Pearson Edexcel

Examiners' Report
June 2024

GCSE Combined Science A 1SC0 1CF

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 www.edexcel.com or www.btec.co.uk.

Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

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 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: www.pearson.com/uk.

June 2024

Publications Code 1SC0_1CF 2406_ER

Introduction

Paper 1CF is the first 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 1 and most parts of the final two questions in this paper are also found on the equivalent higher tier paper.

This paper is targeted at grades up to and including grade 5, with approximately half of the marks on the paper aimed at grades 4 and 5.

The questions on the paper covered a range of skills including chemistry knowledge, application, practical skills and mathematical skills and a variety of question styles were used to test the specification.

There were a large number of blank and illegible responses throughout and responses to questions relating to practical skills were particularly poor. Those that did attempt the questions showed the expected variation in knowledge and quality of response given.

Question 1 (a)

The first question on the paper required candidates to draw a diagram showing the arrangement of particles in a solid. It was expected that candidates would draw the same size particles arranged in neat rows and all touching each other.

This question did not perform as well as expected due to the variable quality of the diagrams drawn. Many candidates started well but drew their particles small and attempted to fill the entire box, which meant that a lot of particles had to be drawn. This led to large variation in both the size of the particles drawn and the arrangement of these particles, with many diagrams showing large gaps between particles or diagrams that looked like the particle arrangement in alloys.

The most successful candidates drew fewer but larger particles, or did enough to show the arrangement of particles in a solid without filling the whole box.

This response scored one mark.

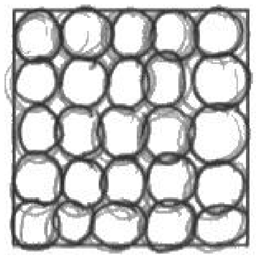


Figure 3

ResultsPlus
Examiner Comments

The particles drawn are uniform in size, laid out in neat rows and all touching with no obvious gaps between them.

ResultsPlus
Examiner Tip

Drawing larger particles mean that fewer are needed to fill the box, which reduces the chance of making mistakes.

This response did not score the mark.

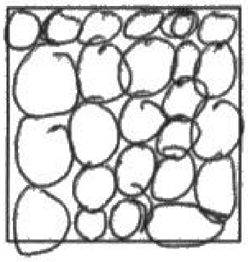


Figure 3

The candidate has attempted to draw the particles in neat rows, and there are no obvious gaps between them. However, the particles are not all uniform in size with some large particles and some small particles, which lead the diagram to look more like the particle arrangement in an alloy.

This response did not score any marks.

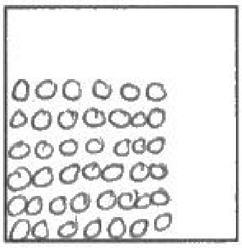


Figure 3

This response did not score due to the large gaps in between the rows of particles and not because the particles did not fill the entire box. Had the particles been touching then this response would have scored even though the entire box had not been filled with particles.

Question 1 (b)(ii)

This question asked candidates to describe the differences between chemical and physical changes and was very poorly answered overall. Candidates either did not understand the differences or could not clearly write their ideas down. It was common to see repeats of the stem of the question and there appeared to be a lot of confusion around these different types of change.

The most able candidates could clearly articulate that there is no new product in a physical change and that these changes are easily reversed, however the majority of responses indicated misconceptions including:

- a chemical change cannot be seen
- a chemical change does not show a change of state
- physical changes are natural and chemical changes are not
- you need to add 'chemicals' for a chemical change to happen.

This is a rare example of a response that scored both marks.

(ii) Explain why the change from a liquid to a solid is a physical change rather than a chemical change.

(2)

A physical change is easily reversed and no new product is made for example, Water ⇌ Ice However, a chemical change is when a new product is made.

ResultsPlus
Examiner Comments

The candidate clearly states both marking points – that a physical change is easily reversed and that no new product is made. They also start to give the reverse argument for a chemical change but it is not complete. However both marks are awarded simply for the information about physical changes.

The idea of rearrangement of particles for a physical change is not enough to score as this also happens in a chemical change.

(ii) Explain why the change from a liquid to a solid is a physical change rather than a chemical change.

(2)

chemical changes have a reaction unlike this physical change the particles just rearrange.

ResultsPlus
Examiner Comments

This response just scored a mark for the idea of there being a reaction in a chemical change.

(ii) Explain why the change from a liquid to a solid is a physical change rather than a chemical change.

(2)

Because the change can be reversable the hot wax can melt but also go back to it's original state. Also you can see the wax melting.

ResultsPlus Examiner Comments

This response scored one mark for the idea of the physical change being reversible.

There is no mention of the fact that no new products are formed.

ResultsPlus Examiner Tip

A response that is worth two marks needs either two ideas or one idea with a linked explanation.

One common misconception is that because no chemicals have been added then there can be no chemical change.

(ii) Explain why the change from a liquid to a solid is a physical change rather than a chemical change.

(2)

Because no Chemicals have been added to the Liquid for it to Freeze its a physical change.

ResultsPlus Examiner Comments

This response did not score any marks.

This response did not score any marks.

Another common misconception is that you can 'see' a physical change. However, there are often visible signs when chemical changes are happening.

(ii) Explain why the change from a liquid to a solid is a physical change rather than a chemical change.

(2)

You are able to physically see liquid and solid, due to the fact it isn't a chemical change. physical change means you can see it.

ResultsPlus
Examiner Comments

Visible signs of chemical changes can include: effervescence, formation of precipitates and colour changes.

Question 1 (c)(ii)

This question did not perform as well as expected and highlighted another common candidate misconception – that wax cannot exist as a gas.

Only the most able candidates scored the mark for this question but there were a lot of 'near misses'. Sometimes candidates were not clear whether their answer referred to the water or the wax, or did not give a comparison between water and wax.

This response scored the mark.

(ii) Suggest why the wax did **not** change into a gas when the test tube was heated in the beaker of water.

(1)

The temperature was not hot enougn for the wax to be evaporated.

ResultsPlus
Examiner Comments

The candidate clearly states that the temperature of the water is not hot enough for the wax to evaporate.

This response is an example of a near miss.

(ii) Suggest why the wax did **not** change into a gas when the test tube was heated in the beaker of water.

(1)

Has a high boiling point.

ResultsPlus
Examiner Comments

The candidate obviously has some idea of the correct answer but has not stated what the high boiling point refers to and gives no comparison between the wax and the water.

ResultsPlus
Examiner Tip

Make sure that answers are specific to the question rather than general responses like this.

This response did not score.

(ii) Suggest why the wax did **not** change into a gas when the test tube was heated in the beaker of water.

(1)

Because its wax and wax does not turn into a gas and simply turns into a liquid and returns back to a solid.

ResultsPlus
Examiner Comments

A surprising number of candidates think that it is not possible for wax to evaporate and responses similar to this were very common.

ResultsPlus
Examiner Tip

Wax will turn into a gas if enough heat is added.

Question 2 (a)

This question required candidates to put three stages of water treatment in the correct order.

Responses were quite evenly distributed across 0, 1 and 2 marks and it is difficult to see any common errors in the responses, but questions about water treatment often don't score well.

It appears that candidates do not understand the different stages of water treatment and what they do.

2 Water treatment is needed to make most sources of water suitable for drinking.

(a) Water treatment includes the processes of **chlorination**, **filtration** and **sedimentation**.

Place these processes in the order that they take place during water treatment.

(2)

first		last
sedimentation	filtration	chlorination

ResultsPlus
Examiner Comments

This response scored both marks.

This response scored one mark.

Candidates could score one mark for putting sedimentation as the first step OR chlorination as the last step.

2 Water treatment is needed to make most sources of water suitable for drinking.

(a) Water treatment includes the processes of **chlorination**, **filtration** and **sedimentation**.

Place these processes in the order that they take place during water treatment.

(2)

first		last
Sedimentation	Chlorination	Filtration

ResultsPlus
Examiner Comments

It was more common to see chlorination correct in the one mark answers but it was apparent that many candidates did not know a lot about water treatment processes.

This response did not score.

2 Water treatment is needed to make most sources of water suitable for drinking.

(a) Water treatment includes the processes of **chlorination**, **filtration** and **sedimentation**.

Place these processes in the order that they take place during water treatment.

(2)

first		last
filtration	chlorination	sedimentation

ResultsPlus
Examiner Comments

Either sedimentation or chlorination had to be in the correct place to score one mark.

Question 2 (b)(i)

Questions about the formation of ions are common.

To score both marks here the candidate needed to identify that electrons are gained in the formation of chloride ions and that it is a single electron that is gained.

Again, this was a low scoring response with only a minority of candidates scoring any marks at all. The most common misconception is that for an ion to be negatively charged then it must have lost electrons. Other commonly seen misconceptions include confusing ions with isotopes and mention of electrons being shared.

This response scores both marks for the idea of electron gain and a single electron being gained.

(b) Some tap water contains chloride ions.

(i) Explain, in terms of electrons, how a chlorine atom, Cl, forms a chloride ion, Cl^-.

(2)

Because chlorine gains an electron.

ResultsPlus Examiner Comments

Either gains 'an' electron or gains 'one' electron scored both marks.

(b) Some tap water contains chloride ions.

(i) Explain, in terms of electrons, how a chlorine atom, Cl, forms a chloride ion, Cl^-.

(2)

There gaining more electrons, which makes the charge negative

ResultsPlus Examiner Comments

This response scores one mark for the idea of the gain of electrons but does not state how many electrons are gained.

This response did not score any marks.

It is confused but clearly states that electrons are lost, which is incorrect.

