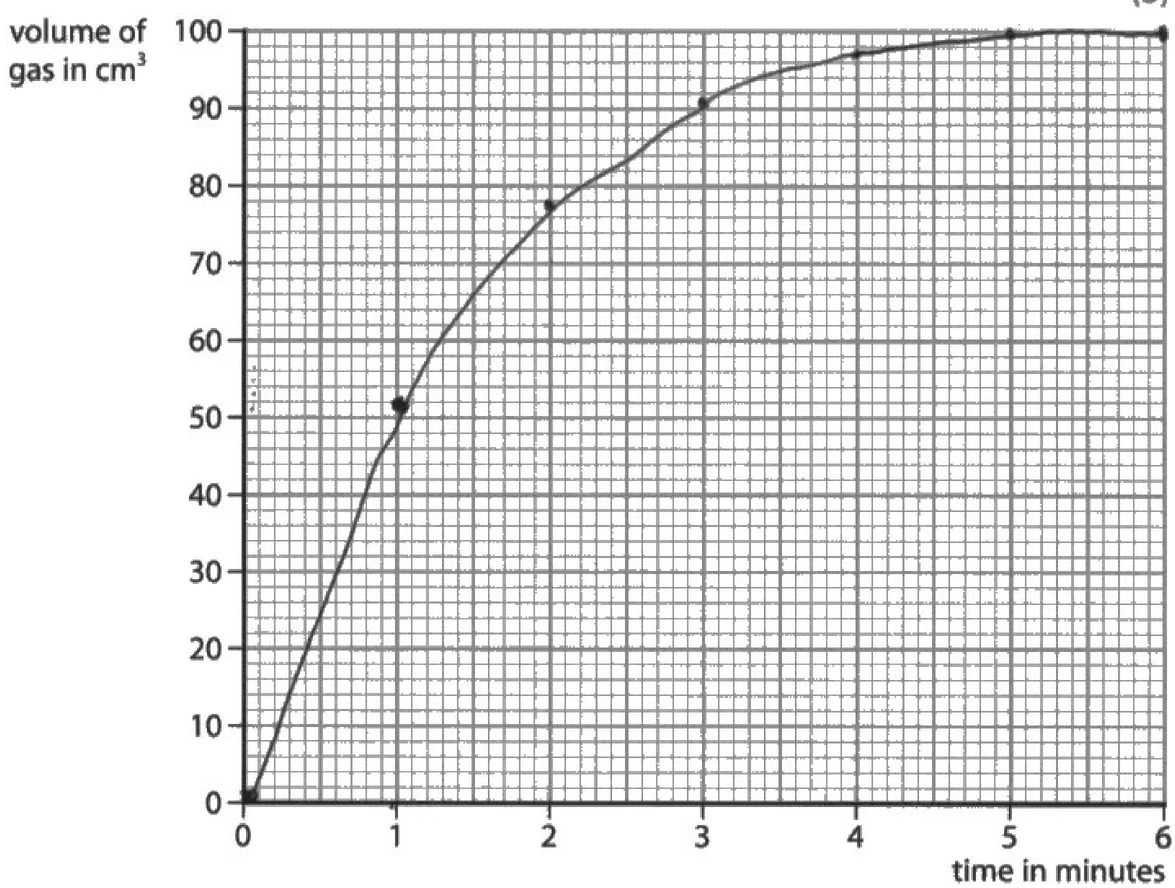
Draw a curve of best fit.

(3)



ResultsPlus
Examiner Comments

This response scored all 3 marks.

The points are correctly plotted and a single line curve of best fit has been added.

Some candidates drew very thick or feathered lines, but this is a good example of what the curve should look like.

Question 5 (b)(i)

This question was well attempted by most candidates and about half scored the mark.

There were various ways of calculating the rate – some were obtained by trial and error, and others by calculation. However, some calculations were incorrect with the initial rate being divided by 3 or others dividing the correct answer by 60.

(b) Rate of reaction can be calculated using

$$\text{rate of reaction} = \frac{\text{volume of gas produced in 1 minute}}{\text{1 minute}}$$

Figure 12 shows the rates of reaction calculated from the results of this experiment.

The rate of reaction for the time interval 2 to 3 minutes is missing.

time interval	0 to 1 minute	1 to 2 minutes	2 to 3 minutes	3 to 4 minutes	4 to 5 minutes
rate of reaction in $cm^3\,min^{-1}$	52	26	17	6	3

Figure 12

(i) Calculate the rate of reaction for the time interval 2 to 3 minutes.

(1)

$\frac{52}{3} = 17.\dot{3}$

rate of reaction = 17 $cm^3\,min^{-1}$

ResultsPlus
Examiner Comments

A final answer of 17 was common. Candidates simply divided the initial rate by 3.

(b) Rate of reaction can be calculated using

$$\text{rate of reaction} = \frac{\text{volume of gas produced in 1 minute}}{\text{1 minute}}$$

Figure 12 shows the rates of reaction calculated from the results of this experiment.

