Pearson
Edexcel

Examiners' Report
June 2025

Int GCSE Chemistry 4CH1 1CR

ResultsPlus

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at https://www.edexcel.com or https://www.btec.co.uk.

Alternatively, you can get in touch with us using the details on our contact us page.

ResultsPlus

Giving you insight to inform next steps

ResultsPlus is Pearson's free online service giving instant and detailed analysis of your students' exam results.

- See students' scores for every exam question.
- Understand how your students' performance compares with class and national averages.
- Identify potential topics, skills and types of question where students may need to develop their learning further.

For more information on ResultsPlus, or to log in, visit https://www.edexcel.com/resultsplus. Your exams officer will be able to set up your ResultsPlus account in minutes via Edexcel Online.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: https://www.pearson.com/uk.

June 2025

Publications Code 4CH1_1CR_2506_ER

Introduction

Question 1 is about states of matter and Question 2 is about rusting and both performed well. Question 4 is about atomic structure and performed well on the whole. There are quite a few five mark questions including producing crystals, structure and bonding of silicon dioxide and chemical tests. All of these discriminated well. Question 7 is an unusual question that is very different for a rate of a reaction question and this topic discriminated well. There appears to be better performance than in previous years and many candidates performed well with the calculations.

Question 1(b)

The question describes the particles in a gas. Three marks are required to answer the question.

(b) Describe the arrangement, movement and energy of the particles in a gas.

(3)

In a gas. particles are arranged randomly and is far apart from eachother. They move randomly and has freedom to move anywhere. The particle also has the most energy out of all the states and moves the fastest.

ResultsPlus
Examiner Comments

This is a good answer. All four marks are available for describing the arrangement, movement and energy so all three marks were awarded.

ResultsPlus
Examiner Tip

Three answers needed to gain all the marks.

(b) Describe the arrangement, movement and energy of the particles in a gas.

(3)

The particles in a gas can move freely.

ResultsPlus
Examiner Comments

One mark is awarded for the particles move freely.

ResultsPlus
Examiner Tip

There are three marks here, so there must be three different arrangements of particles to gain all three marks.

(b) Describe the arrangement, movement and energy of the particles in a gas.

(3)

- Arrangement :-
  Gas particles are far a part from eachother,
- Movement :-
- They move in random directions
- Energy :-
- The energy is high in gas particles

ResultsPlus
Examiner Comments

Three marks are awarded here.

ResultsPlus
Examiner Tip

This is a good way of showing the three bullet points to show arrangement, movement and energy.

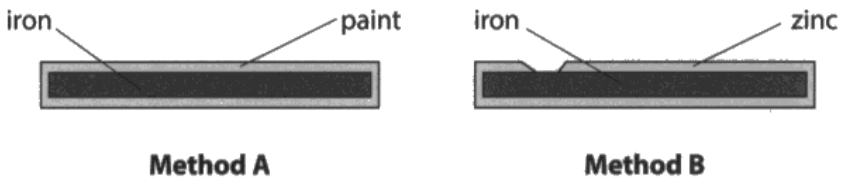
Question 2(a)ii

Candidates must show iron(III) oxide to gain the mark, not just iron oxide. Most candidates gave a correct answer.

Question 2(b)i

Most candidates gained two marks for describing a barrier method.

(b) The diagram shows method A and method B, which are both used to prevent iron from rusting.



Method A **Method B**

(i) Describe how method A prevents iron from rusting.

(2)

Paint prevents iron to react with oxygen and water from rusting.

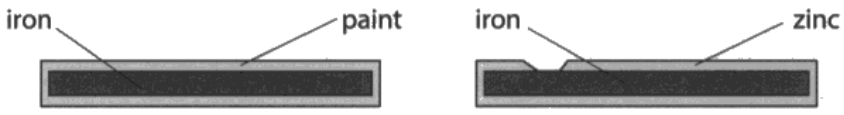
ResultsPlus
Examiner Comments

Needs to mention a barrier method or coating the paint to gain the first marking point, so just one mark awarded.

ResultsPlus
Examiner Tip

You need to mention why there is a barrier method to gain the first mark.

(b) The diagram shows method A and method B, which are both used to prevent iron from rusting.



Method A **Method B**

(i) Describe how method A prevents iron from rusting.

(2)

Painting provides a protective barrier that prevents the iron from reacting with oxygen

ResultsPlus
Examiner Comments

This is a good answer showing that painting provides a barrier that prevents the iron reacting with oxygen, so two marks awarded.

ResultsPlus
Examiner Tip

Method A shows the diagram and so needs to explain why it is a protective barrier.

Question 2(b)iii

Most candidates gained both marks for zinc is more reactive than iron and zinc reacts.

(iii) Explain how method B prevents iron from rusting even when the zinc layer is damaged.

(2)

Even the zinc layer is damaged or scratched, oxygen and water react with zinc. Because zinc is more reactive than iron and iron will not rust.

ResultsPlus
Examiner Comments

A good answer stating that zinc is more reactive than iron and that oxygen and water react with zinc rather than iron.

ResultsPlus
Examiner Tip

For two marks you must show zinc is more reactive.

(iii) Explain how method B prevents iron from rusting even when the zinc layer is damaged.

(2)

Zinc sacrificially protects iron by preferentially oxidising.

ResultsPlus
Examiner Comments

One mark for zinc sacrificially protects iron from oxidising.

ResultsPlus
Examiner Tip

This is an explain, so needs to say why zinc is more reactive than iron, as well as why it protects iron.

Question 3(b)

Most candidates gave M1 for move faster or particles have more kinetic energy. Some lost a mark for not mentioning more frequent collisions.

(b) The experiment is repeated with the water at a higher temperature.

Explain, in terms of particles, why the copper(II) hydroxide takes less time to form.

(2)

Because particles now have more kinetic energy meaning there are more frequent successful collisions per second. Therefore lowering the time taken to form

ResultsPlus
Examiner Comments

A good answer with more kinetic energy and frequent successful collisions per second.

ResultsPlus
Examiner Tip

This is an explain so needs to say why there are more collisions.

(b) The experiment is repeated with the water at a higher temperature.

Explain, in terms of particles, why the copper(II) hydroxide takes less time to form.

(2)

The particles move faster because the water is at a higher temperature they vibrate more which makes them faster.

One mark for particles move faster.

No explanation why they take less time, so just one mark awarded.

Question 3(c)ii

Most candidates knew the correct charge of either 2+, +2 or Cu2+. A few had the wrong charge such as 2-, 1-, 1+ or 3+.

Question 4(a)

Most candidates knew the first relative mass, but sometimes they did not put the +1 rather than 1, which was not acceptable. Many candidates just said 0 which was not creditworthy.

4 This question is about atoms and ions.

(a) Table 1 shows some information about sub-atomic particles.

Complete Table 1 by giving the missing information.

(3)

	Relative mass	Relative charge
Neutron	1	0
Proton	1	+1
Electron	1/2000	−1

Table 1

ResultsPlus
Examiner Comments

A good answer with all correct.

ResultsPlus
Examiner Tip

Learn the charges as these are often asked for.

4 This question is about atoms and ions.

(a) Table 1 shows some information about sub-atomic particles.

Complete Table 1 by giving the missing information.

(3)

	Relative mass	Relative charge
Neutron	1	0
Proton	1	+1
Electron	0	−1

Table 1

ResultsPlus
Examiner Comments

This was a common answer with 2 marks awarded.

ResultsPlus
Examiner Tip

Zero is not an acceptable answer. It needs to be a range between 1/1800 or 1/2000.

Question 4(c)

Most candidates had 2 marks for the same number of protons and different number of neutrons.

(c) A sample of lithium contains two isotopes, ^{6}Li and ^{7}Li.

In terms of sub-atomic particles, give one similarity and one difference between these isotopes.