(b) Some tap water contains chloride ions.

(i) Explain, in terms of electrons, how a chlorine atom, Cl, forms a chloride ion, Cl^-.

(2)

it is because it is losing electrons (oxidation), because it was posotive.

ResultsPlus Examiner Comments

This response would not have scored even if the candidate had mentioned a single electron.

This response did not score any marks.

(b) Some tap water contains chloride ions.

(i) Explain, in terms of electrons, how a chlorine atom, Cl, forms a chloride ion, Cl^-.

(2)

Chlorine has 7 electrons in its outershell and hydrogen has 1 so they form an ionic bond to give both atoms a full outer shell.

ResultsPlus
Examiner Comments

The candidate has given correct statements but ultimately does not answer the question being asked. The response refers to electrons and to ionic bonds but does not explain how the bond is formed.

Question 2 (b)(iii)

There were a number of possible answers that could have scored on this question and the majority of candidates were awarded the mark.

It was very common to see that tap water contains chlorine, possibly due to chlorination being given in earlier parts of the question – but this was awarded the mark.

The other commonly seen correct response was that tap water is not pure. Responses referring to tap water containing ions or affecting the results of analysis were very rare.

Where candidates did not score it was usually because the responses were too general such as water not being clean. Responses referring to tap water containing bacteria were rejected.

This question was only worth one mark but this response covers a number of correct responses including the rarely seen idea of tap water affecting the results of chemical analysis.

(iii) State why tap water is not suitable for use in chemical analysis.

(1)

tap water is not distiled /Chlorine is added this will affect other chemicals analysis as it's not a pure liquid, won't give an acurate result

ResultsPlus
Examiner Comments

This response contains three of the accepted marking points including the addition of chlorine, affecting analysis and tap water not being pure.

(iii) State why tap water is not suitable for use in chemical analysis.

(1)

because tap water isnt pure

ResultsPlus
Examiner Comments

The idea of tap water not being pure was the most commonly seen, correct response.

This response did not score any marks.

(iii) State why tap water is not suitable for use in chemical analysis.

(1)

because it has different type of chemicals inside

ResultsPlus
Examiner Comments

Reference to tap water containing other chemicals was not enough to score.

This response did not score any marks.

The candidate has stated that the tap water is not filtered and that it may contain bacteria. Both filtration and chlorination are included in earlier parts of the question about producing drinking water and so these responses are not correct.

(iii) State why tap water is not suitable for use in chemical analysis.

(1)

as it has not been filtred and may carry bacteria.

ResultsPlus
Examiner Comments

Responses referring to tap water containing bacteria did not score.

Question 2 (c)(i)

This question tested the practical knowledge of the candidates and highlighted an apparent lack of practical skills and application in chemistry.

Many answers stated that the set up needed a condenser which suggested that candidates had seen some set up of distillation, but unfortunately not the one given in the question.

Other responses did not seem to understand the question and indicated that using tap water or ice would not allow pure water to be collected.

When candidates did identify that the error was the delivery tube being in the solution, the idea of moving the tube up was the most common mark given. Very few candidates were able to explain why this would allow the experiment to work with some responses suggesting that water needed to go through the delivery tube rather than steam or water vapour.

This response scored both marks for identifying the error and also explaining why the current equipment set up would not work.

(c) A student was asked to distil a sample of tap water.
Figure 4 shows the apparatus the student used.

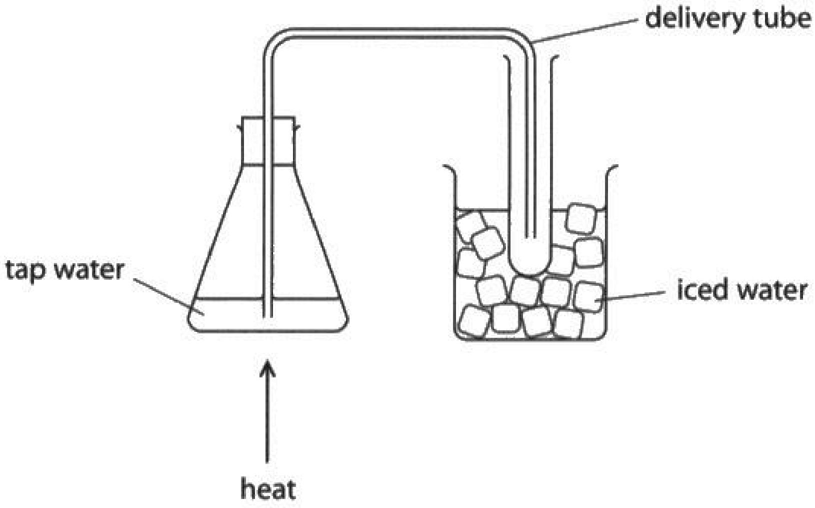


Figure 4

(i) The student made an error when setting up the apparatus in Figure 4.

This error meant that pure water could **not** be collected in the test tube.

Explain what the student needs to change so that pure water can be collected in the test tube.

(2)

The Delivery tube Should not be in the water. The Steam produced by the water needs to be able to travel up and through the tube

ResultsPlus
Examiner Comments

Marks were awarded either for identifying the problem and explaining why this would not allow the collection of pure water, or for identifying a solution and explaining why this would allow pure water to be collected.

(c) A student was asked to distil a sample of tap water.
Figure 4 shows the apparatus the student used.

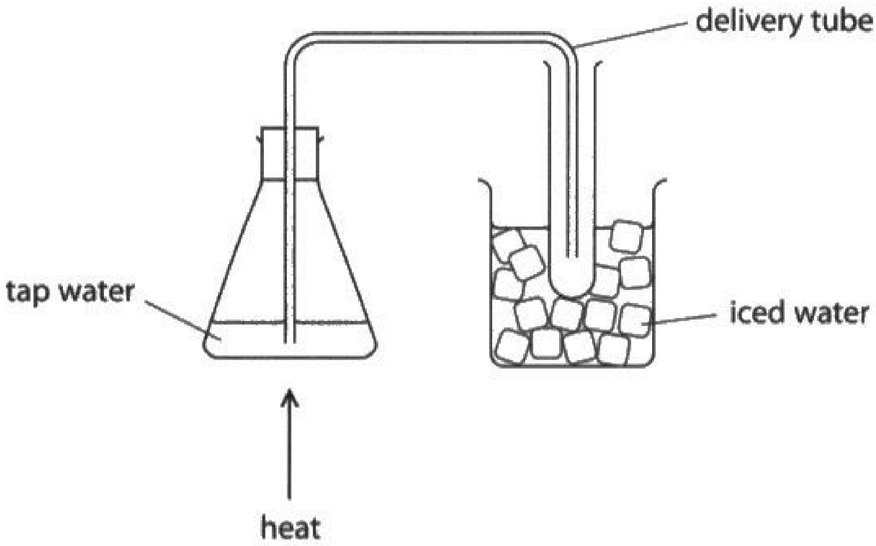


Figure 4

(i) The student made an error when setting up the apparatus in Figure 4.

This error meant that pure water could **not** be collected in the test tube.

Explain what the student needs to change so that pure water can be collected in the test tube.

(2)

The delivery tube was put all the way in the water so no oxygen could be ~~[illegible]~~ released so the water ~~cold~~ could go up the tube into the test tube

ResultsPlus
Examiner Comments

This response scored one mark for correctly identifying the error in the set up of the equipment.

However, there appears to be some misunderstanding with the purpose of the experiment as the response suggests that moving the tube would allow the water itself to move into the delivery tube rather than the water vapour.

ResultsPlus
Examiner Tip

Make sure you know the names and functions of different pieces of laboratory equipment.

This is an example of a common response that did not score any marks, suggesting that a condenser would somehow turn tap water into pure water. It is not clear whether or not this response recognises that the condensation would be pure water, even if the error had been correctly identified.

(c) A student was asked to distil a sample of tap water.
Figure 4 shows the apparatus the student used.

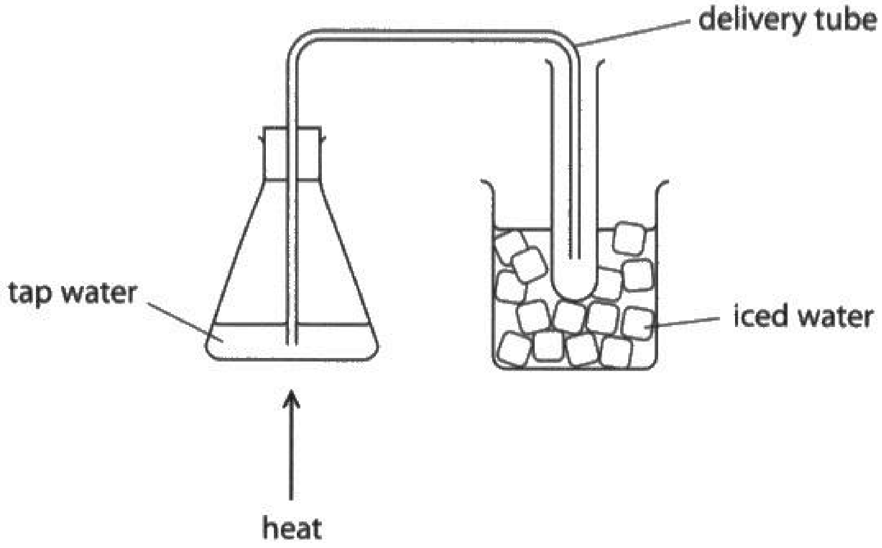


Figure 4

(i) The student made an error when setting up the apparatus in Figure 4.