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time interval	0 to 1 minute	1 to 2 minutes	2 to 3 minutes	3 to 4 minutes	4 to 5 minutes
rate of reaction in $cm^3 min^{-1}$	52	26		6	3

Figure 12

(i) Calculate the rate of reaction for the time interval 2 to 3 minutes.

(1)

52 ÷ 2 = 26   26 ÷ 2 = 13

rate of reaction = 13 $cm^3 min^{-1}$

ResultsPlus
Examiner Comments

Here, the candidate has spotted the pattern that the initial rate is halving every minute and gets the correct answer by halving the rate at 1-2 minutes.

Some candidates looked at the data in the opposite direction and doubled the 6 given at 3-4 minutes to get 12, which was not credited.

(b) Rate of reaction can be calculated using

$$\text{rate of reaction} = \frac{\text{volume of gas produced in 1 minute}}{\text{1 minute}}$$

Figure 12 shows the rates of reaction calculated from the results of this experiment.

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time interval	0 to 1 minute	1 to 2 minutes	2 to 3 minutes	3 to 4 minutes	4 to 5 minutes
rate of reaction in $cm^3 min^{-1}$	52	26	13	6	3

Figure 12

(i) Calculate the rate of reaction for the time interval 2 to 3 minutes.

(1)

91-78=13 $\frac{13}{1}$ = 13

rate of reaction = 13 $cm^3 min^{-1}$

ResultsPlus
Examiner Comments

In this response, the candidate has correctly taken the volumes of gas produced at 2 and 3 minutes and found the difference between them.

Then divided this difference by the time period to correctly calculate the rate.

Question 5 (b)(ii)

Many candidates did not seem to understand what this question was asking and there were very few responses that scored more than 1 mark.

Common misconceptions included the idea that because the volume of gas produced was increasing, then the rate of reaction must also be increasing. Many candidates stated that the rate of reaction increased and then decreased, with a single mark most commonly being awarded for recognising that the rate decreases over time.

Some candidates recognised that the rate would decrease because reactants were being used up, but this was often poorly worded. Candidates sometimes thought that a decreasing size of marble chips would give an increased surface area and therefore increase the rate of reaction.

It was very rare to see any mention at all of collision theory or frequency of collisions.

(ii) State and explain what happens to the rate of reaction as the acid reacts with the marble chips in this experiment.

(3)

Rate of reaction with the marble chips in this experiment will increase because marble chips are very reactive when in contact with some properties of a high PH, therefore acid will react and rate of reaction increases and create a gas.

ResultsPlus
Examiner Comments

One of the most common incorrect responses was that the rate of reaction would increase. Various explanations were given for this but ultimately no marks could be awarded.

(ii) State and explain what happens to the rate of reaction as the acid reacts with the marble chips in this experiment.

(3)

It Decreases as the minutes go on meaning the ~~rat~~ reaction slow's down.

ResultsPlus
Examiner Comments

The most common correct responses stated that the rate of reaction would decrease but often offered no explanation as to why.

(ii) State and explain what happens to the rate of reaction as the acid reacts with the marble chips in this experiment.

(3)

the Rate of Reaction decreases as the Reactants are being used up. the experiment concludes at 5 minutes.

ResultsPlus
Examiner Comments

A concise and clear example of a 2 mark answer.

Many candidates tried to express the idea of reactants being used by stating that the chips got smaller or that there was less acid, but these were often poorly written and did not always score.

ResultsPlus
Examiner Tip

The rate of reaction decreases as reactants are used up.

(ii) State and explain what happens to the rate of reaction as the acid reacts with the marble chips in this experiment.

(3)

The rate of reaction decreases as there is less marble ship as fewer reactant particle so there is less frequent collision and sucessful collision as there is less energy

ResultsPlus
Examiner Comments

It was very rare to see a response that scored all of the marks, or referred to collision theory at all.