(2)

similarity

Same ~~no~~ number of protons.

difference

Different number of neutrons.

ResultsPlus
Examiner Comments

Correct answer for both marks.

ResultsPlus
Examiner Tip

Must be number of to gain the marks.

(c) A sample of lithium contains two isotopes, ^{6}Li and ^{7}Li.

In terms of sub-atomic particles, give one similarity and one difference between these isotopes.

(2)

similarity

same number of neutrons

difference

different number of electrons

ResultsPlus
Examiner Comments

Unfortunately, the neutrons and electrons were the wrong way round so no marks awarded.

ResultsPlus
Examiner Tip

The two isotopes are shown 6 Li and 7 Li which was a way of showing there were different neutrons.

Question 4(d)

The majority of candidates gained all three marks for this calculation.

(d) A sample of magnesium contains 79.0% of ^{24}Mg, 10.0% of ^{25}Mg and 11.0% of ^{26}Mg.

Calculate the relative atomic mass, A_r, of this sample of magnesium.

Give your answer to one decimal place.

(3)

$$Ar\ (Mg) = \frac{(79 \times 24) + (10 \times 25) + (11 \times 26)}{100} = 24.3$$

A_r = 24.3

ResultsPlus
Examiner Comments

Clear answer gaining all three marks.

ResultsPlus
Examiner Tip

Remember to read all of the question before attempting the calculation.

(d) A sample of magnesium contains 79.0% of ^{24}Mg, 10.0% of ^{25}Mg and 11.0% of ^{26}Mg.

Calculate the relative atomic mass, A_r, of this sample of magnesium.

Give your answer to one decimal place.

Relative atomic mass, A_r = $\frac{(24 \times 79.0) + (25 \times 10.0) + (26 \times 11.0)}{100}$

= 24.32

A_r = 24.32

(3)

Gains two marks for 24.32.

Make sure you read the question as it should be one decimal place.

Question 5(a)

Most candidates gained either two or three marks. Colour is sometimes not correct.

5 This question is about elements in Group 7 of the Periodic Table.

(a) Complete the table by giving the missing information.

(3)

Element	Colour	Physical state at room temperature
fluorine	pale yellow	gas
chlorine	pale green	gas
bromine	brown	liquid
iodine	dark grey	solid
astatine	black	solid

ResultsPlus
Examiner Comments

A good answer, all correct.

ResultsPlus
Examiner Tip

Use the pattern to see how the physical states are going down.

5 This question is about elements in Group 7 of the Periodic Table.

(a) Complete the table by giving the missing information.

(3)

Element	Colour	Physical state at room temperature
fluorine	pale yellow	gas
chlorine	pale green	gas
bromine	orange	liquid
iodine	dark grey	solid
astatine	black	solid

ResultsPlus
Examiner Comments

Two marks for gas and solid but orange is not acceptable for bromine.

ResultsPlus
Examiner Tip

Learn the colour of bromine as it is often asked.

5 This question is about elements in Group 7 of the Periodic Table.

(a) Complete the table by giving the missing information.

(3)

Element	Colour	Physical state at room temperature
fluorine	pale yellow	gas
chlorine	pale green	solid
bromine		liquid
iodine	dark grey	solid
astatine	black	liquid

No marks as solid and liquid are in the wrong place.

The pattern goes gas, liquid and solid in this order. So, chlorine must be gas or liquid and astatine has to be a solid.

Question 5(b)i

This was not answered well by the majority of candidates.

(b) The order of reactivity of the Group 7 elements can be shown by using displacement reactions.

(i) When chlorine is added to sodium bromide solution, chlorine displaces bromine.

Give a chemical equation for this reaction.

(2)

$Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$

ResultsPlus
Examiner Comments

Correct answer and balanced so two marks awarded.

ResultsPlus
Examiner Tip

Remember that chlorine and bromine are always diatomic.

(b) The order of reactivity of the Group 7 elements can be shown by using displacement reactions.

(i) When chlorine is added to sodium bromide solution, chlorine displaces bromine.

Give a chemical equation for this reaction.

(2)

$Cl_2 + NaBr \rightarrow NaCl + Br_2$

ResultsPlus
Examiner Comments

All formulae are correct but have not been balanced, so just one mark awarded.

ResultsPlus
Examiner Tip

Don't forget to balance the equation.

(b) The order of reactivity of the Group 7 elements can be shown by using displacement reactions.

(i) When chlorine is added to sodium bromide solution, chlorine displaces bromine.

Give a chemical equation for this reaction.

(2)

$2Cl + 2NaBr \rightarrow 2NaCl + Br_2$

Unfortunately, 2Cl is not correct as must be diatomic so no marks awarded.

Remember all halogens are diatomic.

Question 5(b)ii

Most candidates knew there was no reaction and most had both marks.

(ii) Explain whether a reaction takes place when bromine water is added to sodium chloride solution.

(2)

No, chlorine is gas, bromine is liquid

ResultsPlus
Examiner Comments

Gained one mark for knowing there was no reaction, but nothing else was creditworthy.

ResultsPlus
Examiner Tip

You must explain why bromine is less reactive than chlorine for the second mark.

(ii) **Explain whether a reaction takes place when bromine water is added to sodium chloride solution.**

(2)

No, since bromine is less reactive than chlorine, so the chloride ion will not be displaced, from sodium chloride.

ResultsPlus
Examiner Comments

Explains why there is no reaction as bromine is less reactive than chlorine, so two marks awarded.

ResultsPlus
Examiner Tip

Make sure you use bromine and chlorine, not chloride or bromide as these were not allowed.

Question 5(b)iii

Many candidates lost a mark by using astatine rather than astatide.

(iii) The displacement reaction between potassium astatide and bromine can be represented by this ionic equation.

$$2At^- + Br_2 \rightarrow At_2 + 2Br^-$$

Explain why this is described as a redox reaction.

(2)

At^- loses electron and become oxidised

Br_2 gains electrons and become reduced

The reaction happens at the same time

ResultsPlus
Examiner Comments

A clear answer that states that At^- loses electrons and is oxidised and Br_2 gains electrons and is reduced so both marks awarded.

ResultsPlus
Examiner Tip

If you use the equation shown you can use At^- and Br_2 to be sure you use the right species.

(iii) The displacement reaction between potassium astatide and bromine can be represented by this ionic equation.

$$2At^- + Br_2 \rightarrow At_2 + 2Br^-$$

Explain why this is described as a redox reaction.

(2)

At loses electrons so is oxidised.

Bromine gains electrons so it is reduced

ResultsPlus
Examiner Comments

At is not allowed as we do not know if it was astatine or astatide ions, so just one mark for the bromine gains electrons and is reduced.

ResultsPlus
Examiner Tip

Use the equation to be sure you use the correct species.

(iii) The displacement reaction between potassium astatide and bromine can be represented by this ionic equation.

$$2At^- + Br_2 \rightarrow At_2 + 2Br^-$$

Explain why this is described as a redox reaction.

(2)

At is ~~oxidise~~ reduced because ~~loses~~ gains of electrons

Br is ~~reduced~~ oxidise because ~~gains~~ loses of electrons.

ResultsPlus
Examiner Comments

At and Br would not score even if the electrons losing or gaining electrons as At is not an ion and Br is not a correct formula. In this case At is reduced and gains electrons is wrong and Br is oxidised and loses electrons is wrong so no marks awarded.

ResultsPlus
Examiner Tip

Note that $2At^-$ must lose electrons to get At_2 and Br_2 must gain electrons to get $2Br^-$. Use this equation to work this out.

Question 6(b)

The majority of candidates got the marks for fizzing, bubbles or effervescence. Note that saying gas is produced is not creditworthy as it is not an observation.

Question 6(c)

Most candidates knew that all the hydrochloric acid was reacted. A few lost the mark by talking about magnesium rather than acid.