This error meant that pure water could **not** be collected in the test tube.

Explain what the student needs to change so that pure water can be collected in the test tube.

(2)

A condensor. This collects the condensation of the tap water so pure water can be collected.

ResultsPlus
Examiner Comments

Many responses did not seem to recognise that the iced water was added as an alternative to a condenser.

This response did not score any marks.

(c) A student was asked to distil a sample of tap water.
Figure 4 shows the apparatus the student used.

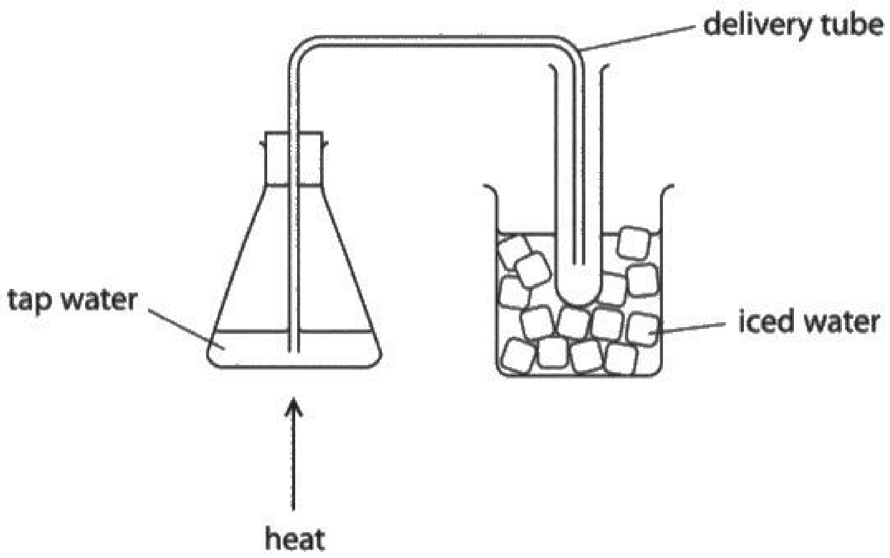


Figure 4

(i) The student made an error when setting up the apparatus in Figure 4.

This error meant that pure water could **not** be collected in the test tube.

Explain what the student needs to change so that pure water can be collected in the test tube.

(2)

A bung needs to be used in order for the particles to be collected and transported.

ResultsPlus
Examiner Comments

It is a common misconception that a closed system will increase the volume of water collected.

Question 2 (c)(ii)

The last item of this question was well answered, with the majority of candidates recognising that a bunsen burner would be required to heat the water. Responses that did not score this mark often suggested equipment that would not heat the water enough for it to boil.

This response scored the mark. A bunsen burner would heat the water enough for it to boil.

(ii) State what the student should use to heat the water.

(1)

They need a bunsen burner

ResultsPlus
Examiner Comments

A bunsen burner is used when a lot of heat is required.

This response did not score as it is not clear that the candidate is referring to a bunsen burner.

(ii) State what the student should use to heat the water.

(1)

burner

ResultsPlus
Examiner Comments

Any recognisable spelling of bunsen was awarded the mark.

This response did not score the mark.

(ii) State what the student should use to heat the water.

(1)

water bath

ResultsPlus
Examiner Comments

A water bath would not heat the water in the flask enough for it to boil.

ResultsPlus
Examiner Tip

Water baths are used for gentle, controlled heating only.

Question 3 (a)

This question was answered well overall with most candidates scoring at least one mark and a significant number scoring all three marks.

There were two commonly seen errors. One was writing the numbers in a different order to that asked in the question – protons, electrons and neutrons rather than protons, neutrons and electrons. The other was with calculating the number of neutrons with the numbers 35 and 52 frequently seen.

3 (a) Figure 5 shows some information about an atom of chlorine.

$$^{35}_{17}Cl$$

Figure 5

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

(3)

number of protons = 17

number of neutrons = 18

number of electrons = 17

ResultsPlus
Examiner Comments

This response scored all three marks for stating the correct number of protons, electrons and neutrons.

This response scored two marks.

The number of protons is incorrect but the numbers of neutrons and electrons are both correct.

3 (a) Figure 5 shows some information about an atom of chlorine.

$$^{35}_{17}\mathrm{Cl}$$

Figure 5

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

(3)

number of protons = 35

number of neutrons = 18

number of electrons = 17

ResultsPlus
Examiner Comments

It was unusual to see an incorrect number of protons with both other numbers correct.

This response scored two marks.

3 (a) Figure 5 shows some information about an atom of chlorine.

$$^{35}_{17}\mathrm{Cl}$$

Figure 5

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

(3)

number of protons = 17

number of neutrons = 35

number of electrons = 17

ResultsPlus
Examiner Comments

This response states the correct number of protons and neutrons but has not found the difference between the numbers to calculate the number of neutrons.

This response scored 1 mark.

3 (a) Figure 5 shows some information about an atom of chlorine.

$$^{35}_{17}\mathrm{Cl}$$

Figure 5

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

(3)

number of protons = 17

number of neutrons = 17

number of electrons = 18

ResultsPlus
Examiner Comments

It was common for responses to indicate numbers of protons, electrons and neutrons rather than protons, neutrons and electrons. The numbers given here are correct but not in the right order.

ResultsPlus
Examiner Tip

Read the question carefully and double check your answers.

Question 3 (b)

Questions relating to empirical formula continue to be challenging to the majority of candidates, with most responses to this question scoring zero marks.

When this question was answered well, clear working out was shown and it was easy to determine where the numbers had come from. Some candidates attempted to guess the formula which scored no marks whether or not it was correct.

One of the most common errors was to put the initial division upside down and obtain the answer Si_4Cl. There were also a lot of responses that did the initial division correctly but then did not manage to convert this into the correct whole number ratio.

This response scored full marks.

(b) Chlorine reacts with silicon to form silicon chloride.

A sample of silicon chloride contains 1.4 g of silicon atoms and 7.1 g of chlorine atoms.

Calculate the empirical formula of this sample of silicon chloride.

(relative atomic masses: Si = 28, Cl = 35.5)

(3)

Si	Cl
1.4g	7.1g
28	35.5
0.05	0.2
1	4

empirical formula = SiCl4

ResultsPlus
Examiner Comments

The calculation is clearly set out, with all working clearly shown and the correct formula on the answer line.

This response scored 2 marks.

(b) Chlorine reacts with silicon to form silicon chloride.

A sample of silicon chloride contains 1.4 g of silicon atoms and 7.1 g of chlorine atoms.

Calculate the empirical formula of this sample of silicon chloride.

(relative atomic masses: Si = 28, Cl = 35.5)

(3)

1.4 ÷ 28 = 0.05 ÷ 0.05 = 1

7.1 ÷ 35.5 = 0.2 ÷ 0.05 = 4

empirical formula = 1 : 4

ResultsPlus
Examiner Comments

The correct calculation has been done and the answer converted into the simplest whole number ratio. However, the candidate has not then given an empirical formula and does not score the final mark.

ResultsPlus
Examiner Tip

Remember to write the formula after completing the calculation.

This response scored 2 marks.

(b) Chlorine reacts with silicon to form silicon chloride.

A sample of silicon chloride contains 1.4 g of silicon atoms and 7.1 g of chlorine atoms.

Calculate the empirical formula of this sample of silicon chloride.

(relative atomic masses: Si = 28, Cl = 35.5)

(3)

Si: $\frac{28}{1.4}$ | Cl: $\frac{35.5}{7.1}$

$= \frac{20}{5}$ $= \frac{5}{5}$

$= 4$ $= 1$

empirical formula = Si_4Cl

ResultsPlus
Examiner Comments

The candidate has made an error in the first part of the calculation by putting the division upside down. However they have clearly shown all working, and the rest of the calculation is correct and therefore marks could still be awarded.

ResultsPlus
Examiner Tip

Make sure all working out is shown because marks may be awarded even if the final answer is incorrect.

This response scored one mark.

(b) Chlorine reacts with silicon to form silicon chloride.

A sample of silicon chloride contains 1.4 g of silicon atoms and 7.1 g of chlorine atoms.

Calculate the empirical formula of this sample of silicon chloride.

(relative atomic masses: Si = 28, Cl = 35.5)

(3)

$\frac{1.4g}{28} = 0.05$ $\quad$ $0.2 + 0.05 = 0.25$

$\frac{7.1g}{35.5} = 0.2$

empirical formula = 0.25

ResultsPlus
Examiner Comments

The candidate has done the first part of the calculation correctly, with clear working shown and this is awarded a mark. The incorrect addition after this is ignored.

This response, like most of those seen, scored no marks.

(b) Chlorine reacts with silicon to form silicon chloride.

A sample of silicon chloride contains 1.4 g of silicon atoms and 7.1 g of chlorine atoms.

Calculate the empirical formula of this sample of silicon chloride.

(relative atomic masses: Si = 28, Cl = 35.5)

(3)

$\frac{(1.4 \times 28) + (7.1 \times 35.5)}{100} = 2.9125$

empirical formula = 2.9125

ResultsPlus
Examiner Comments

In this example the candidate has attempted something that looks like a relative formula mass calculation. Even though the working is clearly shown there is nothing creditworthy in this response.

Question 3 (c)

This question required candidates to use the Periodic Table to identify silicon's group and period. The majority of candidates scored at least 1 mark here, usually for identifying that silicon is in group 4. By far the most common error was to identify that the element is in period 2. Candidates often forget about period 1, presumably because it is just 2 elements and they are not next to each other.