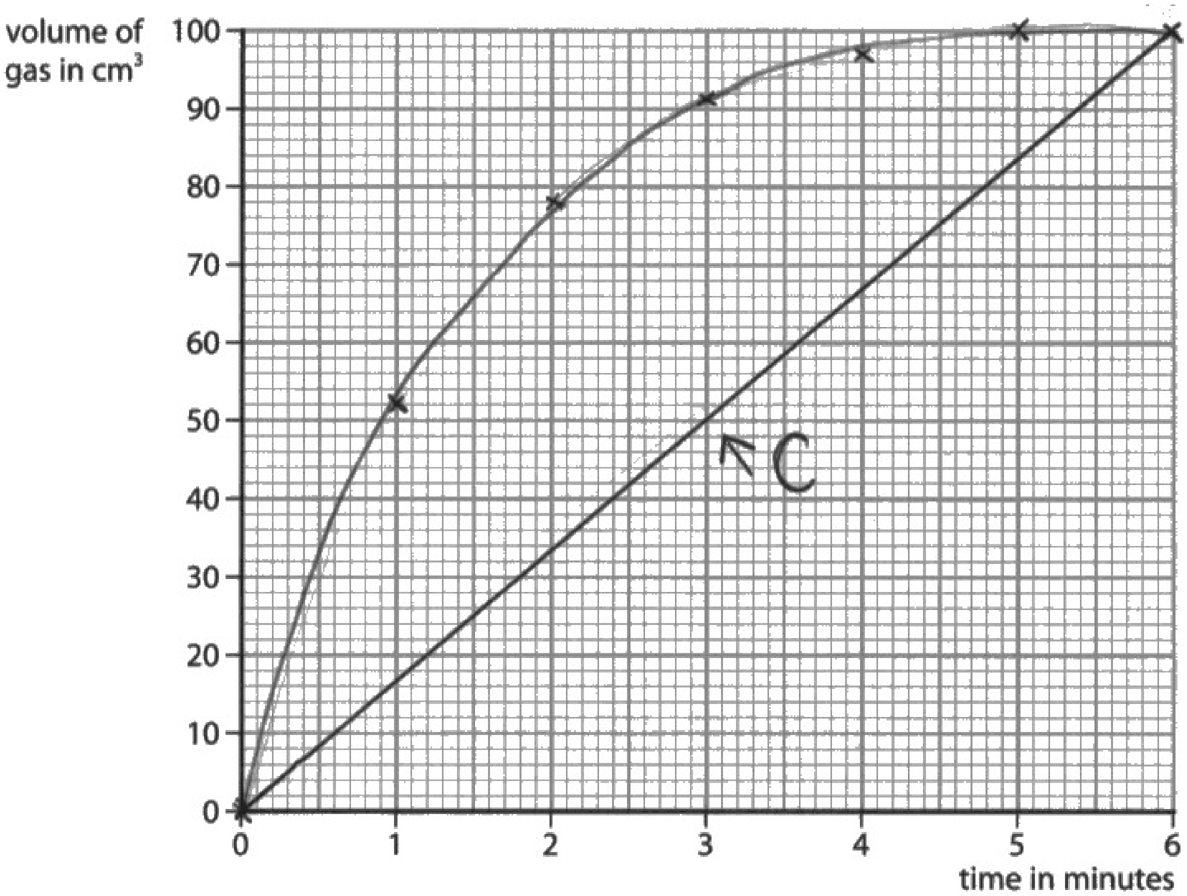
This candidate has covered all of the marking points and scores all 3 marks.

Question 5 (c)

This question required candidates to add a line to their graph to show an increased rate of reaction and it was stated in the question that the reaction was faster, but produced the same volume of gas.

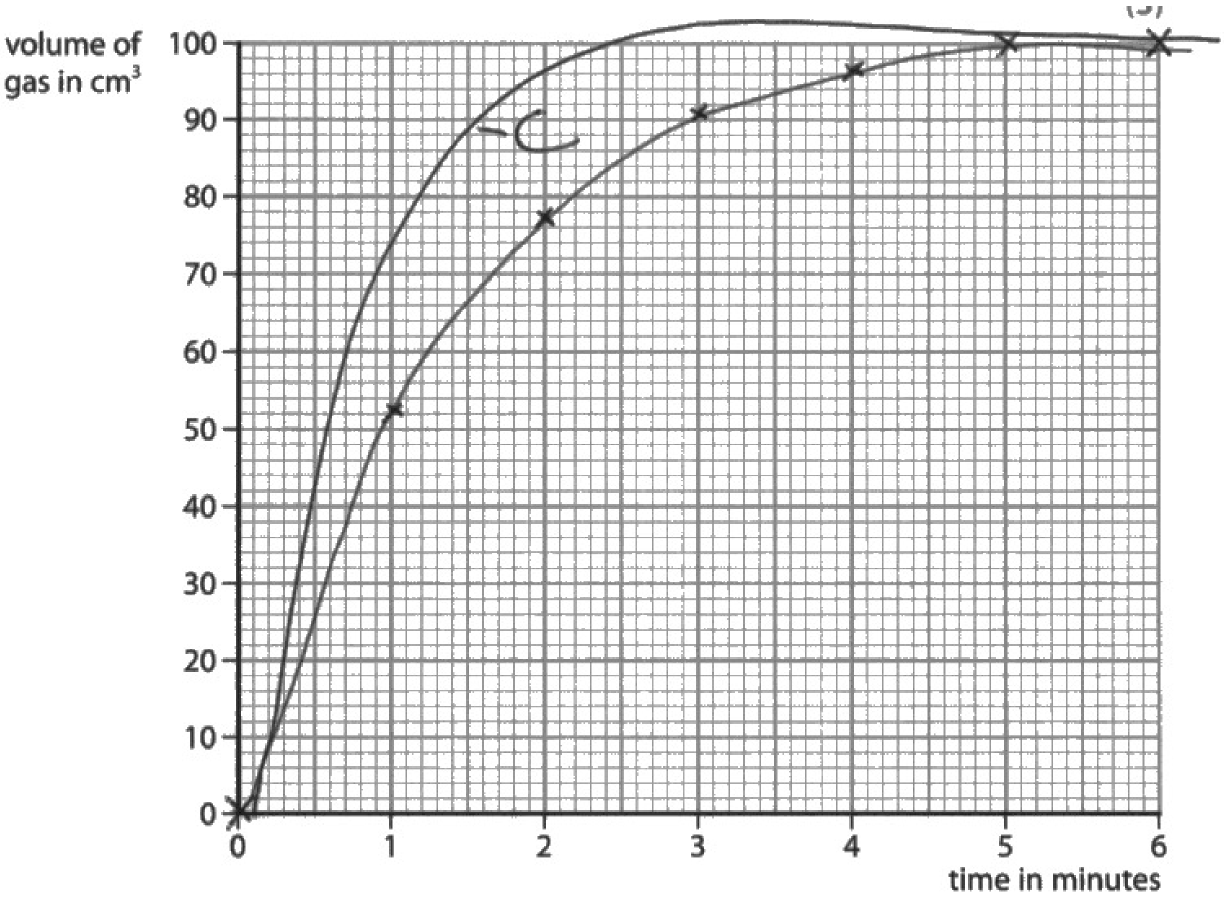
This question was often left out altogether, and those candidates who attempted to add a line often did not score. There seemed to be a massive amount of guesswork with lines all over the graph and not much apparent pattern to them. Sometimes a tangent was added and labelled as C, and occasionally a line showing a slower rate was drawn.