Question 6(d)

Many candidates could give a description of how the crystal was formed and gained four or five marks. Not heating or heating to dryness lost most of the marks. Some candidates missed the filtering mark in M1.

(d) **Describe what the student should do to the mixture formed in (c) to produce pure, dry crystals of hydrated magnesium chloride.**

(5)

Filter the excess magnesium to obtain magnesium chloride solution. Heat the filtrate to evaporate some of the water. Cool it down till crystals are formed. Filter to obtain pure crystals of hydrated magnesium chloride only. Dry them gently between two filter papers or leave in a warm place to dry.

ResultsPlus
Examiner Comments

This is a very good answer, which described the process clearly and gained all five marks.

ResultsPlus
Examiner Tip

It is a good idea to do a plan, by making a few bullet points before writing the description.

(d) Describe what the student should do to the mixture formed in (c) to produce pure, dry crystals of hydrated magnesium chloride.

(5)

Firstly ~~heat~~ up place the mixture on a petri dish. The heat is up to make all the water to evaporate. Then repeat ~~the~~ Step 2 ~~or~~ until you start to see crystals being formed. After you see crystals, leave out the petri-dish of crystals out in a place ~~to~~ with some sunlight to help any excess water to evaporate.

No M1 as not filtered initially. The candidate stated that heat is up to make all the water evaporate which implies that it was heated to dryness so can only gain M2. It went on to imply that the crystals were formed when the water was evaporated, but this cannot be scored, as all the water had already been evaporated.

Learn how the crystals are formed, as this description is often tested.

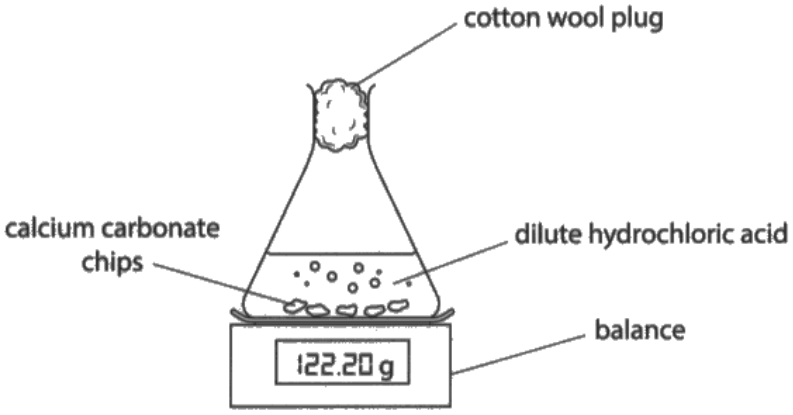
Question 7(a)

Many candidates gained two marks from this calculation, but very few knew that 120.00g needs to show the decimals to gain three marks.

7 A student reacts small chips of calcium carbonate with an excess of dilute hydrochloric acid.

This is the student's method.

- add 5.00 g of small calcium carbonate chips to a conical flask
- add 30 cm^3 of dilute hydrochloric acid which is in excess
- quickly add a cotton wool plug and place the conical flask on a balance



This is the equation for the reaction.

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$$

The reading on the balance decreases as carbon dioxide gas is lost through the cotton wool plug.

(a) Calculate the mass reading on the balance when all of the calcium carbonate has reacted.
Assume that all of the carbon dioxide gas is lost through the cotton wool plug.
[for $CaCO_3$, $M_r = 100$ for CO_2, $M_r = 44$]

(3)

$n_{CaCO_3} = \frac{5.00}{100} = 0.05$ mol

$n_{CaCO_3} : n_{CO_2} = 1 : 1$

$n_{CO_2} = 0.05$ mol

mass of CO_2 = $0.05 \times 44 = 2.20$ g

mass reading = $122.20 - 2.20$

$= 120$ g

mass = 120.00 g

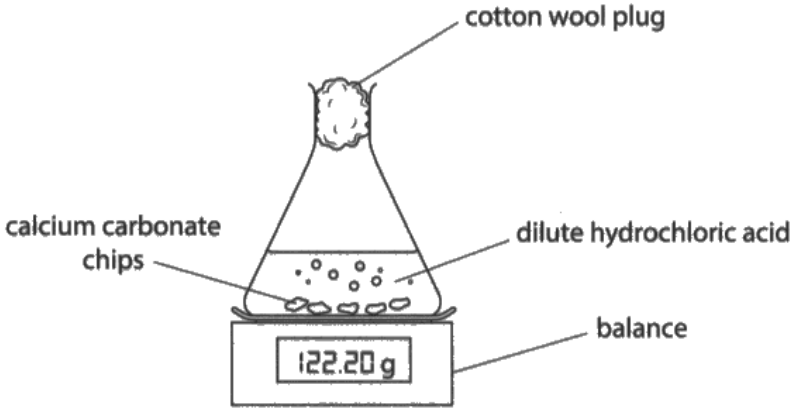
Perfect answer with all three marks.

As the scale shows 122.20g the answer should also be 120.00g

7 A student reacts small chips of calcium carbonate with an excess of dilute hydrochloric acid.

This is the student's method.

- add 5.00 g of small calcium carbonate chips to a conical flask
- add 30 cm^3 of dilute hydrochloric acid which is in excess
- quickly add a cotton wool plug and place the conical flask on a balance



This is the equation for the reaction.

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$$

The reading on the balance decreases as carbon dioxide gas is lost through the cotton wool plug.

(a) Calculate the mass reading on the balance when all of the calcium carbonate has reacted.
Assume that all of the carbon dioxide gas is lost through the cotton wool plug.
[for $CaCO_3$, $M_r = 100$ for CO_2, $M_r = 44$]

(3)

mol of $CaCO_3 = \frac{5}{100}$

$= 0.05$ mol

mol of CO_2 : mol of $CaCO_3 = 1:1$

mass of $CO_2 = 0.05 \times 44$

$= 2.2$ g

the reading of the balance = $122.2 - 2.2 = 120$

120

mass = ~~120~~ g

ResultsPlus
Examiner Comments

Many candidates gained for 120g but lost one mark for not showing the decimals.

ResultsPlus
Examiner Tip

Moles 0.05 and mass 2.2g would also gain two marks but it needs the decimals for three marks.

Question 7(b)i-iii

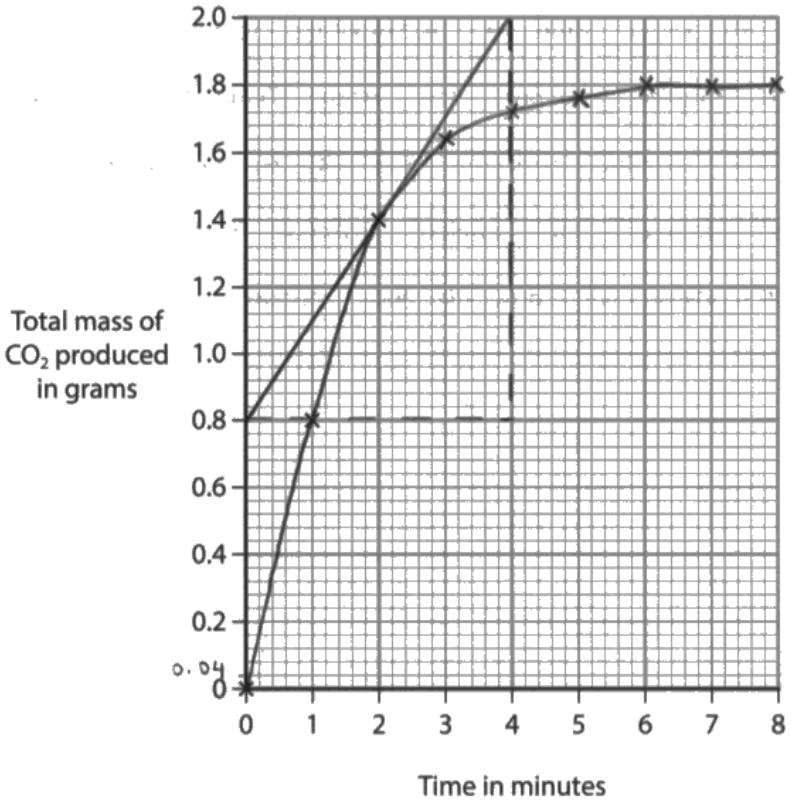
Many candidates knew to draw a tangent but did not always find the correct answer. Some lost a mark by g/m. This must be g/min as m could be mass rather than minutes. Curves were usually plotted accurately and the majority gave a smooth curve for all the points. Those candidates who didn't draw a tangent were only allowed one mark for g/min.