Question 3 (d)

Most candidates made a good attempt at this question. There were very few blank responses and many candidates were able to score at least one mark.

The most common, correct response seen was relating to gaps for undiscovered elements in Mendeleev's periodic table. Only a few candidates gave answers relating to order in terms of mass in Mendeleev's table versus ordered by atomic number now.

There were a few commonly seen misconceptions including that the modern periodic table is separated into metals and non-metals or now has groups and periods. It was surprising that so many candidates did not understand how Mendeleev had originally grouped elements together. There was also some confusion between atomic number and atomic mass.

This response scored two marks.

(d) Describe **two** differences between Mendeleev's periodic table and the modern periodic table.

(2)

1 Mendeleev's table had gaps for unknown element.

2 Mendeleev's table was only measured in weight/mass.

ResultsPlus
Examiner Comments

'Gaps for unknown elements' was enough to score both marks. This response also correctly states that Mendeleev ordered his table according to mass.

This response scored one mark.

(d) Describe **two** differences between Mendeleev's periodic table and the modern periodic table.

(2)

1 the Mendeleev was oderd in weight – relative mass

2 the modern is use on the atomic number

ResultsPlus Examiner Comments

The response gives two correct statements – one about Mendeleev's Periodic Table and one about the modern Periodic Table. However, this is the same argument and cannot be credited twice.

This response did not score any marks.

(d) Describe **two** differences between Mendeleev's periodic table and the modern periodic table.

(2)

1 modern = more organised e.g metals = together Non-metals = together

2 Everyone can easily understand the modern day periodic table

ResultsPlus Examiner Comments

It was common to see the idea of the modern periodic table being separated into metals and non-metals.

Question 4 (a)

This calculation question was attempted by most candidates and many scored at least one mark.

The formula did not need to be rearranged and most were correctly able to substitute the numbers from the question into the equation correctly, which was worth one mark. By far the most common mistake was not to convert the volume given in the question from cm^3 to dm^3. Occasionally candidates attempted to convert the volume but used a factor of 10 or 100 and therefore did not score the second mark.

This response scored two marks.

The volume conversion is clearly shown and substituted into the equation correctly, with the correct evaluation on the answer line.

4 (a) A 250 cm^3 solution of copper sulfate contains 6.52 g of dissolved solid.

Calculate the concentration of this copper sulfate solution in $g\,dm^{-3}$.

$$\text{concentration } (g\,dm^{-3}) = \frac{\text{mass of solid (g)}}{\text{volume of solution } (dm^3)}$$

(2)

Cm → dm = ÷ 1000 $\quad \dfrac{6.52}{0.25} =$

concentration = 26.08 $g\,dm^{-3}$

ResultsPlus
Examiner Comments

Only a very few responses correctly showed the conversion of volume, which was worth one of the two marks.

This response scored one mark and was the most commonly seen response.

4 (a) A 250 cm^3 solution of copper sulfate contains 6.52 g of dissolved solid.

Calculate the concentration of this copper sulfate solution in g dm^{-3}.

$$\text{concentration (g dm}^{-3}\text{)} = \frac{\text{mass of solid (g)}}{\text{volume of solution (dm}^3\text{)}}$$

(2)

$$\frac{6.52}{250}$$

concentration = 0.02608 g dm^{-3}

ResultsPlus Examiner Comments

One mark was available for the correct volume conversion and one mark for substitution and evaluation of the calculation.

ResultsPlus Examiner Tip

Double check the units on calculations – they are given in the question.

This response scored one mark.

4 (a) A 250 cm^3 solution of copper sulfate contains 6.52 g of dissolved solid.

Calculate the concentration of this copper sulfate solution in $g\,dm^{-3}$.

$$\text{concentration } (g\,dm^{-3}) = \frac{\text{mass of solid (g)}}{\text{volume of solution } (dm^3)}$$

(2)

$\frac{6.52}{250} = \frac{6.52}{2.5} = 2.608$

concentration = 2.608 $g\,dm^{-3}$

ResultsPlus
Examiner Comments

Unfortunately this response has incorrectly converted the volume by dividing by 100 instead of 1000. However, one mark was still awarded for the correct substitution and evaluation using the incorrect conversion.

ResultsPlus
Examiner Tip

Include working out for all calculations.

Question 4 (b)

This question was very poorly attempted with the majority of responses left completely blank. When responses were attempted it was very obvious that candidates did not understand what the question was asking them to do.

The correct response required candidates to separate a precipitate from a solution and leave it to dry, as well as crystallising the filtered solution. Many responses suggested electrolysis, fractional distillation or simply heating the mixture. There was no credit for heating the mixture with a bunsen burner as this would cause copper hydroxide to decompose.

Where marks were scored this was usually for mention of filtration, followed by the idea of crystallising the sodium sulfate solution. Very few people mentioned the idea of washing the precipitate to make it pure.

This response scored four marks.

It was very unusual to see any responses scoring more than one mark and a response scoring full marks was incredibly rare.

This response is clear, concise and in a logical order. The mixture is filtered and the precipitate dried, then the solution is crystallised and left to dry.

(b) Sodium hydroxide solution and copper sulfate solution were reacted together completely.

The result was a mixture of a precipitate of copper hydroxide in a solution of sodium sulfate.

Describe how to obtain

- a pure sample of solid copper hydroxide from the mixture
- a pure sample of solid sodium sulfate from the mixture.

(4)

- ~~Fit~~ Filter the mixture using filter paper into a beaker. The residue of copper hydroxide should of gathered in the filter paper.
- Leave the filter paper to air dry. The result should be solid copper hydroxide.
- To obtain solid sodium sulfate: with this gathered in the beaker, put it into a dish. Put dish onto a tripod with a bunsen burner beneath it. Heat the solution and overtime ~~the~~ crystals will start to form on the rim/outer. After, let it to air dry.

ResultsPlus
Examiner Comments

This response is given in bullet points and it is very clear when the candidate is referring to the precipitate, the solution and the mixture.

ResultsPlus
Examiner Tip

Bullet point answers are a good way to make points clearly.

This response scored 3 marks.

(b) Sodium hydroxide solution and copper sulfate solution were reacted together completely.

The result was a mixture of a precipitate of copper hydroxide in a solution of sodium sulfate.

Describe how to obtain

- a pure sample of solid copper hydroxide from the mixture
- a pure sample of solid sodium sulfate from the mixture.

(4)

take the mixture, then filter both substances seperating the mixture, put them in seperate beakers and begin to heat up with a bunson burner until the water/liquid has evaporated, then leave for a while to cool down, and finally pat dry the pure sample of copper hydroxide and sodium sulfate.

ResultsPlus Examiner Comments

The mixture is filtered but then both the precipitate and the solution are heated. Heating copper hydroxide would cause it to decompose so nothing further could be awarded here, but the heating and drying of the filtrate would give pure sodium sulfate crystals.

ResultsPlus Examiner Tip

When carrying out crystallisation, solutions should only be heated to concentrate the solution and not to dry it completely, otherwise crystals may decompose.

This response scored 1 mark, for filtering the mixture.

(b) Sodium hydroxide solution and copper sulfate solution were reacted together completely.

The result was a mixture of a precipitate of copper hydroxide in a solution of sodium sulfate.

Describe how to obtain

- a pure sample of solid copper hydroxide from the mixture
- a pure sample of solid sodium sulfate from the mixture.

(4)

you would filter it first for Copper then heat it up.

~~[illegible]~~

you would also do crystal-isation and they would turn into crystals and seperate.

ResultsPlus
Examiner Comments

The mention of crystallisation did not score because the response does not make it clear that it is the solution that is crystallised.

Question 4 (c)(i)

This question asked for two properties of graphite that made it suitable for use as electrodes.

Most candidates attempted this question, but did not always score marks because they gave general properties of graphite rather than those specific to use as an electrode. It was common to see responses such as soft, flaky or insoluble. Many responses correctly identified that graphite conducts electricity, but some did not score the mark by simply stating that graphite has delocalised electrons and not linking this to it being a good conductor of electricity.

This response scored two marks.

(c) Figure 6 shows the equipment used to electrolyse a sample of sodium sulfate solution.

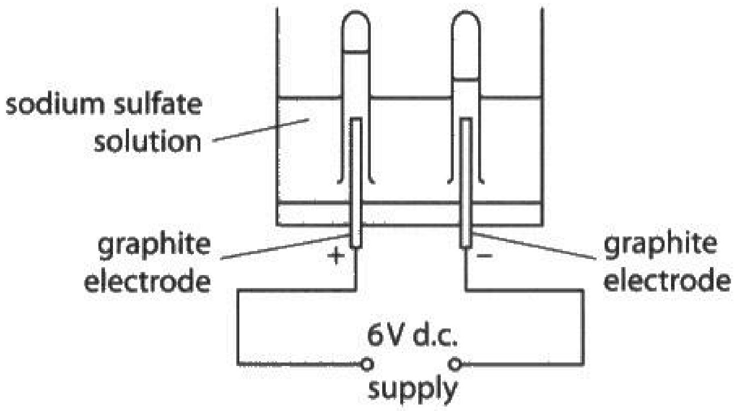


Figure 6

Graphite electrodes are used in the electrolysis.

(i) Give **two** reasons why graphite is a suitable material for the electrodes.

(2)

1 because graphite doesn't react

2 can conduct electricity

ResultsPlus
Examiner Comments

Very few responses correctly identified that graphite is used in electrodes because it is unreactive.

This response scored one mark for identifying that graphite conducts electricity.

(c) Figure 6 shows the equipment used to electrolyse a sample of sodium sulfate solution.