Overall, it appeared that candidates had no idea what this line should have looked like.



ResultsPlus
Examiner Comments

One commonly seen incorrect response simply drew a straight line between the origin and 6 minutes.

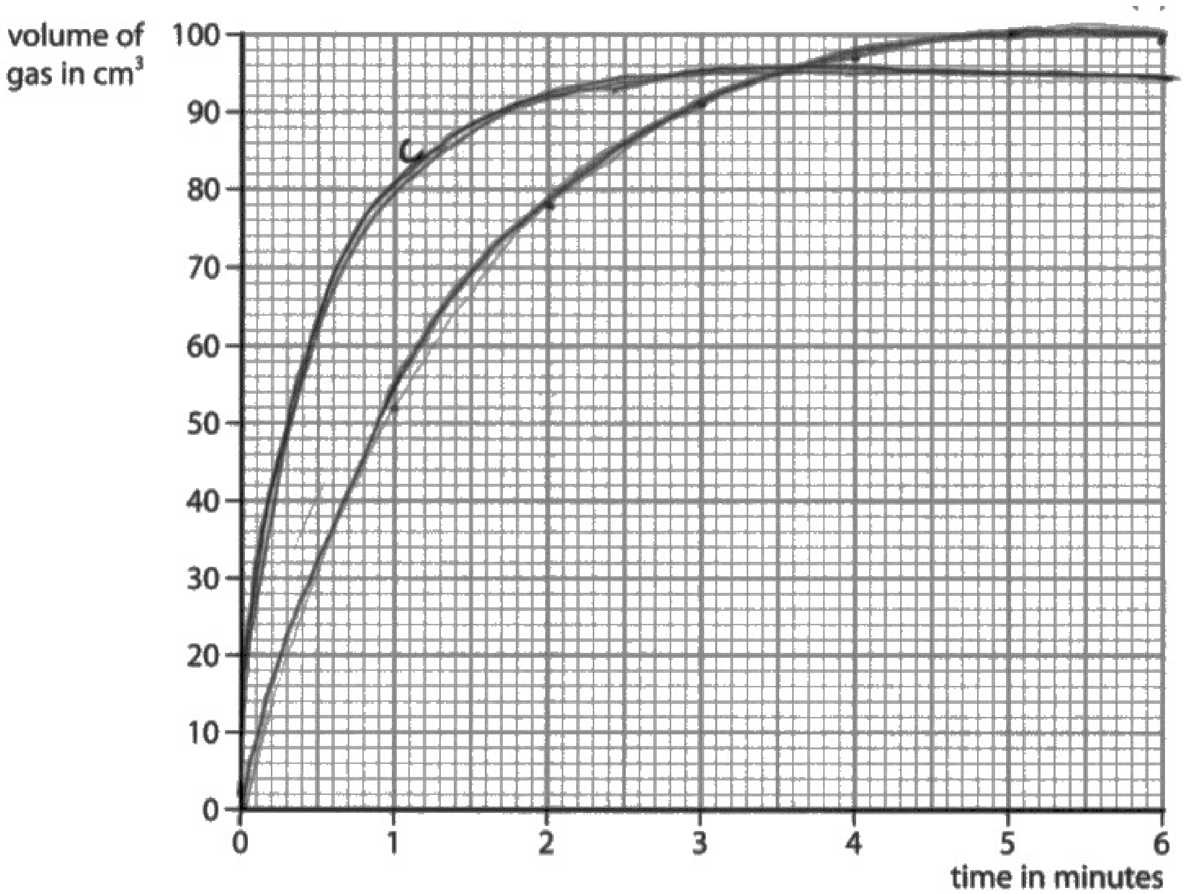


ResultsPlus
Examiner Comments

This response has the right idea of a steeper gradient and finishing at the same spot. However, the curve goes above the final volume and then back down, so the second marking point was not awarded.