(i) Plot the student's results.
The first three have been plotted for you.

(1)

(ii) Draw a curve of best fit through the points.

(1)



(iii) Calculate the rate of reaction at 2 minutes by drawing a tangent to the curve and calculating the gradient of the tangent.

Give the units for the rate of reaction.

(3)

$\frac{1.2}{4} = 0.3$

rate of reaction = 0.3

units = g / min

ResultsPlus
Examiner Comments

A good answer, plotting correctly with a smooth curve. The tangent is drawn and the triangle has been shown clearly. The answer is correct and the units are correct so all marks were awarded.

ResultsPlus
Examiner Tip

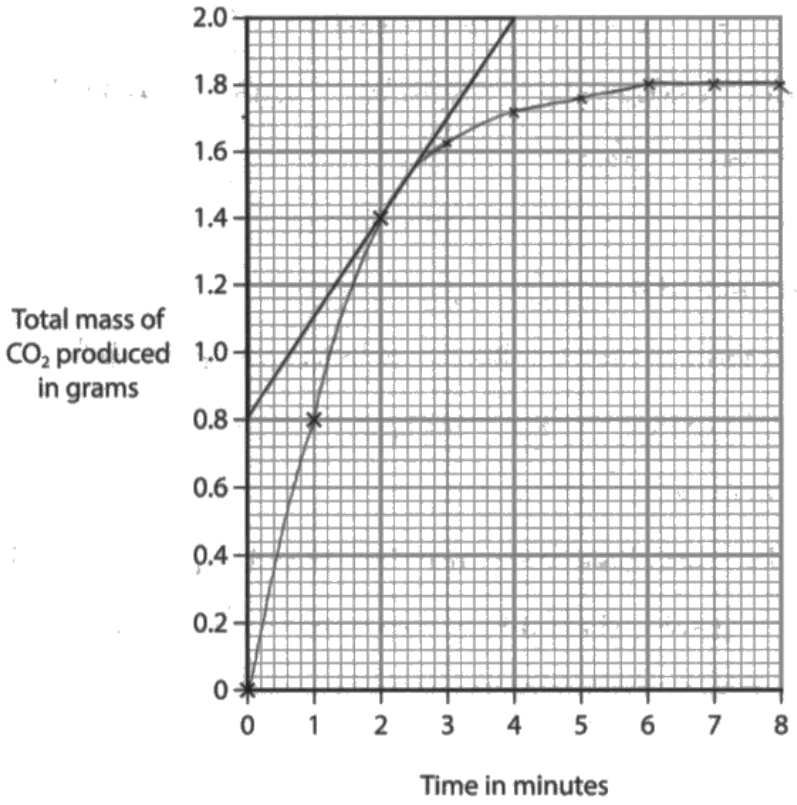
The question clearly says that the candidate needs to draw a tangent, so not doing that loses two marks straightaway.

(i) Plot the student's results.
The first three have been plotted for you.

(1)

(ii) Draw a curve of best fit through the points.

(1)



(iii) Calculate the rate of reaction at 2 minutes by drawing a tangent to the curve and calculating the gradient of the tangent.

Give the units for the rate of reaction.

(3)

rate of reaction = 2.4

units = g/m

The plots and curve are correct, with a tangent, but the rate of reaction was incorrect and g/m is incorrect so just three marks awarded.

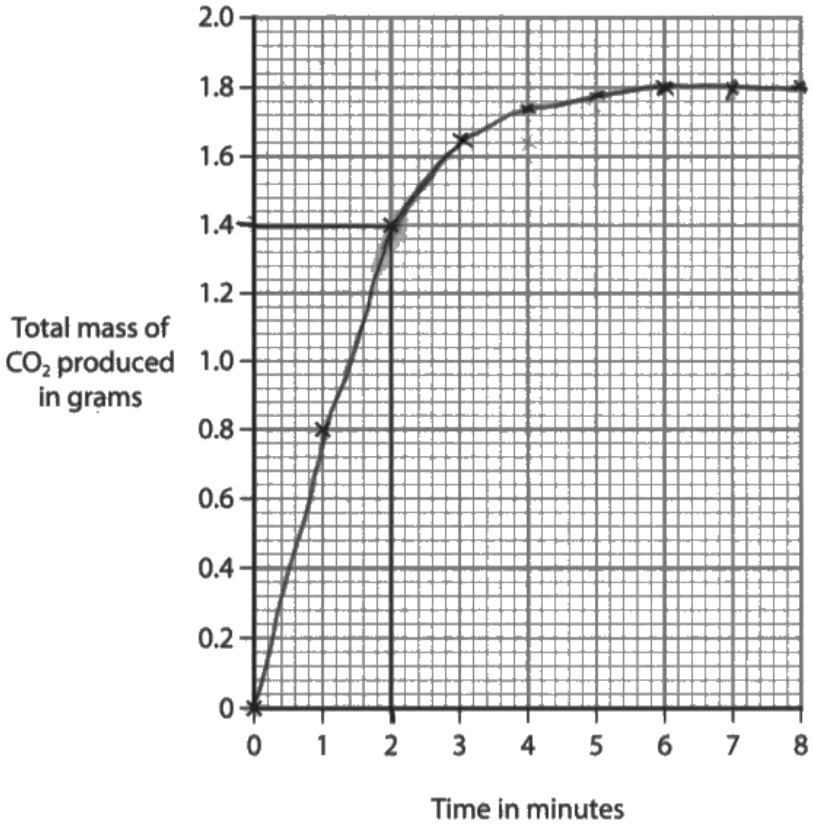
Show your working, with the triangle as 1.2 divided by 4 would have had the answer 0.3 and must be g/min not g/m.

(i) Plot the student's results.
The first three have been plotted for you.

(1)

(ii) Draw a curve of best fit through the points.

(1)



(iii) Calculate the rate of reaction at 2 minutes by drawing a tangent to the curve and calculating the gradient of the tangent.

Give the units for the rate of reaction.

(3)

$\frac{1.4}{2} = 0.7$

rate of reaction = 0.7

units = g/min

ResultsPlus
Examiner Comments

No tangent so loses 2 marks straightaway. Plots and curve are correct and g/min is correct so three marks awarded.

ResultsPlus
Examiner Tip

1.4 divided by 2 is incorrect as this is not the average rate of reaction. The question clearly says draw a tangent so make sure you answer the question.

Question 7(b)iv

This question discriminated well. The strong candidates explained the answers by looking at the three sections and explained the steepness of the graph, why it was the steepest and why it was less steep. A common answer was saying at 8 minutes it was horizontal but did not always say all the calcium carbonate was used up, rather than saying hydrochloric acid or carbon dioxide was used up.

(iv) Explain why the shape of the graph changes during the 8 minutes.

(4)

At between 0 to 2mins, the slope of the graph is steepest as ~~the~~ the rate of reaction is fastest ~~due to greater~~ rate particles ~~per biggest~~ as the surface area of the chips are greatest at that time. ~~At~~ Between 2 to 6 mins, the slop becomes less steep as the rate of reaction decreased due to the decrease in ~~the~~ frequency of successful particle collision ~~amount~~ per unit ~~volume~~ time. Between 6 to 8 mins, the slope becomes flat ~~due to the~~ as the ~~react~~ reaction is ended.