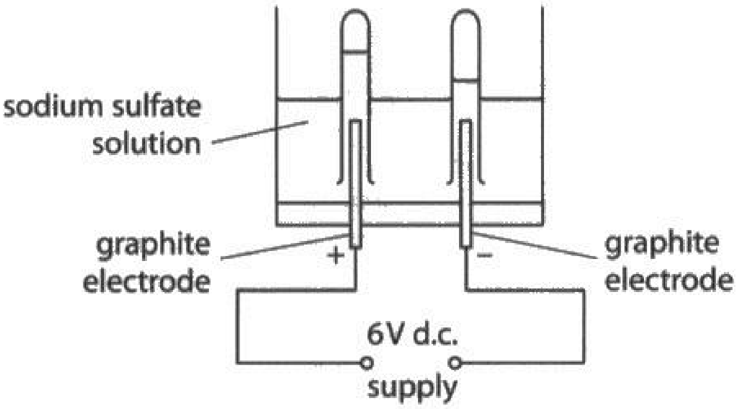


Figure 6

Graphite electrodes are used in the electrolysis.

(i) Give **two** reasons why graphite is a suitable material for the electrodes.

(2)

1 Conduct electricity

2 high boiling points.

ResultsPlus
Examiner Comments

Graphite does have a high boiling point but this is not relevant to its use in electrodes.

This response did not score any marks.

(c) Figure 6 shows the equipment used to electrolyse a sample of sodium sulfate solution.

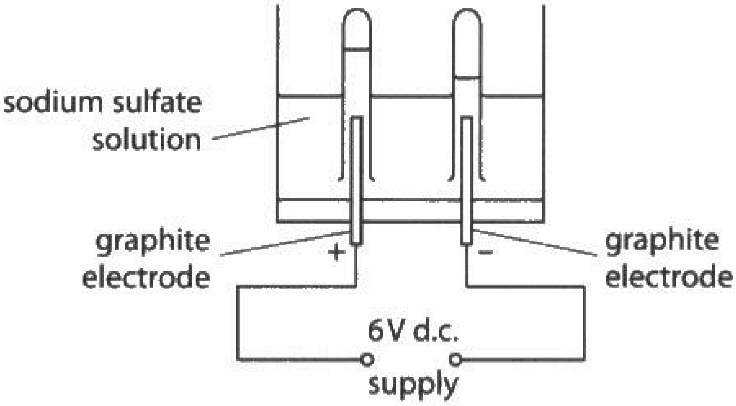


Figure 6

Graphite electrodes are used in the electrolysis.

(i) Give **two** reasons why graphite is a suitable material for the electrodes.

(2)

1 weak covalent bonds

2 metal

ResultsPlus
Examiner Comments

Neither of these properties are correct for graphite.

ResultsPlus
Examiner Tip

Covalent bonds are strong.

Question 4 (c)(iii)

This question asked candidates to identify the products formed at each electrode during the electrolysis of sodium sulfate solution and was very poorly answered.

Many candidates did not know that the products would be hydrogen and oxygen with the most common combination of answers being hydrogen and sodium or sodium and hydroxide. When hydrogen was correctly identified as a product it was often incorrectly linked to the anode.

Question 5 (a)(i)

This question required candidates to balance an equation, and was well answered overall.

However there are were a significant number of responses that had attempted to write chemical symbols or state symbols in the gap rather than a number.

Question 5 (a)(ii)

This item asked candidates to state what they would see when barium hydroxide is reacted with hydrochloric acid and was one of the worst scoring questions on the paper.

The vast majority of answers suggested fizzing or bubbles or a white precipitate. Only a very few candidates correctly identified either that the barium hydroxide would no longer be visible or that there would be a colourless solution formed.

This response scored one mark.

Although the barium hydroxide reacts away rather than dissolving, this is accepted as a description of the solid no longer being present.

(ii) State what you would **see** during the reaction.

(1)

Barium hydroxide dissolve in the hydrochloric acid

ResultsPlus
Examiner Comments

At this level it is acceptable to use the term dissolve as an alternative to react.

This response scored one mark.

(ii) State what you would **see** during the reaction.

(1)

colourless solution

ResultsPlus
Examiner Comments

This reaction produces barium chloride and water, which would be a colourless solution.

This response did not score.

The most commonly seen responses were fizzing or white precipitate. The reaction equation with state symbols was given in the question but candidates did not seem to use this to help them answer the question.

(ii) State what you would **see** during the reaction.

(1)

fizzing , bubbling , colour change

ResultsPlus
Examiner Comments

Colour change was another common, incorrect answer.

ResultsPlus
Examiner Tip

Bubbles will only be seen if one of the reaction products is a gas.

Question 5 (b)(i)

Questions relating to suggesting equipment that will improve the accuracy of data are commonly asked, and it was very surprising that this question was answered so poorly. Candidates should be made aware of alternative equipment that could be used in a practical situation, including digital alternatives.

Most candidates suggested an alternative indicator such as litmus or phenolphthalein, showing a lack of understanding of the difference between indicators and pH. Some suggested a pH scale, with only a few correctly identifying a pH meter.

Question 5 (b)(ii)

This question was another assessment of practical skills and was not as well answered as expected, although most candidates did score one mark. Responses suggested that stirring would ensure a uniform pH throughout the mixture or speed up the reaction, but rarely both.

This response scored two marks.

(ii) Explain why, in step 3, the mixture was stirred after adding the barium hydroxide.

(2)

This was to ensure that the mixture was completely mixed, and it also sped up the integration process.

ResultsPlus
Examiner Comments

The response correctly refers to both the mixture and the reaction, and scores one mark for each.

This response scored one mark for the idea of dissolving the barium hydroxide.

(ii) Explain why, in step 3, the mixture was stirred after adding the barium hydroxide.

(2)

so that the substance could properly disolve in the mixture

ResultsPlus
Examiner Comments

Dissolving could be linked to either marking point, but this response would need to be more detailed to score both marks.

This response scored one mark.

(ii) Explain why, in step 3, the mixture was stirred after adding the barium hydroxide.

(2)

To make a compound

More accurate level of finding the ph change

ResultsPlus
Examiner Comments

Ensuring that the mixture is evenly distributed will mean that the measured pH will be more accurate.

This response did not score any marks.

(ii) Explain why, in step 3, the mixture was stirred after adding the barium hydroxide.

(2)

• To see if it would change colour and to see whether it's an alkaline or acid

ResultsPlus
Examiner Comments

The candidate has answered a different question to what was being asked, giving an explanation of why an indicator might be added to the mixture rather than why it was stirred.

Question 5 (b)(iii-iv)

This item required candidates to draw a pH curve from a table of data and use this curve to determine the pH of the solution when 4.5 spatulas of barium hydroxide have been added. This should have been familiar as it is almost identical to the neutralisation core practical in the specification, and most responses scored some marks.

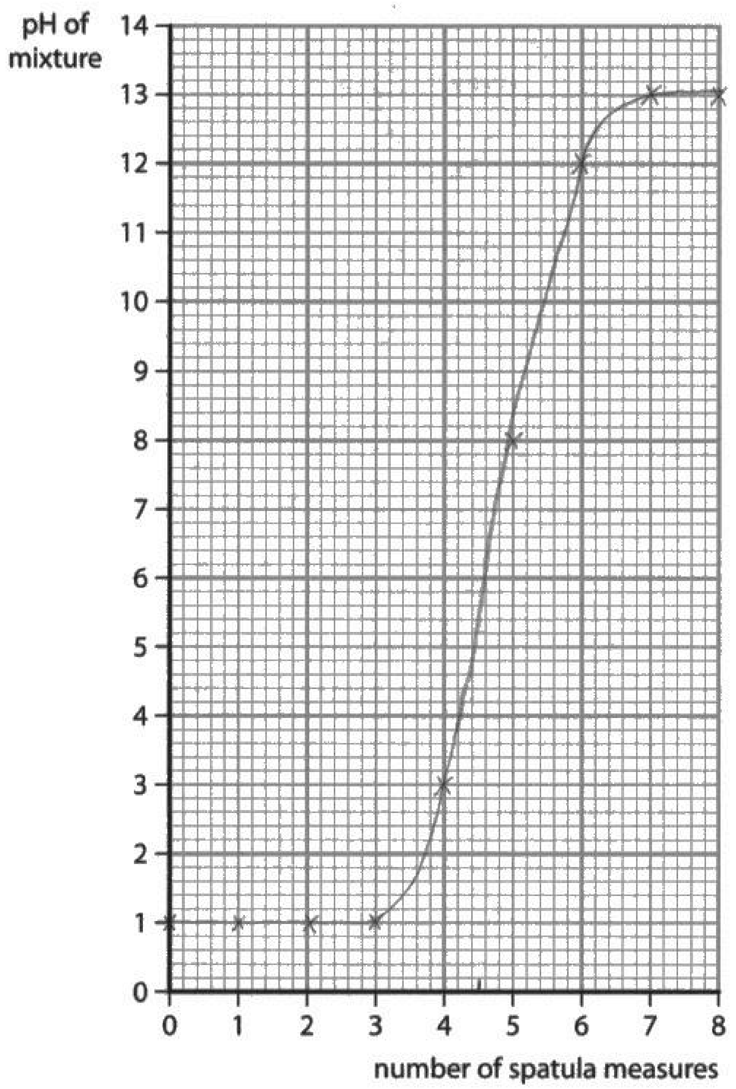
The most common errors were not in plotting the data points on the grid, but in drawing the curve onto the data points. Many responses showed dot to dot straight lines, drawn with a ruler while others showed thick curves with multiple lines rather than a single S-shaped curve. There were also a significant number of responses that had no curve at all on the data plots, which also meant that graph could not be used to determine the pH at 4.5 spatulas of barium hydroxide.