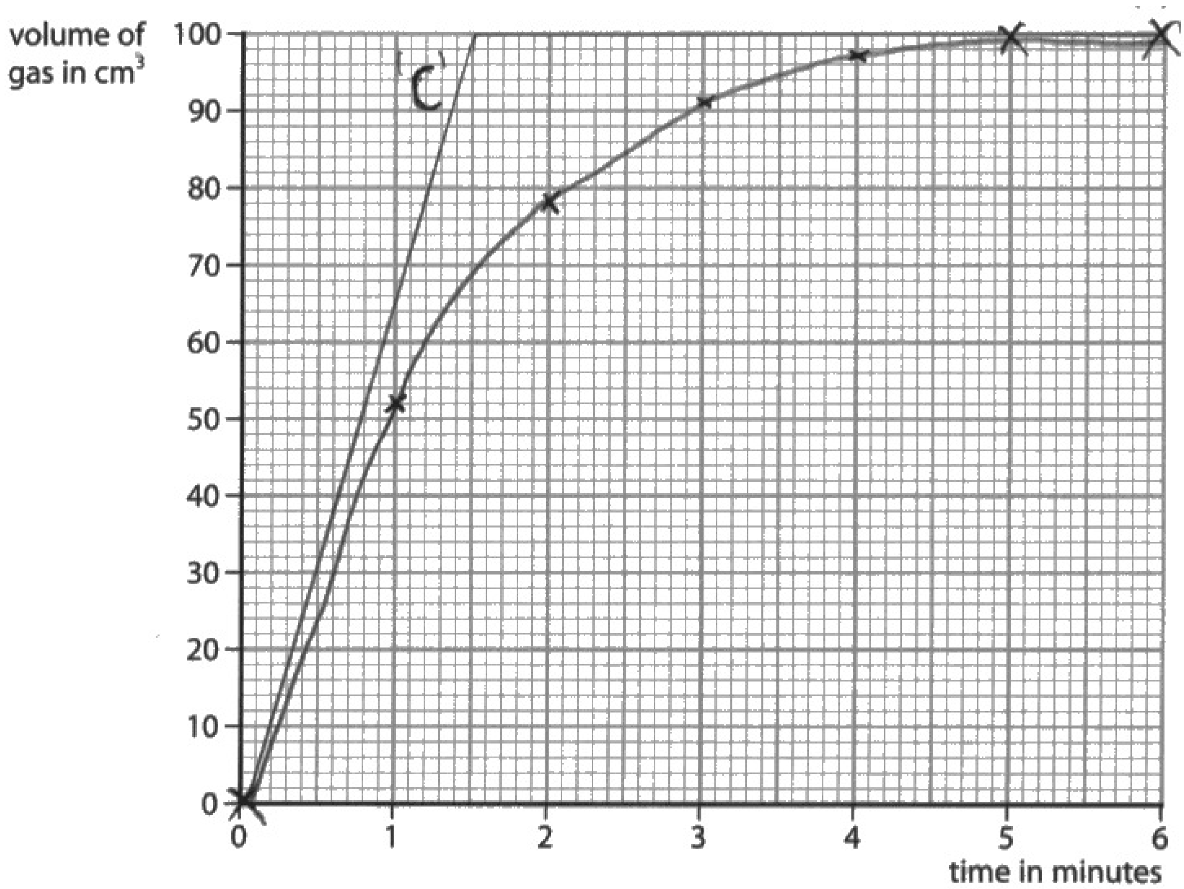
ResultsPlus
Examiner Tip

Practise drawing graphs of data from different rate of reaction practicals to become more familiar with these curves.