ResultsPlus
Examiner Comments

This was a good answer dividing each answer in sections. The first section was the steepest and then explaining why the rate of reaction is fastest and then less steep as the rate of reaction decreased. So, all four marks are awarded.

ResultsPlus
Examiner Tip

You need to mention the shape of the graph in each section and explain why the graph is steepest or less steep.

(iv) Explain why the shape of the graph changes during the 8 minutes.

(4)

In 0~2 mins ~~the~~, It's the steepest at ~~the first~~
since a lot of particles available for collision,
a lot of collision ~~per unit time~~
more chance of successful collision per unit time
In 2~6 mins ~~there~~, it became less steep,
less particles available for collision.
In 6~8 mins ~~At the last~~, it became flat,
since the reactant is used up.

ResultsPlus
Examiner Comments

The first minute is steepest for the first mark and it is less steep for the second mark but no explanation for either so it is limited to two marks. It does say it was flat but no mention of calcium carbonate used up, so still no explanation which limits it to two marks.

ResultsPlus
Examiner Tip

Explanations are required or otherwise only two marks can be awarded.

(iv) Explain why the shape of the graph changes during the 8 minutes.

(4)

After 8 minutes, there is no more reaction as all of the calcium carbonate have been used up and only hydrochloric acid is presented in the solution. Total mass of carbon ~~dioxide~~ produced also remains the same after 8 minutes. There is no ~~more~~ rate of reactions.

ResultsPlus
Examiner Comments

One mark for saying all the calcium carbonate was used up in 8 minutes, but there was no mention that the line is flat so just one mark awarded.

ResultsPlus
Examiner Tip

There is no mention of talking about the steepness or any relation with the curve which would limit us to only two marks. This is necessary when describing the shape of the curve.

Question 7(c)

This was well done by the majority of candidates. Most candidates stated how the rate of reaction increases and why the surface area increases for two marks. A few lost the third mark for not saying there were more frequent collisions.

(c) The student repeats the experiment using the same mass of calcium carbonate but as powder rather than chips, keeping all other conditions the same.

Explain the effect of this change on the rate of reaction.

(3)

Exchanging chips to powder increases the surface area of calcium carbonate. So more particles are exposed, and the particles collide more frequently. So there are more successful collisions per unit time. So the rate of reaction increases.

ResultsPlus
Examiner Comments

A good answer covering all the points, so three marks awarded.

ResultsPlus
Examiner Tip

The explanation needs to explain why the rate of reaction increases.

(c) The student repeats the experiment using the same mass of calcium carbonate but as powder rather than chips, keeping all other conditions the same.

Explain the effect of this change on the rate of reaction.

(3)

Using powder decreases the surface area, allowing more collisions to take place and increasing the rate of reaction.

ResultsPlus
Examiner Comments

This candidate thought that powder decreases the surface area so no mark for M2. More collisions take place is not enough for more collisions as no mention per unit time so no M3. One mark for increasing the rate of reaction.

ResultsPlus
Examiner Tip

Make sure you say more collisions per unit time or more frequent collisions to gain the third mark.

Question 8(a)

Those candidates who learned the definitions gained two marks for shared pairs of electrons and nuclei. A few lost both marks for mentioning intermolecular forces.

8 This question is about the covalent compounds hydrogen chloride and silicon dioxide.

(a) Describe the forces of attraction in a covalent bond.

(2)

Electrostatic force of attraction between a shared pair of electrons and their nuclei.

ResultsPlus
Examiner Comments

A good answer that had learnt the definition.

ResultsPlus
Examiner Tip

Learn the definition as it is often tested.

8 This question is about the covalent compounds hydrogen chloride and silicon dioxide.

(a) Describe the forces of attraction in a covalent bond.

(2)

Electrons are shared between atoms which are attracted to the nucleis.

ResultsPlus
Examiner Comments

This lost one mark for not saying a pair of electrons are shared. One mark for attracted to nuclei.

ResultsPlus
Examiner Tip

Nuclei must always be plural to gain the mark.

8 This question is about the covalent compounds hydrogen chloride and silicon dioxide.

(a) Describe the forces of attraction in a covalent bond.

(2)

Covalent is a bond between ~~non-metals~~ two non-metals and is held together by ~~friction~~ sharing electrons.

No mention of sharing a pair of electrons and no mention of nuclei so no marks.

Remember to always mention a shared pair of electrons to gain a mark.

Question 8(b)i

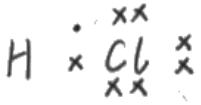
Many correct answers showing the dot and cross diagrams. Some candidates lost a mark for adding an extra hydrogen electron. A few candidates gave an ionic structure and a few added two hydrogens to one chlorine, so no marks awarded.

(b) Hydrogen chloride has the formula HCl

(i) Draw a dot-and-cross diagram to show the bonding in a hydrogen chloride molecule.

Show only the outer shell electrons in each atom.

(2)



ResultsPlus
Examiner Comments

A correct dot and cross diagram. It is not necessary to put the dots and crosses around the rings.

ResultsPlus
Examiner Tip

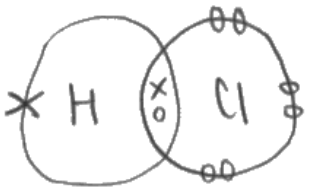
Look at the Periodic Table so you know how many electrons there are in hydrogen and chlorine.

(b) Hydrogen chloride has the formula HCl

(i) Draw a dot-and-cross diagram to show the bonding in a hydrogen chloride molecule.

Show only the outer shell electrons in each atom.

(2)



ResultsPlus
Examiner Comments

Gained one mark for a shared pair of electrons but lost one mark for adding an extra x on hydrogen.

ResultsPlus
Examiner Tip

If you look at the Periodic Table you can see that H only has one electron.

(b) Hydrogen chloride has the formula HCl

H^+ Cl^-

(i) Draw a dot-and-cross diagram to show the bonding in a hydrogen chloride molecule.

Show only the outer shell electrons in each atom.

(2)

ResultsPlus
Examiner Comments

The clue in the question says that hydrogen chloride is a molecule so it is not ionic, so no marks awarded.

ResultsPlus
Examiner Tip

Make sure you read the question and you can see that it is HCl, not H_2Cl.

Question 8(b)ii

Some candidates lost both marks for not realising weak intermolecular forces are involved. Those who scored the first marking point lost the second point for saying there was **less** energy to overcome or to break the bond.

(ii) Explain why the boiling point of hydrogen chloride is low.

(2)

Hydrogen chloride has a simple molecular structure with weak ~~intermole~~ intermolecular forces between the ~~structure~~ molecular structure. Therefore it requires ~~les~~ low amount of energy to break the ~~bonds~~ forces.

ResultsPlus
Examiner Comments

This is a clear answer saying the weak intermolecular forces requires low energy to break the forces for both marks.

ResultsPlus
Examiner Tip

Low boiling point is a clue to realise there are weak intermolecular forces.

(ii) Explain why the boiling point of hydrogen chloride is low.

(2)

because there is only one small bond between hydrogen and chlorine which requires a low amount of energy to break down

ResultsPlus
Examiner Comments

This implies that the bond between hydrogen and chlorine is broken and no mention of weak intermolecular forces, so no marks awarded.

ResultsPlus
Examiner Tip

This depends on mentioning the weak intermolecular forces, so if this is not mentioned there are no marks.

(ii) Explain why the boiling point of hydrogen chloride is low.

(2)

Hydrogen chloride ~~has a~~ is a simple molecular structure, where molecules are weakly held by intermolecular forces, so less energy is required to overcome the forces, resulting ~~in~~ in low boiling point.