Unfortunately many of the readings of the pH were out of tolerance and did not gain the mark. This was usually due to careless plotting and reading, using a pen or blunt pencil to draw the lines or poor quality of the original curve on the graph.

This response scored four marks.

Plot a graph of the pH of the mixture against the number of spatula measures of barium hydroxide.

(3)



(iv) Use the graph to find the pH of the mixture when 4.5 spatula measures of barium hydroxide are added.

(1)

pH of the mixture = 5.4

ResultsPlus
Examiner Comments

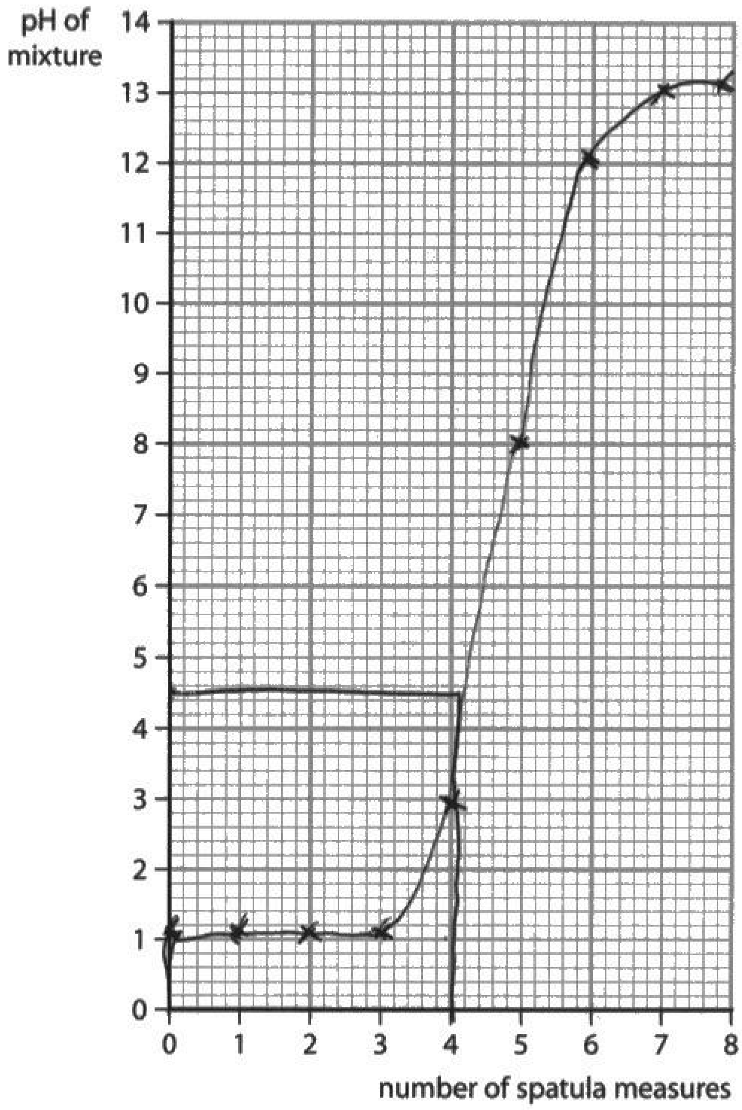
All plots are correct and joined with a single, smooth curve and the pH reading is correct using this curve.

This response scored three marks for the graph.

Unfortunately the candidate has not stated the pH at 4.5 spatulas of barium hydroxide. This looks like an attempt at the quantity of barium hydroxide for a pH of 4.5. However, the lines are not drawn with a ruler and the readings would have been out of tolerance even if this had been what was asked for in the question.

Plot a graph of the pH of the mixture against the number of spatula measures of barium hydroxide.

(3)



(iv) Use the graph to find the pH of the mixture when 4.5 spatula measures of barium hydroxide are added.

(1)

pH of the mixture = 4

ResultsPlus
Examiner Comments

The correct amount of barium hydroxide for a pH of 4.5 according to this curve would be 4.2 spatula measures.

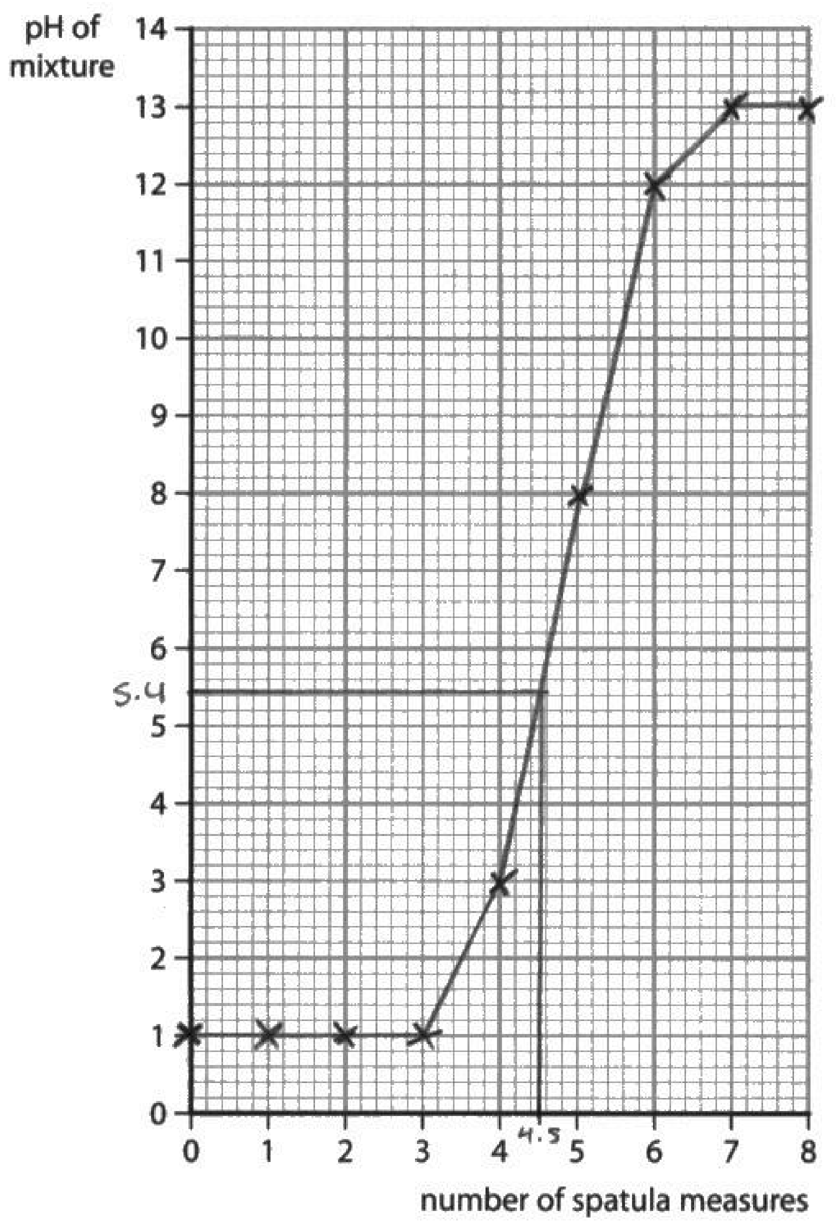
ResultsPlus
Examiner Tip

Use a sharp pencil for drawing graphs and a ruler where straight lines are required.

This response scored two marks for the graph and one mark for the pH reading.

Plot a graph of the pH of the mixture against the number of spatula measures of barium hydroxide.

(3)



(iv) Use the graph to find the pH of the mixture when 4.5 spatula measures of barium hydroxide are added.

(1)

pH of the mixture = 5.4

ResultsPlus

Examiner Comments

There is no smooth curve as the points have been joined with straight lines using a ruler. However the pH reading using this graph is correct.

ResultsPlus

Examiner Tip

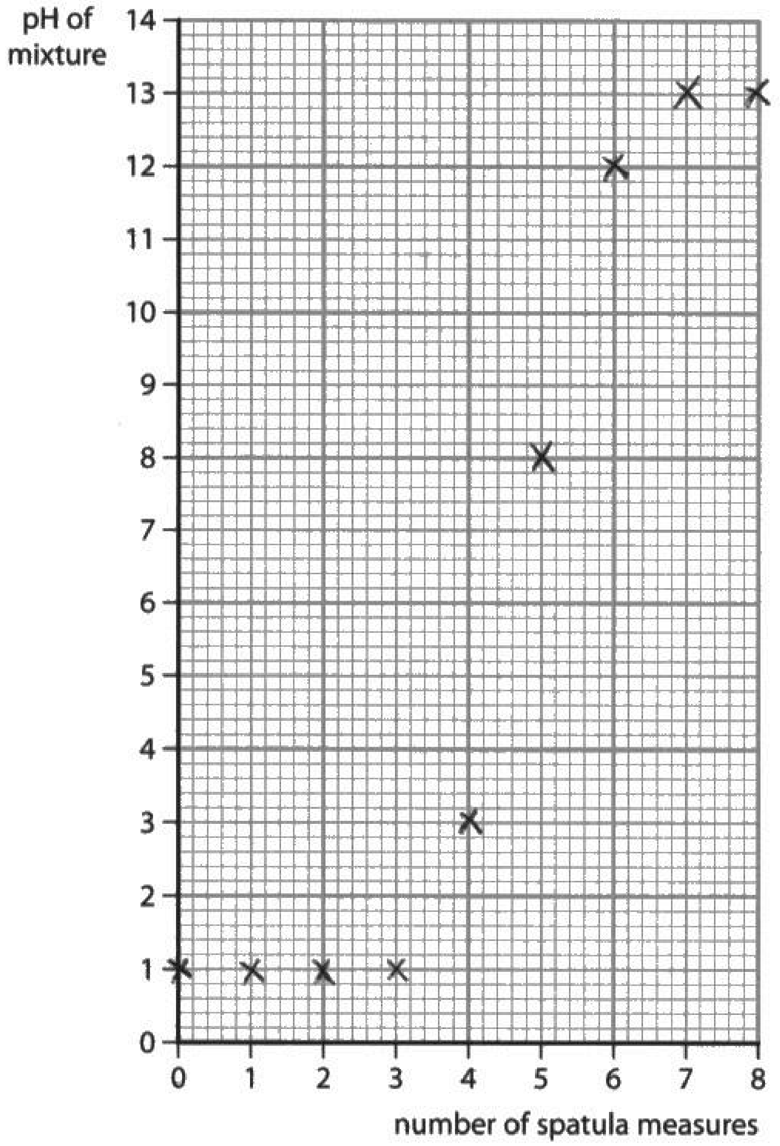
A ruler should only be used to join points if the data indicates that the line of best fit is a straight line rather than a curve.