ResultsPlus
Examiner Comments

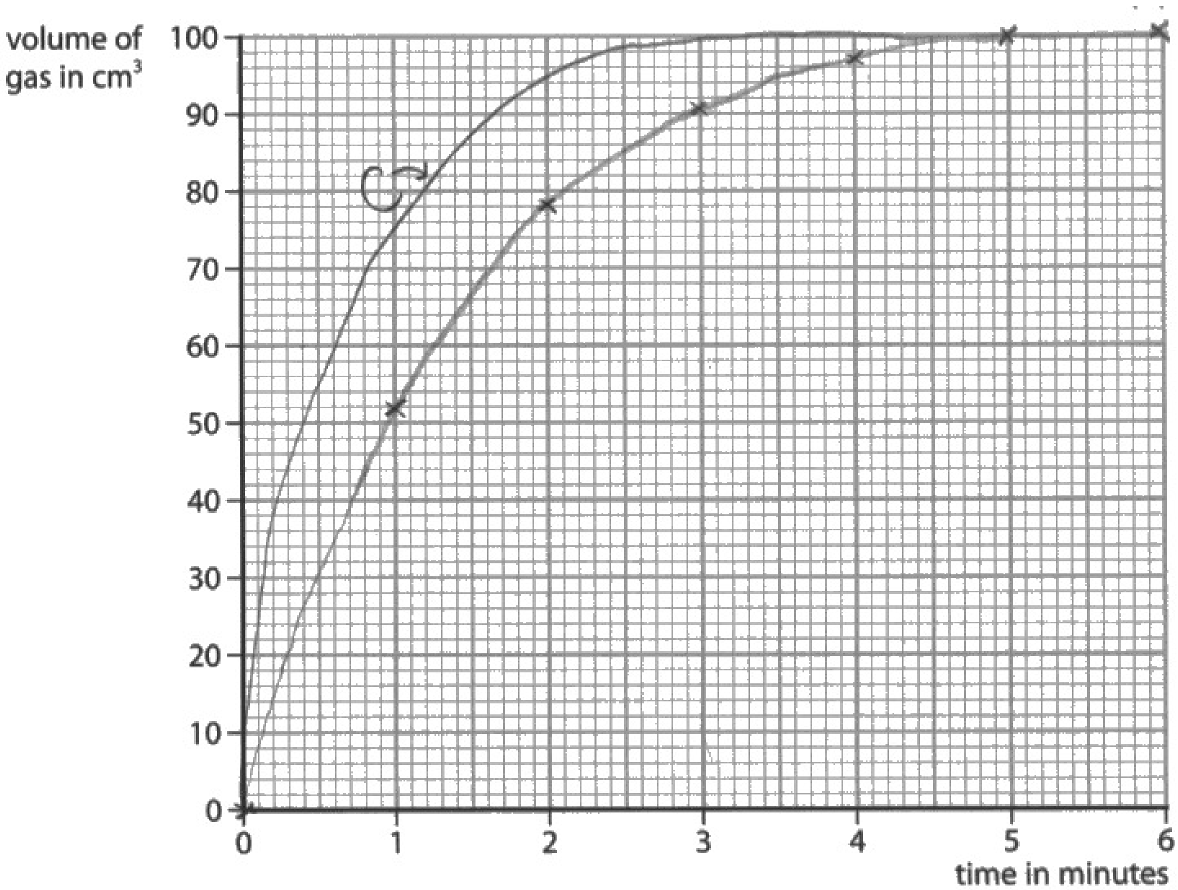
This response scored 1 mark for the steeper line at the beginning but did not score the second mark as the final volume of gas is around 95 cm^3 which is too low.



ResultsPlus
Examiner Comments

A number of candidates chose to use a ruler to draw the lines for this question. As long as the initial line was steeper and the second line drawn at 100 cm^3, then 2 marks were awarded.

Unfortunately, many of the ruler drawn lines simply had a steeper line initially and there was no horizonal line at the final volume and so they could not score the second mark.



ResultsPlus
Examiner Comments

A few candidates were able to draw a line that was both steeper initially and rose up to 100 cm^3.

This response scored 2 marks.

Question 5 (e)

Most candidates were able to identify an appropriate piece of equipment for measuring time, with the most common answer being a stopwatch or stop clock.

Question 6 (a)

This question is similar to one on paper 1, asking candidates to relate the electron configuration of an element to its position in the periodic table. This question was about groups and was answered better overall than the question about periods on the previous paper, although the majority of responses still scored 0 marks.

It was common to see answers stating some properties of alkali metals rather than linking back to electron configuration.

Candidates were not given the electron configuration of the alkali metals and therefore some that had correctly related the number of outer shell electrons to the group then went on to get the number of outer electron shells wrong.

6 Figure 13 shows some information about some group 1 metals.

group 1 metal	atomic number	relative atomic mass
lithium	3	7
sodium	11	23
potassium	19	39
rubidium	37	85
caesium	55	133

Figure 13

(a) Explain, in terms of their electronic configurations, why these metals are placed in group 1 of the periodic table.

(2)

they are the most reactive with water and oxygen and have a low density and melting point.

ResultsPlus
Examiner Comments

A large number of responses did not link their answer back to the electron configuration and instead gave some properties that are typical of alkali metals.

6 Figure 13 shows some information about some group 1 metals.

group 1 metal	atomic number	relative atomic mass
lithium	3	7
sodium	11	23
potassium	19	39
rubidium	37	85
caesium	55	133

2.5
2.8.8.5
2.8.8.8.8.5

Figure 13

(a) Explain, in terms of their electronic configurations, why these metals are placed in group 1 of the periodic table.

(2)

All electronic configurations end in 5 which shows their are 5 electrons on each outer shell. All elements in the same group have the same number of electrons on the outer shell.

ResultsPlus
Examiner Comments

Most responses that scored were awarded 2 marks, with 1 mark answers being very unusual.

In this example, the candidate has the right idea about group and outer shell electrons but has used the relative atomic mass to come up with an incorrect electron configuration and decided that there are 5 outer shell electrons.

6 Figure 13 shows some information about some group 1 metals.

group 1 metal	atomic number	relative atomic mass
lithium	3	7
sodium	11	23
potassium	19	39
rubidium	37	85
caesium	55	133

Figure 13

(a) Explain, in terms of their electronic configurations, why these metals are placed in group 1 of the periodic table.

(2)

they only have one electron in their outer shell

ResultsPlus
Examiner Comments

Some candidates were able to correctly link the group number to the electron configuration of the different elements.

Question 6 (c)

The majority of candidates did not score any marks for this question, with a large number of blank responses seen.

It is apparent that many candidates are not familiar with state symbols at all, even though they are regularly asked about, and this mark was awarded less often than the balancing mark.