ResultsPlus
Examiner Comments

One mark for weak intermolecular forces, but no second mark for less energy to overcome, as this is not a comparison.

ResultsPlus
Examiner Tip

If not using a comparison use a little amount of energy rather than less amount of energy.

Question 8(c)i

Many candidates stated that oxygen is a smaller atom and gained the mark. Others said oxygen was bonded to two silicon atoms or said silicon is bonded to four oxygen atoms. Oxygen has two shells and silicon has three shells were rarely seen. Some candidates lost a mark by saying silicon is bonded by two oxygen atoms.

Question 8(c)ii

Very few candidates gained a mark. They did not realise that silicon dioxide was acidic or calcium oxide was basic so no marks could have been awarded.

Question 8(c)iii

This question discriminated well. Some candidates lost marks for talking about intermolecular forces, which were not present in silicon dioxide. Others talked about diamond rather than silicon dioxide.

(iii) Silicon dioxide has the same structure as diamond.
Silicon dioxide is very hard and has a very high melting point.

Explain these properties.

Refer to the structure and bonding of silicon dioxide in your answer.

(5)

SiO_2 has a high melting point because it has a giant covalent structure, so to melt it, strong covalent bonds need to be ~~broken~~ overcome, which requires a large amount of heat energy. It is hard because it ~~is / has a~~ it is in a tetrahedral lattice where each Si atom is covalently bonded with two oxygen atoms. It does not have layers that can slide over each other.

ResultsPlus
Examiner Comments

This was a good answer with five marks covered. M1 giant covalent structure, M2 strong covalent bonds, M3 requires a large amount of energy to overcome, M4 tetrahedral lattice, M6 does not have layers.

ResultsPlus
Examiner Tip

It is a good idea to make a plan using bullet points before writing the structure and bonding.

(iii) Silicon dioxide has the same structure as diamond.
Silicon dioxide is very hard and has a very high melting point.

Explain these properties.

Refer to the structure and bonding of silicon dioxide in your answer.

(5)

Silicon dioxide has giant covalent structure. ~~and it is bonded with strong covalent bond and more heat energy is needed to break the strong covalent bond~~. It has strong force of attraction between shared pair of electrons and nucleis. Large amount of heat energy is needed to break the strong covalent bond. Silicon dioxide have ~~covalen~~ strong carbon-carbon bond that is why it is hard

Three marks for M1 giant covalent structure, M2 strong covalent bond, M3 large amount of heat energy to break.

There are three points but needed M4, M5 or M6 to gain all five marks.

Question 9(b)

Those candidates that mention sulfur burns and forms sulfur dioxide often gained either two or three marks. Unfortunately, if sulfur or sulfur dioxide was not mentioned, no marks were awarded for water dissolves to form acid rain as this is dependent on either M1 or M2. Some candidates discussed nitrogen dioxide or carbon dioxide instead of sulfur so no marks could be awarded.

(b) Many fuels are obtained from the fractional distillation of crude oil.

Explain how the combustion of a common impurity in fuels causes acid rain.

(3)

When nitrogen is reacted with oxygen, ~~in the~~ nitrogen oxide is formed. When it go up in the atmosphere, it react with water vapour and form acid rain.

ResultsPlus
Examiner Comments

Unfortunately, nitrogen not sulfur was discussed so no marks for react with water vapour to form acid rain.

ResultsPlus
Examiner Tip

Nitrogen is not present in fractional distillation. It is sulfur that is present in crude oil.

(b) Many fuels are obtained from the fractional distillation of crude oil.

Explain how the combustion of a common impurity in fuels causes acid rain.

(3)

Combustion of a common impurity causes greenhouse gases such as sulphur dioxide and carbon dioxide to be released ~~from~~ into the air. These gases will rise and react with the rain water, causing acid rain to form.

ResultsPlus
Examiner Comments

Ignore greenhouse gases and carbon dioxide. Sulfur was not mentioned so no M1 but sulfur dioxide was mentioned so M2 and M3 to react with the rainwater, so two marks awarded.

(b) Many fuels are obtained from the fractional distillation of crude oil.

Explain how the combustion of a common impurity in fuels causes acid rain.

(3)

Fuels contain sulfur. When they are burned, sulfur reacts with oxygen and sulfur dioxide is formed. Sulfur dioxide reacts with water and oxygen to form sulfuric acid (H_2SO_4). This sulfuric acid causes acid rains.

All points are covered so all three marks awarded.

Start with sulfur combusts and then explain why sulfur dioxide forms and why it forms acid rains.

Question 9(c)i

Many candidates knew the correct temperature and silica or alumina was often answered. Learn these conditions as it is often tested.

Question 9(c)ii

The majority of candidates stated that short chain had higher demand. M3 quite often stated that alkenes produced polymers but not many candidates mentioned alkanes were more flammable, however some gained a mark for saying it was useful for petrol or gasoline. The majority of candidates usually gained two marks.

(ii) Explain why cracking is a useful process in the oil industry.

(3)

it breaks down less useful long chain hydrocarbons into more useful short chain hydrocarbons

ResultsPlus
Examiner Comments

This gained one mark for saying long chain hydrocarbons are less useful and short chain more useful. Nothing else was creditworthy.

ResultsPlus
Examiner Tip

This was just one mark. An explain is needed to say why alkanes are more flammable or why alkenes produced polymers.

(ii) Explain why cracking is a useful process in the oil industry.

(3)

- It converts long-chain hydrocarbons into more useful short-chain hydrocarbons
- ~~Short-ch~~ Short-chain alkanes are ~~more~~ more useful as they are more flammable
- Short-chain alkenes can be used to produce polymers
- Short-chain alkanes have higher demand, long-chain hydrocarbons are in low demand

ResultsPlus
Examiner Comments

A good answer covering three marking points.

ResultsPlus
Examiner Tip

For three marks candidates need to explain why short chain is more useful and why alkanes were more useful as they are flammable and why alkenes produce polymers.

Question 9(d)i

The majority of candidates gained both marks for stating same molecular formula and different displayed formula.

(d) The formula C_5H_{12} represents three isomers.

(i) Explain what is meant by the term **isomers**.

(2)

Same general formula but different structural formula.

ResultsPlus
Examiner Comments

Same general formula is not correct but one mark for different structural formula.

ResultsPlus
Examiner Tip

Isomers are often tested so learn the definitions.

(d) The formula C_5H_{12} represents three isomers.

(i) Explain what is meant by the term **isomers**.

(2)

- same molecular formula
- different display formula

ResultsPlus
Examiner Comments

Precise and correct, two marks.

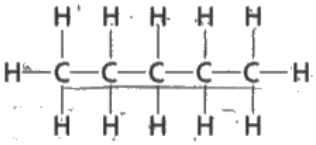
ResultsPlus
Examiner Tip

Good way of showing the two bullet points.

Question 9(d)ii

The majority of candidates gained one mark, but only the minority gained both marks. Candidates need to appreciate that just taking an angle is the same as a straight chain so not creditworthy.

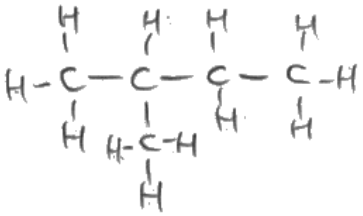
(ii) This is the displayed formula of one of the isomers.

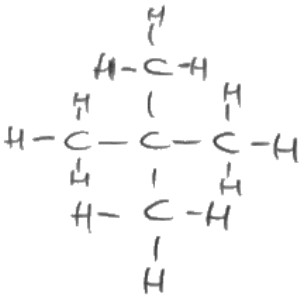


pentane.

Draw the displayed formula of each of the other two isomers.