This response scored two marks for the correct plotting of the data points.

Unfortunately the candidate has made no attempt to draw a curve and so no further marks can be awarded.

Plot a graph of the pH of the mixture against the number of spatula measures of barium hydroxide.

(3)



(iv) Use the graph to find the pH of the mixture when 4.5 spatula measures of barium hydroxide are added.

(1)

pH of the mixture = 3

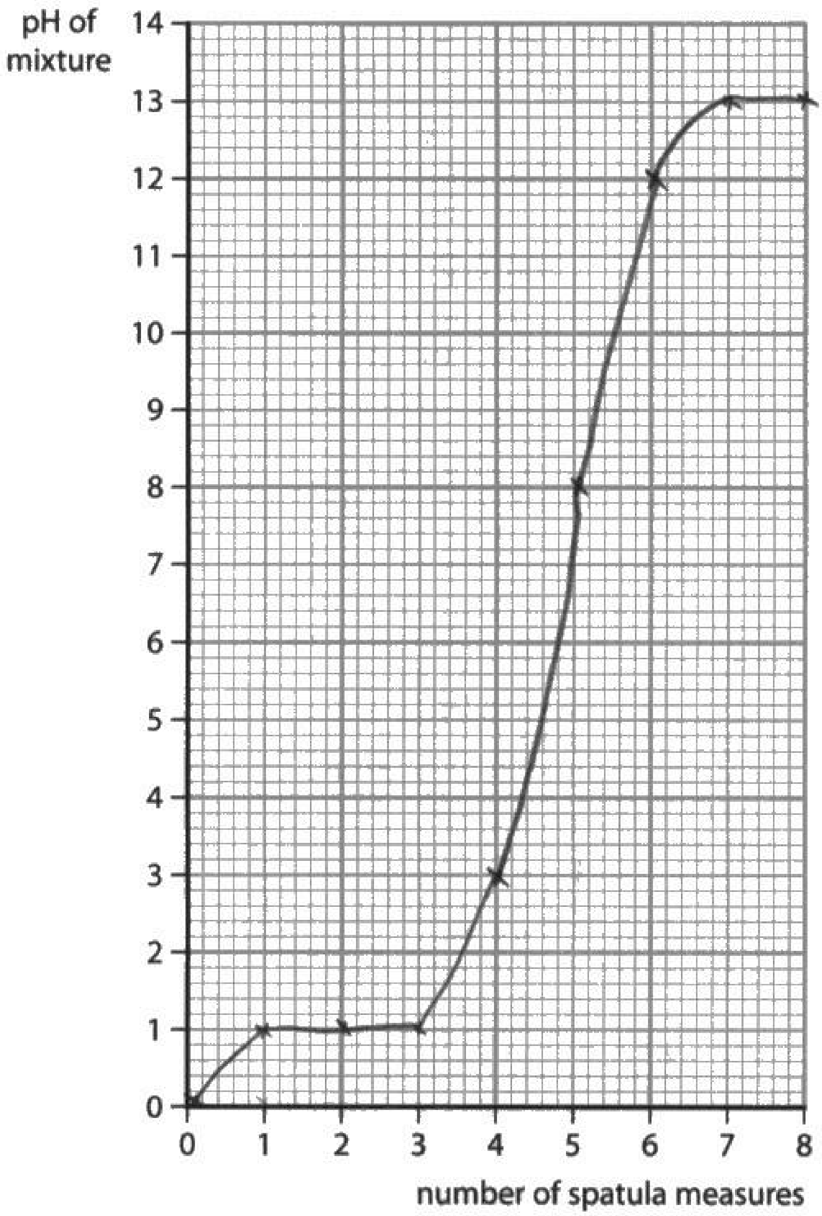
ResultsPlus
Examiner Comments

When the data points were not joined at all then the final part of the question could not score a mark. This was a common error.

This response scored one mark for plotting the data.

Plot a graph of the pH of the mixture against the number of spatula measures of barium hydroxide.

(3)



(iv) Use the graph to find the pH of the mixture when 4.5 spatula measures of barium hydroxide are added.

(1)

pH of the mixture = ~~8~~ 6

ResultsPlus
Examiner Comments

Not all points are correct as the graph clearly goes through the origin and therefore the curve is also incorrect.

Unfortunately the pH reading for 4.5 spatulas is out of tolerance and does not score.

Question 5 (d)

The last part of this question asked for an improved way to measure the barium hydroxide and was looking for some indication of measuring the mass.

A number of different answers were accepted and a majority of candidates scored the mark. However, a significant number of responses suggested that candidates were not aware that barium hydroxide is a solid even though it had been measured in spatulas and a state symbol was given in the balanced equation.

This response scored the mark.

Either reference to mass units or equipment to measure mass was accepted.

(d) The barium hydroxide was measured in spatulas.

State **one** way that the measuring of the barium hydroxide could be improved.

(1)

you can measure it in grams by using a balance

ResultsPlus
Examiner Comments

It was unusual to see a balance correctly named. Weighing scales was the most common scoring answer.

This answer did not score the mark.

Candidates do not seem to be aware that a scale is simply a set of numbers used to measure and compare values and applies to any measuring equipment.

(d) The barium hydroxide was measured in spatulas.

State **one** way that the measuring of the barium hydroxide could be improved.

(1)

On a Scale

ResultsPlus
Examiner Comments

Scales was accepted as a common alternative name for a balance but scale was not accepted.

ResultsPlus
Examiner Tip

Learn the names of common laboratory equipment.

This response did not score the mark.

It was common to see responses suggesting a piece of equipment that could be used to measure volume of liquids rather than masses of solids.

(d) The barium hydroxide was measured in spatulas.

State **one** way that the measuring of the barium hydroxide could be improved.

(1)

Measuring cyclinder.

ResultsPlus
Examiner Comments

Additional information is often given in the question to assist candidates with their answers.

Question 6 (a)(ii)

Questions comparing the properties of different types of substance often prove challenging, and this was no exception. A large majority of responses scored no marks at all, with only a very small number of candidates scoring all three marks.

This question highlighted some ongoing misconceptions about different types of substance and their electrical conductivity. The vast majority of candidates still relate the conductivity of ionic compounds to delocalised electrons rather than movement of ions and there were a significant number of responses that suggested that solids do not conduct electricity while liquids do.

This response scored three marks.

In order to score all of the marks, candidates needed to give some information about the structure of an ionic solid and state that ions are not able to move in a solid whereas they can move in a solution.

(ii) Explain why solid sodium carbonate **cannot** conduct electricity but a solution of sodium carbonate **can** conduct electricity.

(3)

because in a solid the ions are in a compact lattice structure and can't move but as a solution the ions can move and carry an electricity charge.

ResultsPlus
Examiner Comments

Very few responses gave any information about the structure and bonding in an ionic solid.

This response scored two marks.

(ii) Explain why solid sodium carbonate **cannot** conduct electricity but a solution of sodium carbonate **can** conduct electricity.

(3)

In a solid the ions are stuck in one place meaning that they can't move freely. In a solution the ions can move freely so it can conduct electricity.

ResultsPlus
Examiner Comments

The candidate correctly states that ions are able to move in a solution but not in a solid.

There is no information about the structure of an ionic solid for the third mark.

This response scored one mark for the movement of ions in solution.

(ii) Explain why solid sodium carbonate **cannot** conduct electricity but a solution of sodium carbonate **can** conduct electricity.

(3)

because solid sodium carbonate does not have electrons which are free to move therefore cannot conduct electricity however a solution sodium carbonate can as the ions are free to move enabling to conduct electricity.

ResultsPlus
Examiner Comments

The candidate refers to movement of electrons in a solid, which is not relevant to the conductivity of ionic compounds.

ResultsPlus
Examiner Tip

Ionic compounds conduct electricity when the **ions** are able to move.

This is an example of a common response that did not score any marks.

(ii) Explain why solid sodium carbonate **cannot** conduct electricity but a solution of sodium carbonate **can** conduct electricity.

(3)

→ sodium carbonate can have delocalised electrons

→ moves freely when electricity is conducted

→ sodium carbonate (solid) electrons cannot move since its in a fixed state.

ResultsPlus
Examiner Comments

Most candidates think that an electrical current is a flow of electrons.