(c) The word equation for the reaction of potassium with bromine is

potassium + bromine → potassium bromide

Add the missing state symbol and balance the equation for this reaction.

(2)

2 K(l) + Br_2(g) → 2 KBr(s)

ResultsPlus Examiner Comments

It was more common to see correct balancing than a correct state symbol.

This response scored 1 mark.

ResultsPlus Examiner Tip

Balanced equations are very common, but need to be practised as they contain a lot of information.

(c) The word equation for the reaction of potassium with bromine is

potassium + bromine → potassium bromide

Add the missing state symbol and balance the equation for this reaction.

(2)

....1.... K(....1....) + Br_2(g) → ....2.... KBr(s)

ResultsPlus
Examiner Comments

State symbols should be letters rather than numbers.

A number of candidates also put letters into the balancing gaps.

ResultsPlus
Examiner Tip

State symbols become straightforward once they have been practised.

(c) The word equation for the reaction of potassium with bromine is

potassium + bromine → potassium bromide

Add the missing state symbol and balance the equation for this reaction.

(2)

....2.... K(....S....) + Br_2(g) → ....2.... KBr(s)

ResultsPlus
Examiner Comments

Some candidates were able to balance the equation and also give the correct state symbol for potassium.

Question 6 (d)

Candidates are expected to know what an isotope is, and therefore defining the term should be straightforward.

Unfortunately, this was not the case here and only about a quarter of candidates on this paper scored any marks at all.

The most common misconception seen was to describe ions rather than isotopes, but there were other incorrect definitions. Isotopes have been confused with microscopes, types of triangle and even mitosis.

Some candidates got close to scoring marks by mentioning the different subatomic particles, but did not give enough detail about numbers to score any marks. Others did not score because they were confused between atoms and elements, or gave contradictory answers.

(d) A sample of potassium contains three isotopes, potassium-39, potassium-40 and potassium-41.

Explain the meaning of the term **isotopes**.

(2)

isotopes have the same ~~[illegible]~~ number of protons but different number of neutrons.

ResultsPlus
Examiner Comments

The simplest definition of an isotope is atoms that contain the same number of protons but different numbers of neutrons.

This response is concise and scores both marks.

(d) A sample of potassium contains three isotopes, potassium-39, potassium-40 and potassium-41.

Explain the meaning of the term **isotopes**.

(2)

isotopes are when they lose or gain a electron.

ResultsPlus
Examiner Comments

One of the most common errors was to give a description of ions rather than isotopes.

(d) A sample of potassium contains three isotopes, potassium-39, potassium-40 and potassium-41.

Explain the meaning of the term **isotopes**.

(2)

The same atom but with different relative atomic masses

ResultsPlus
Examiner Comments

This response is confused between atoms and elements.

Stating 'the same atom' suggests a single atom whereas 'the same element' would have suggested more than 1 atom.

ResultsPlus
Examiner Tip

Atoms and elements are not the same thing.

(d) A sample of potassium contains three isotopes, potassium-39, potassium-40 and potassium-41.

Explain the meaning of the term **isotopes**.

(2)

A same version of the element but with different number of protons, neutrons and electrons.

ResultsPlus
Examiner Comments

This response is contradictory and so does not score. The candidate states the same element, but then goes on to say that there will be a different number of protons, electrons and neutrons. This introduces both the idea of different elements and ions.

Question 6 (e)

The 6-mark question on this paper was about reactions of the alkali metals with water. There were many opportunities for candidates to score marks here, by giving observations, naming products, comparing reactivity and predicting reactions at the bottom of the group.

Unfortunately, a large number of candidates did not make any attempt to answer the question and there were a lot of blank responses.

Those candidates who made some attempt on the question usually scored at least 1 mark and often scored 3 or 4 marks. Most were able to give correct observations and compare the reactivity of the metals down the group. The most common observation was bubbles and / or a lilac flame for potassium and many could predict that rubidium and caesium would explode.

To get into Level 3, candidates had to be able to name at least one product from the reaction, and this was not seen very often. Sometimes the squeaky pop test was mentioned but this was not linked to testing for the hydrogen produced in the reaction.

Some candidates had the reactivity the wrong way round and predicted that rubidium and caesium would not react, but were still able to score some marks for correct observations.

*(e) The reactivity of the group 1 metals increases from lithium to caesium.

Often, teachers demonstrate the reactions of lithium, sodium and potassium with water.

These reactions can be used to predict the behaviour and reactions of rubidium and caesium with water.

Describe the reactions of each of the group 1 metals with water including the predicted behaviour and reactions of rubidium and caesium.

You may use word equations in your answer.

(6)

When sodium is mixed with water it beggins to bubble.

ResultsPlus
Examiner Comments

This sentence gives one correct observation for one alkali metal and is therefore worth a mark.

ResultsPlus
Examiner Tip

Even short responses may be worthy of some credit.

*(e) The reactivity of the group 1 metals increases from lithium to caesium.

Often, teachers demonstrate the reactions of lithium, sodium and potassium with water.

These reactions can be used to predict the behaviour and reactions of rubidium and caesium with water.