(2)





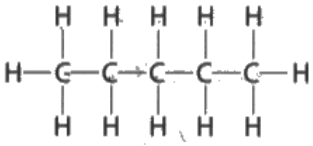
ResultsPlus
Examiner Comments

A good answer showing the two different isomers for two marks.

ResultsPlus
Examiner Tip

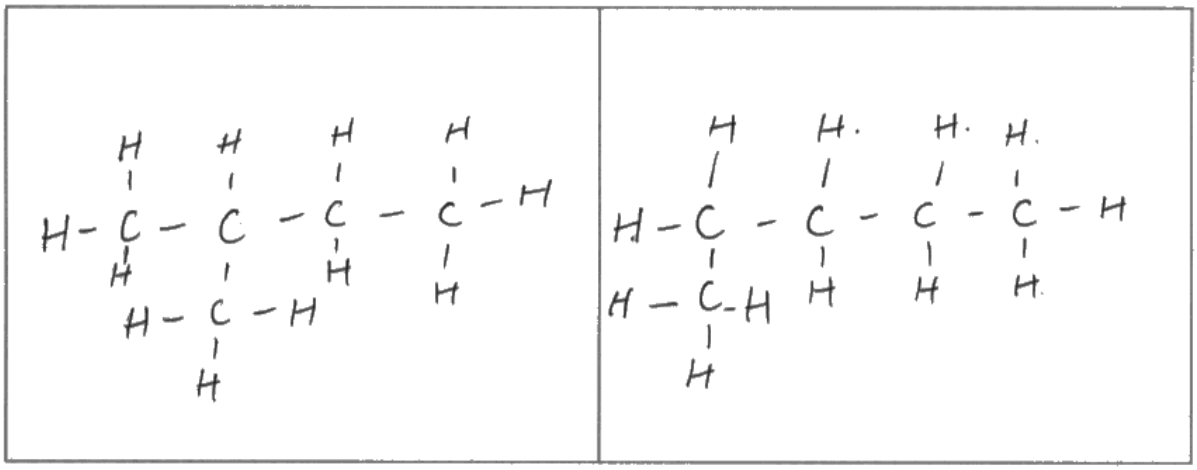
Make sure you add each one of them on a middle chain rather than just adding on the end.

(ii) This is the displayed formula of one of the isomers.



Draw the displayed formula of each of the other two isomers.

(2)



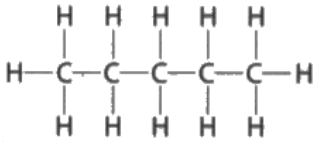
ResultsPlus
Examiner Comments

One mark for the first diagram but just adding one on the end is the same as a straight pentane so not creditworthy.

ResultsPlus
Examiner Tip

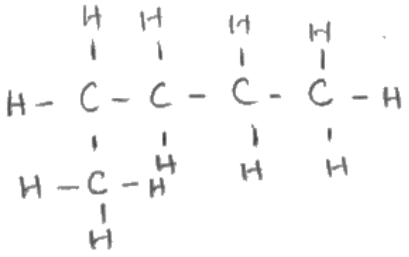
You need to put two carbons in the middle to get the second mark.

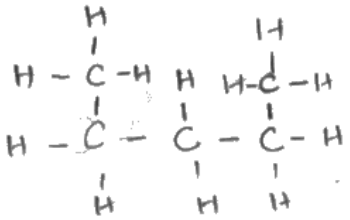
(ii) This is the displayed formula of one of the isomers.



Draw the displayed formula of each of the other two isomers.

(2)





ResultsPlus
Examiner Comments

Unfortunately, no marks awarded as both are pentane.

ResultsPlus
Examiner Tip

Just adding them at the ends at ninety degrees was still pentane so no marks awarded.

Question 10(a)i

The majority of candidates suggested the polystyrene cup and explained that heat would be lost for two marks.

10 A student investigates the reaction between zinc and copper(II) sulfate solution.

This is the equation for the reaction.

$$Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$$

This is the student's method.

Step 1 add 25.0 cm^3 of copper(II) sulfate solution to a glass beaker
Step 2 record the temperature of the solution
Step 3 add between 5 g and 6 g of zinc powder (an excess) and stir the mixture
Step 4 record the highest temperature reached

(a) (i) Explain an improvement to step 1 to produce a more accurate temperature rise.

(2)

record the temperature of the solution before adding the 25.0 cm^3 of copper(II) sulfate then add it.

ResultsPlus
Examiner Comments

This was not an improvement as it just stated record the temperature in step 2, so nothing creditworthy.

ResultsPlus
Examiner Tip

Record the temperature was in the question so not creditworthy. There must be some way to prevent heat loss to gain the marks.

10 A student investigates the reaction between zinc and copper(II) sulfate solution.

This is the equation for the reaction.

$$Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$$

This is the student's method.

Step 1 add 25.0 cm^3 of copper(II) sulfate solution to a glass beaker
Step 2 record the temperature of the solution
Step 3 add between 5 g and 6 g of zinc powder (an excess) and stir the mixture
Step 4 record the highest temperature reached

(a) (i) Explain an improvement to step 1 to produce a more accurate temperature rise.

(2)

Use a styrafoam cup with a lid to insulate it, can also use a put it in a glass beaker with cotton balls for further insulation

ResultsPlus
Examiner Comments

One mark for using a Styrofoam cup with a lid but no explanation why less heat would be lost.

ResultsPlus
Examiner Tip

Needs to explain the improvement to get the second mark.

10 A student investigates the reaction between zinc and copper(II) sulfate solution.

This is the equation for the reaction.

$$Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$$

This is the student's method.

Step 1 add 25.0 cm^3 of copper(II) sulfate solution to a glass beaker
Step 2 record the temperature of the solution
Step 3 add between 5 g and 6 g of zinc powder (an excess) and stir the mixture
Step 4 record the highest temperature reached

(a) (i) Explain an improvement to step 1 to produce a more accurate temperature rise.

(2)

use a polystyrene cup instead of an glass beaker, to reduce heat loss to the surroundings then covers the cup with a lid

ResultsPlus
Examiner Comments

A clear answer stating that a polystyrene cup was used instead of a glass beaker and reduce heat loss to the surroundings. So, two marks awarded.

ResultsPlus
Examiner Tip

Must be a way why there was an improvement and an explanation on reducing heat loss.

Question 10(a)ii

The majority of candidates knew that zinc was in excess.

Question 10(a)iii

Surprisingly this was not well done with only the minority gaining one mark. Quite a few candidates knew that the colour was blue but instead of colourless was often white or grey or some other colour. White is not acceptable; it must be colourless. A variety of different colours was often seen.

Question 10(b)

This was well done by the majority. A few candidates lost the wrong mass but still scored two marks or occasionally lost a mark for incorrect rounding. Most had all three marks for Q10(b)(i), but fewer for Q10(b)(ii) getting four marks. Common mistakes were not showing -95 instead of either +95 or just 95. Some candidates did not divide by 1000 so lost another mark.

(b) (i) The table shows the student's results.

volume of copper(II) sulfate solution in cm^3	25.0
initial temperature of the copper(II) sulfate solution in °C	18.5
final temperature of the copper(II) sulfate solution in °C	48.6

Calculate the heat energy change (Q) in joules (J).

[for the solution, c = 4.2 J/g/°C]
[mass of 1.0 cm^3 of solution = 1.0 g]

(3)

$Q = mc\Delta T$

$= 25 \times 4.2 \times 30.1$

$= 3160.5\ J$

$Q =$ 3160.5 J

(ii) The student repeats the experiment and calculates Q as 3800 J.
The solution used contains 6.38 g of copper(II) sulfate.