This response did not score any marks.

(ii) Explain why solid sodium carbonate **cannot** conduct electricity but a solution of sodium carbonate **can** conduct electricity.

(3)

Solid sodium carbonate cannot conduct electricity because its solid. whereas, a liquid solution of Sodium carbonate can conduct electricity.

ResultsPlus
Examiner Comments

Some responses suggested that solids do not conduct electricity and liquids do.

Question 6 (b)

This year some of the calculation questions included the formula to assist the candidates with answering the question.

Unfortunately this item proved to be challenging to most candidates and scored very poorly overall. The most commonly awarded mark was for the correct calculation of the relative formula mass of 106 for sodium carbonate, although this was often incorrectly calculated as 51 or 130.

This response scored all three marks.

(b) Calculate the percentage by mass of sodium in sodium carbonate, Na_2CO_3.

$$\text{percentage by mass of element} = \frac{\text{total relative atomic mass of element}}{\text{relative formula mass of compound}} \times 100$$

(relative atomic masses: C = 12, O = 16, Na = 23)

(3)

$Na_2 = 2(23)$ $\therefore \frac{46}{106} \times 100$

$= 46$

$Na_2CO_3 = 2(23) + 1(12) + 3(16)$.

$= 106$

percentage by mass of sodium = 43.4%.

ResultsPlus
Examiner Comments

It was unusual to see a fully correct response.

ResultsPlus
Examiner Tip

When rounding an answer make sure it is correctly rounded.

This response scored two marks.

(b) Calculate the percentage by mass of sodium in sodium carbonate, Na_2CO_3.

$$\text{percentage by mass of element} = \frac{\text{total relative atomic mass of element}}{\text{relative formula mass of compound}} \times 100$$

(relative atomic masses: C = 12, O = 16, Na = 23)

(3)

C - 1 × 12 = 12

O - 3 × 16 = 48 + } = 106

Na - 2 × 23 = 46

$\frac{23}{106} \times 100$

= 0.21698 × 100

= 21.6981

percentage by mass of sodium = 21.7 %

ResultsPlus
Examiner Comments

The candidate has forgotten to put the mass of two sodium atoms into the calculation and used the mass of one sodium atom. This can be clearly seen as the response shows all working out for the calculation. The final calculated answer is correct, and correctly rounded, using the incorrect number in the sum and so two marks can be awarded.

ResultsPlus
Examiner Tip

Marks may be awarded for processes even if the final answer is incorrect, as long as working out is clearly shown.

This response scored two marks.

An incorrect formula mass has been calculated, but the rest of the calculation has been done and rounded correctly (albeit to a large number of decimal places) and so two marks can still be awarded.

(b) Calculate the percentage by mass of sodium in sodium carbonate, Na_2CO_3.

$$\text{percentage by mass of element} = \frac{\text{total relative atomic mass of element}}{\text{relative formula mass of compound}} \times 100$$

(relative atomic masses: C = 12, O = 16, Na = 23)

(3)

~~N~~ 23×2=46 12+16=28×3=84

46+~~4~~ 84=140 $\frac{46}{84}$ × 100

$\frac{140}{11}$ × 100

percentage by mass of sodium = 54.76190476

ResultsPlus
Examiner Comments

Had the candidate not shown their working out and simply put their answer then no marks would have been awarded.

This response scored one mark for the correct calculation of the relative formula mass.

(b) Calculate the percentage by mass of sodium in sodium carbonate, Na_2CO_3.

$$\text{percentage by mass of element} = \frac{\text{total relative atomic mass of element}}{\text{relative formula mass of compound}} \times 100$$

(relative atomic masses: C = 12, O = 16, Na = 23)

(3)

Na2 O3 C
23 16 12
46 48 12 $\frac{106}{51} \times 100 = 207.843$
208
(3 sig fig)

percentage by mass of sodium = 208%

ResultsPlus
Examiner Comments

Some responses gave an answer above 100%, suggesting that candidates do not understand what percentage composition actually means.

ResultsPlus
Examiner Tip

Answers with a percentage above 100 are rarely correct.

Question 6 (c)

The six mark question on the paper gave information about the reaction of different solids with sulfuric acid and asked candidates to identify the solids and explain their choices. It was intended that the information given would help with answering the question, but the majority of candidates still found this to be a challenging question and seemed to score some marks through luck or very basic knowledge rather than being able to use the data to inform their conclusions. As always a large proportion of responses to this question were simply left blank.

Candidates were often able to identify the gas tests for hydrogen and carbon dioxide, but were not able to successfully use this to identify the correct solid with many candidates stating that Solid A was hydrogen and Solid C was carbon dioxide. The solid that was most commonly identified correctly was C as sodium carbonate but again, this wasn't always well linked with the data from the table.

Solid B was often incorrectly identified as leftover powdered zinc even though the preparation of copper sulfate crystals using copper oxide is one of the core practical activities.

Very few responses attempted any form of equation at all, and a lot of candidates simply wrote out information from the table.

This is an example of a level 3 response.

If the response had only included the information written around the table then that alone would have been enough to award four marks.

All three solids are correctly identified in the table, as is the test for hydrogen.

The candidate has then given more information to support their conclusion including that limewater is used to test for carbon dioxide, the blue solution is copper solid and the black solid is leftover copper oxide. Although there are no equations in the answer there is enough correct detail for full marks to be awarded.

*(c) A student has three solids, **A**, **B** and **C**.

The solids are sodium carbonate, powdered zinc and copper oxide, but the student does not know which solid is which.

The student reacted each solid with dilute sulfuric acid.

Figure 9 shows the student's observations and the results of tests on any gases produced.

	observations and results			
	reaction with dilute sulfuric acid	**gas bubbled through limewater**	**gas tested with a lit splint**	
Powdered Zinc → solid **A**	bubbles seen colourless solution formed	no change	squeaky pop	Hydrogen
Copper Oxide → solid **B**	blue solution formed some black solid remains at bottom of test tube	no gas produced	no gas produced	Sulfur
Sodium carbonate → solid **C**	bubbles seen colourless solution formed	limewater turned cloudy	puts out lit splint	

CO2

Figure 9

Use the observations and results in Figure 9 to identify which solid is which.

Your answer should include

- how each test result helps you to identify the solid
- word equations to support your answer.

(6)

Solid A
·Colarless
·Has Hydrogen
·No Change through lime water
·These leads it to be Powdered Zinc

Solid C
· High CO2 amount since it Puts out lit Splint
· Also Cloudy limewater means CO2 is present
Must be Sodium carbonate since Carbonate has CO2 contents

Solid B - Must be copper Sulphate
·Blue Solution formed → Copper Sulphate
· Black Soluble → copper Oxide Sludge
·No gas Produced → Must be Copper Sulphate

ResultsPlus
Examiner Comments

The bullet point parts of the question indicate what should be included in the final answer.

This is an example of a level 2 response.

~~The~~ Solid B is the powdered Zinc because Zinc is the colour black and the reaction leaves a black solid

Carbon or carbon dioxide gas puts out a lit splint So the Sodium carbonate is ~~the~~ solid C as it contains carbon

Solid A is the copper oxide because It will produce hydrogen gas causing the squeaky pop

ResultsPlus
Examiner Comments

Solid C has been correctly identified with a good explanation linking the production of carbon dioxide from a compound that must contain carbon and recognising that carbon dioxide would put out a lit splint.

Although Solids A and B are incorrectly identified the response also recognises that the squeaky pop is used as a test for hydrogen and this is enough to award level 2.

This is an example of a level 1 response that scored 2 marks.

• A is powdered zinc because it has a squeky pop and no change in gas. ~~Also it turned cloudy.~~
• B is copper oxide because no gases were produced
• C is sodium carbonate because the bubbles were seen and also it turned cloudy.

ResultsPlus
Examiner Comments

All three solids have been correctly identified, but there is no link to the observations given in the table. The candidate has simply copied out the results for each of the tests.

ResultsPlus
Examiner Tip

There is no credit for repeating information from the question – it needs to be linked to the answer.

This is an example of a level 1 response that scored two marks.

Solid A was tested with the squeaky pop test, which means hydrogen is present, which could mean that it is sodium carbonate. Solid B has no gas produced so that could be copper oxide and Solid C put out the lit splint and turned cloudy which could mean that it is powdered zinc.

ResultsPlus
Examiner Comments

The response correctly identifies the squeaky pop as the test for hydrogen and that Solid B is copper oxide but the rest of the information is copied from the table and not linked to the identification of the solids.

This response did not score any marks.

The solid is C because when it reacts with dilute sulfuric acid it becomes colourless when gas bubbles go through-h it turns cloudy and when lighted it puts the splint out.

ResultsPlus
Examiner Comments

The response suggests that there is only one solid present and does not attempt to identify it. It does not link the limewater test to carbon dioxide or attempt to name any products from the reaction.

Paper Summary

Based on their performance in this paper, candidates should:

- Understand the differences between the command words 'describe' and 'explain'
- Work on improving their general and scientific literacy and become more comfortable with using specific science language in their responses
- Write clearly and legibly – examiners can only mark responses that they can read
- Learn to write clear and concise responses, using scientific terms
- Show all working out for calculations and round correctly to the number of significant figures or decimal places stated in the question
- Practice all types of calculations including unit conversion and empirical formula
- Focus on all aspects of practical work including the names and uses of scientific equipment, different variables, processing data, concluding and evaluating
- Ensure that they have experience of all of the core practicals
- Use the information given, particularly in longer questions, when coming up with an answer
- Make use of past exam questions to practice exam technique and develop understanding of the written style of the questions.

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.