Describe the reactions of each of the group 1 metals with water including the predicted behaviour and reactions of rubidium and caesium.

You may use word equations in your answer.

(6)

~~because~~ The predictive reactions is that the rubidium would fizz around the water and release gas called hydrogen and as they go down the groups the reactions will become more significantly more reactive.

ResultsPlus
Examiner Comments

This is an example of a 2 mark response.

The candidate has given their observations specifically for rubidium. These observations are correct but the other metals in the group are not mentioned or compared, so this response could not get into Level 2.

*(e) The reactivity of the group 1 metals increases from lithium to caesium.

Often, teachers demonstrate the reactions of lithium, sodium and potassium with water.

These reactions can be used to predict the behaviour and reactions of rubidium and caesium with water.

Describe the reactions of each of the group 1 metals with water including the predicted behaviour and reactions of rubidium and caesium.

You may use word equations in your answer.

(6)

Group 1 metals react with water to form metal hydroxides and hydrogen gas. The reactivity increases down the group, so rubidium and caesium will be more reactive than the other group 1 metals. When rubidium and caesium react with water, they will produce more hydrogen gas and more heat than the other group 1 metals.

ResultsPlus
Examiner Comments

This response correctly identifies the products of the reaction and the increasing reactivity down the group by predicting that rubidium and caesium will react 'more'.

Unfortunately, there are no observations made about the reactions and so Level 3 could not be scored.

*(e) The reactivity of the group 1 metals increases from lithium to caesium.

Often, teachers demonstrate the reactions of lithium, sodium and potassium with water.

These reactions can be used to predict the behaviour and reactions of rubidium and caesium with water.

Describe the reactions of each of the group 1 metals with water including the predicted behaviour and reactions of rubidium and caesium.

You may use word equations in your answer.

(6)

Lithium would be the least reactive element in group 1 as when put in water the reaction takes the longest, if each piece was the same size in all the metals, and shows slight effervescing and decreased mass due to the Lithium dissolving.

The next metal, sodium, is more reactive than lithium due to when put in water the reaction happens a lot faster and more hydrogen bubbles get produced.

Potassium is even more reactive than both the other metals as the reaction is extremely fast and it has a pink flame on top of the water before it dissolves completely and stops bubbling really quickly. It is also really easy to cut through and turns darker inside, oxidises, when in contact with oxygen much faster

Rubidium and Caesium would a lot more reactive than the other three as the effervescing, dissolving and movement on the water would be much faster, frequent bubbles, and potentially exploding in the water due to it being so reactive.

ResultsPlus
Examiner Comments

This is an example of a Level 3 response.

The candidate has clearly set out their expected observations from lithium to rubidium and caesium and indicates that the reactions will happen faster down the group. The increased rate of production of hydrogen bubbles are mentioned as well as how quickly the metals will disappear.

The candidate also makes valid predictions for rubidium and caesium based on observations of the other metals.

*(e) The reactivity of the group 1 metals increases from lithium to caesium.

Often, teachers demonstrate the reactions of lithium, sodium and potassium with water.

These reactions can be used to predict the behaviour and reactions of rubidium and caesium with water.

Describe the reactions of each of the group 1 metals with water including the predicted behaviour and reactions of rubidium and caesium.

You may use word equations in your answer.

(6)

As we move up from lithium to caesium the reactivity also increases and become more survere. For example metals with a lower reaction like lithium, sodium and pottasium only produce small reaction. Take pottasium for example; this metal whe placed ~~on~~ in water ~~catches~~ slightly lights on fire and moves around the surface whilst bubbling the water, wich is the same for the majority of the ~~few~~ less reactive metals. However as we move up towards metals like caesium and other more reactive metals the reaction that takes place happens much quicker and with a larger after product. For example the metals could create more frequant bubbling, create large amounts of smoke and often makes loud bangs. If metals like rubidium was added to the water you migh expect to ~~here~~ hear a large explosive like bang wich produces both fire and a larger quantity of bubbles and or smoke, ~~th~~ showing that this test should not be done in an uncontrolled environment as is very likley to explode its container.

ResultsPlus
Examiner Comments

This is a good Level 2 response. The candidate gives three correct observations for potassium and then predicts that rubidium and caesium reactions will happen faster with more bubbles and explosions.

Unfortunately, no products are identified and so this response could not get into Level 3.

Paper Summary

Based on the performance in this examination paper, candidates should:

- Focus on using and improving their knowledge of scientific literacy, including key terms.
- Clearly show all working out for calculation questions.
- Ensure that their calculation answers are rounded correctly and given to the correct number of significant figures or decimal places if this is asked for in the question.
- Practise using information from the periodic table to calculate the number of subatomic particles in atoms of different elements.
- Focus on the difference between the command words 'describe' and 'explain'.
- Learn the names of equipment commonly used in chemistry practicals.
- Focus on the periodic table and the information it gives about atoms and elements.
- Practise plotting different data onto graphs and drawing lines of best fit.
- Make the effort to write clearly and legibly. Some candidates have lost marks because their work cannot be read by examiners.

Grade boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

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