Calculate the molar enthalpy change, ΔH, in kJ/mol.
Include a sign in your answer.
[for $CuSO_4$, M_r = 159.5]

(4)

mole of $CuSO_4 = \frac{6.38}{159.5} = 0.04$ mol

$\Delta H = \frac{Q}{n} = \frac{3800 \div 1000}{0.04} = -95$ kJ/mol

$\Delta H =$ −95 kJ/mol

ResultsPlus
Examiner Comments

A perfect answer gaining all seven marks.

ResultsPlus
Examiner Tip

Show your working clearly as if you make a mistake, you can sometimes pick up other marks for error carried forward.

(b) (i) The table shows the student's results.

volume of copper(II) sulfate solution in cm^3	25.0
initial temperature of the copper(II) sulfate solution in °C	18.5
final temperature of the copper(II) sulfate solution in °C	48.6

Calculate the heat energy change (Q) in joules (J).

[for the solution, c = 4.2 J/g/°C]
[mass of 1.0 cm^3 of solution = 1.0 g]

(3)

$Q = mc\Delta T$

$Q = 25 \times 4.2 \times 30.1$

$Q = 3160.5\ J$

$Q =$ 3160.5 J

(ii) The student repeats the experiment and calculates Q as 3800 J.
The solution used contains 6.38 g of copper(II) sulfate.

Calculate the molar enthalpy change, ΔH, in kJ/mol.
Include a sign in your answer.
[for $CuSO_4$, M_r = 159.5]

(4)

$\text{mol} = \frac{\text{mass}}{Mr}$

$\text{mol} = \frac{6.38}{159.5}$

$\text{mol} = 0.04\ \text{mol}$

$\Delta H = \frac{Q}{\text{mol}}$

$= \frac{3160.5}{0.04}$

$= \frac{79012.5}{1000}$

$= 79.0125$

$= 79\ \text{kJ/mol}$ $\Delta H =$ 79 kJ/mol

ResultsPlus
Examiner Comments

Q10(b)(i) gained all three marks. Q was asked to use 3800 J but, in this case, they used 3160.5 J which lost one of the marks. M1 for the moles and M3 divided by 1000 but lost one mark for using -79 and lost the other mark for not showing the negative sign, so two marks awarded.

ResultsPlus
Examiner Tip

Make sure you use the right value of Q or you will lose a mark.

Question 11(a)

The majority of candidates knew that a flame test was done and usually had a yellow flame for two marks. They either knew the test of the sulfate or did not, so two marks or all five marks were often seen.

11 This question is about sodium sulfate, Na_2SO_4

(a) A teacher finds an unlabelled bottle containing a white solid.

Describe tests to show that the white solid is sodium sulfate.

(5)

Perform a flame test on the solid. ~~The flame~~ The sodium ions present will turn the flame yellow. Then add dilute hydrochloric acid to the solution and then add barium chloride. White precipitate will form indicating that sulfate ions are present, meaning that the white solid is sodium sulfate.

ResultsPlus
Examiner Comments

A clear answer showing the flame test and the sulfate test. Five marks were awarded.

ResultsPlus
Examiner Tip

There is no need to give a description of how a flame test is performed. Just stating a flame test and sodium forms a yellow flame is enough for two marks.

11 This question is about sodium sulfate, Na_2SO_4

(a) A teacher finds an unlabelled bottle containing a white solid.

Describe tests to show that the white solid is sodium sulfate.

(5)

To test ~~sodium~~ ~~that~~ ~~the~~ the white solid containing sodium ions, use a flame test. Adding hydrochloric solution and the colour turns yellow.

To test sulfate ions, add dilute ~~nitric~~ nitric acid ~~that~~ followed by NaOH, white precipitate is formed.

~~To these test, meet~~

Allow the flame test turning yellow for two marks. Sulfate ions added nitric acid for the third mark, but sodium hydroxide is the wrong reagent so cannot score the white precipitate as dependent on M4.

Learn the test of sulfate ions as it is often tested.

Question 11(b)i

The majority of candidates knew that the mass was constant or that the last two results were the same. A few candidates lost a mark for saying it decreases.

Question 11(b)ii-iv

This was well done with most candidates giving 1.42 g and 1.8 g. Many candidates also gained three marks for x = 10. Sometimes different answers were seen in (ii) and (iii) but candidates could still gain three marks for errors carried forward.

(ii) Calculate the mass of anhydrous sodium sulfate remaining after heating.

(1)

mass of anhydrous $Na_2SO_4 = 24.99 - 23.57$
$= 1.42$ g

mass of anhydrous sodium sulfate = 1.42 g

(iii) Calculate the mass of water lost from the sodium sulfate crystals during heating.

(1)

mass of water lost = $26.79 - 24.99$
$= 1.8$ g

mass of water = 1.8 g

(iv) Use the student's results to calculate x in the formula $Na_2SO_4.xH_2O$

[for Na_2SO_4, $M_r = 142$ for H_2O, $M_r = 18$]

(3)

mole of $Na_2SO_4 = \frac{1.42}{142} = 0.01$

mole of $H_2O = \frac{1.8}{18} = 0.1$

$x = \frac{0.1}{0.01} = 10$

x = 10

ResultsPlus
Examiner Comments

A clear answer showing all the working and scores all five marks.

ResultsPlus
Examiner Tip

Always show your working as if you make a mistake you can pick up other marks for errors carried forward.

(ii) Calculate the mass of anhydrous sodium sulfate remaining after heating.

(1)

$26.79 - 24.99 = 1.8$

mass of anhydrous sodium sulfate = 1.8 g

(iii) Calculate the mass of water lost from the sodium sulfate crystals during heating.

(1)

$26.79 - 23.57 = 3.22$

$3.22 - 1.8 = 1.42$

mass of water = 1.42 g

(iv) Use the student's results to calculate x in the formula $Na_2SO_4.xH_2O$

[for Na_2SO_4, $M_r = 142$ for H_2O, $M_r = 18$]

(3)

mole of $H_2O = \frac{1.42}{18} = 0.079$

mole of $Na_2SO_4 = \frac{1.8}{142} = 0.013$

0.013 mol of Na_2SO_4 → 0.079 mol of H_2O

1 mol of Na_2SO_4 → 6 mol of H_2O x = 6

This was an unusual answer as (ii) and (iii) were the wrong way round so lost the first two marking points. However, using these answers errors can be carried forward and using 0.079 and 0.013 were both correct and dividing 6 as an integer also correct so can gain all three marks.

Remember always use an integer or otherwise you will lose the third marking point.

(ii) Calculate the mass of anhydrous sodium sulfate remaining after heating.

(1)

24.99 - 23.57 = 1.42 g

mass of anhydrous sodium sulfate = 1.42 g

(iii) Calculate the mass of water lost from the sodium sulfate crystals during heating.

(1)

~~26.79 - 23.57 = 3.22 g~~

26.79 - (23.57 + 1.42) = 1.5

mass of water = ~~3.22~~ 1.5 g

(iv) Use the student's results to calculate x in the formula $Na_2SO_4.xH_2O$

[for Na_2SO_4, $M_r = 142$ for H_2O, $M_r = 18$]

(3)

Mol = Mass / Mr

= 1.5 / 18

= 0.083

x = ~~0.8~~ 0.083

One mark for 1.42 g for (ii). No mark for 1.5 g as (iii) is incorrect. One mark for error carried forward for 1.5 dividing by 18 giving 0.083. Nothing else creditworthy.

Could have had three marks if 1.42 was divided by 142 and a correct integer.

Paper Summary

Based on their performance on this paper, candidates should:

- Make sure you do rounding correctly as incorrect rounding can lose unnecessary marks.
- Revise all experimental practical works as this comprises 22%.
- Remember that intermolecular forces are not always required and adding them when not there loses unnecessary marks.
- Learn standard definitions as these are often tested.
- Always show working as if you make a mistake, you can often pick up marks for errors carried forward.
- Note that for longer mark questions it is a good idea to jot down a few bullet points to help construct your answers.

Grade boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link: https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL.