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Examiners' Report
June 2012

GCSE Chemistry 5CH2F 01

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Introduction

This was the first sitting of this paper and as expected, the entry was low, as most candidates are expected to sit at the end of the second year of the course. However, despite the small entry, a fairly wide spectrum of answers was received. It is pleasing to note that most candidates made attempts at nearly all the questions suggesting that there were no time problems, and that most of the questions were accessible to most candidates. In particular, it was good to see that many decent quality attempts were made in response to the two 6 mark questions, especially 5(e) for which answers scoring full marks were not uncommon. However, it was also noticeable that a significant number of candidates lost marks by not answering the question which had been asked e.g. in 1(b)(iii), many did not answer in terms of changes to the marble chips, but instead suggested changes to the hydrochloric acid. It was also noticeable that questions requiring practical experience and knowledge were often not answered well, e.g. it was obvious that many had not used themselves, or seen, a separating funnel used in 3(a)(ii); surprisingly it seemed many were unfamiliar with paper chromatography in 3(c) and flame test results and tests for ions, proved very challenging in 6(c).

This report will provide exemplification of candidates' work, together with tips and/or comments, for a selection of questions. The exemplification will come mainly from questions which required more complex responses from candidates.

Question 1 (a) (ii)

Overall the question was answered well, but some candidates only gained 1 mark because they considered the mention of a thermometer as adequate, and failed to say that the temperature needs to be measured before and after.

Question 1 (b) (i)

This was less well answered than expected, despite the question asking for the name of the **product** which causes the mixture to fizz. Many candidates incorrectly gave the name of a **reactant**, hydrochloric acid as the answer.

Question 1 (b) (ii)

It was surprising to see how many candidates stated that the warmer conditions would produce a **slower** reaction. In addition, some answers failed to give a comparison, simply stating the outcome of the reaction, with comments such as "it fizzed" or "it dissolved".

Question 1 (b) (iii)

Most candidates gained 1 mark and some very good answers were seen.

(iii) Explain what must be done to the marble chips so that the reaction with the warm, dilute hydrochloric acid is even faster.

(2)

To make this reaction even faster the marble chips should be cut or crushed, so they are smaller, this means they have a larger surface area, so there is a much higher chance of reaction, and so it is quicker.

(Total for Question 1 = 8 marks)

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Examiner Comments

This answer gained 2 marks.

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Examiner Tip

Some candidates thought larger pieces gave a smaller surface area, and many described changes that would increase the rate but were not related to the marble chips, as asked in the question.

(iii) Explain what must be done to the marble chips so that the reaction with the warm, dilute hydrochloric acid is even faster.

(2)

Make the marble chips crushed so there a powder.

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Examiner Comments

A fairly typical 1 mark answer.

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Examiner Tip

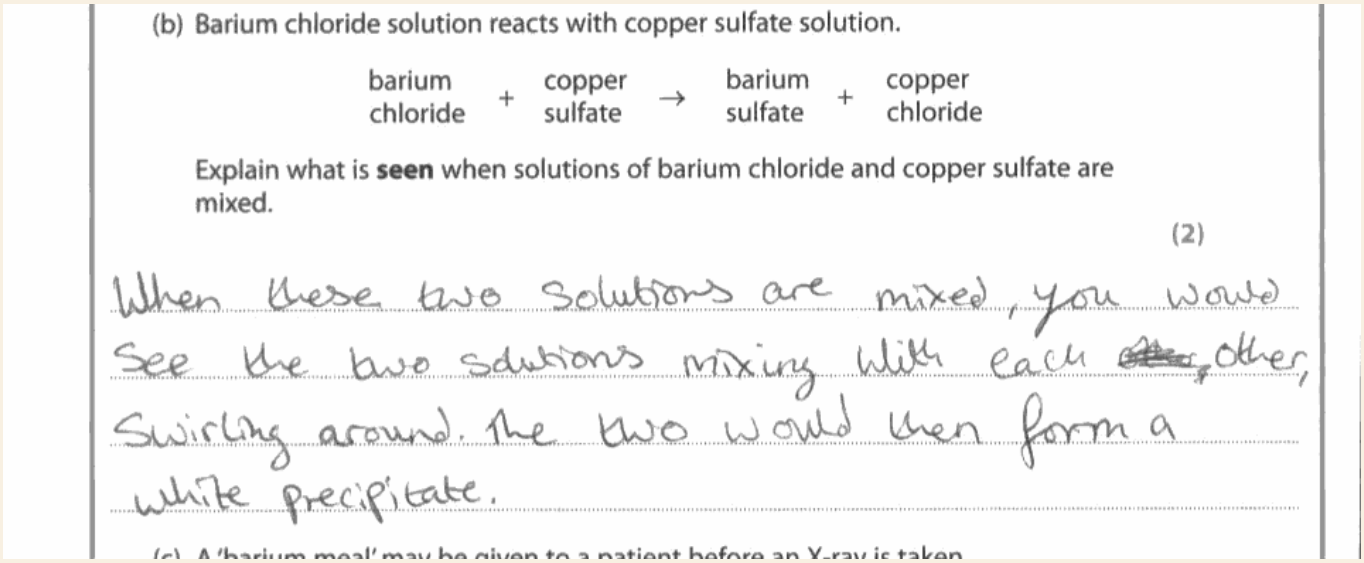
This candidate has said what should be done to the marble chips, but not **explained** why, so cannot access the second mark.

Question 2 (a)

This was usually well answered.

Question 2(b)

This was found challenging by many, with few candidates being able to give a correct **observation**. Many candidates simply repeated what the word equation stated.



(b) Barium chloride solution reacts with copper sulfate solution.

barium chloride + copper sulfate → barium sulfate + copper chloride

Explain what is **seen** when solutions of barium chloride and copper sulfate are mixed.

(2)

When these two solutions are mixed, you would see the two solutions mixing with each ~~other~~, other, swirling around. The two would then form a white precipitate.

(c) A 'barium meal' may be given to a patient before an X-ray is taken

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Examiner Comments

This answer gained a mark for "white precipitate" but did not explain that it is caused by barium sulfate being insoluble, which was needed for the second mark.

Question 2 (c)

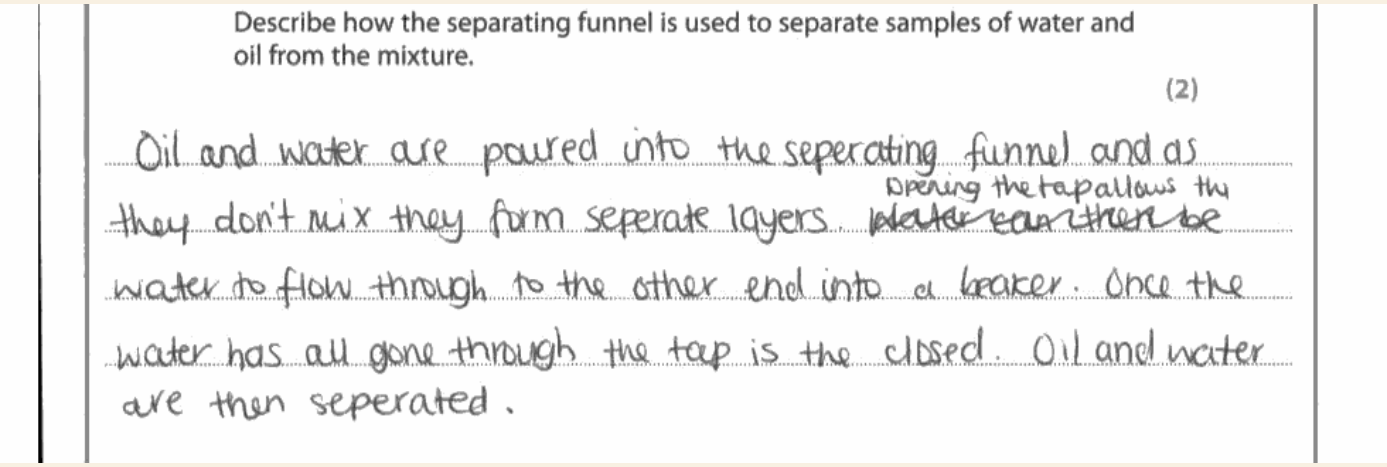
About half of the candidates got the mark here, with some candidates explaining that barium sulfate is opaque to X-rays. Those who did not know the answer often tried to make a guess. Some suggestions were that the barium sulfate showed up "bones" or "purged the system".

Question 2 (e)

This proved too challenging for the majority, but gave an opportunity for the most able candidates to show their ability. Candidates need to be precise in the size and positioning of numbers in formulae.

Question 3 (a) (ii)

It seemed that many candidates were totally unfamiliar with a separating funnel, giving many odd descriptions of how it may be used, as well as strange names for what was the tap. Many produced reasonable answers which gained 1 mark, but others spent time talking about the two liquids being immiscible rather than concentrating on how the equipment is used. For those unfamiliar with the separating funnel, answers often referred to a **filtration** type of process.



Describe how the separating funnel is used to separate samples of water and oil from the mixture.

(2)

Oil and water are poured into the seperating funnel and as they don't mix they form seperate layers Opening the tap allows the ~~water~~ can then be water to flow through to the other end into a beaker. Once the water has all gone through the tap is the closed. Oil and water are then seperated.

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Examiner Comments

This answer was awarded 2 marks.

Question 3 (b) (i)

This was answered well by the majority of the candidates.

Question 3 (b) (ii)

This could be answered either from a theoretical approach based on the type of bonding and structure, or from a practical perspective, involving the high melting point and the inability of a bunsen to reach such a high temperature.

(ii) When the sand is heated using a Bunsen burner there is no visible change.

Explain why.

(2)

There is no visible change when the sand is heated using a bunsen burner because it has a melting point of 1610°C and which therefore means a bunsen burner isn't hot enough to melt it.

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Examiner Comments

This answer, from a practical perspective received 2 marks.

(ii) When the sand is heated using a Bunsen burner there is no visible change.

Explain why.

(2)

Because Sand is a giant macrecular covalently banded making the properties of melting and breaking down high. A lot of heat would be needed.

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Examiner Comments

Some candidates gave good answers based on a theoretical approach.

Question 3 (c) (i)

Perhaps surprisingly, only a half of candidates correctly referred to one spot or dot.

Question 3 (c) (ii)

Some candidates did not respond to this question. Many candidates were able to gain 1 mark by saying ink Z was not pure, or was a mixture, but did not pick up the second mark by identifying one of the constituent dyes.

Question 4 (a)

This question was poorly answered. Some candidates mentioned sharing electrons, but very few stated 'a shared **pair** of electrons'. Many wrote about atoms needing to get a full outer shell, but didn't mention sharing electrons.

Others correctly described the outer shell structures of hydrogen and oxygen, but didn't then go on to give any details of how the electrons were shared.

Question 4 (b)

Many candidates were successful here. Those that were unsuccessful often gave an answer of 17 and were allowed 1 mark. Others gave some surprising methods and answers!

(b) Calculate the relative formula mass of water, H_2O.
(Relative atomic masses: H = 1.0, O = 16)

(2)

$H = 1.0^2 = 1.0 \times 16 = 16.0$ $H_2O = 16.0$

answer = 16.0

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Examiner Comments

Some squared and multiplied.

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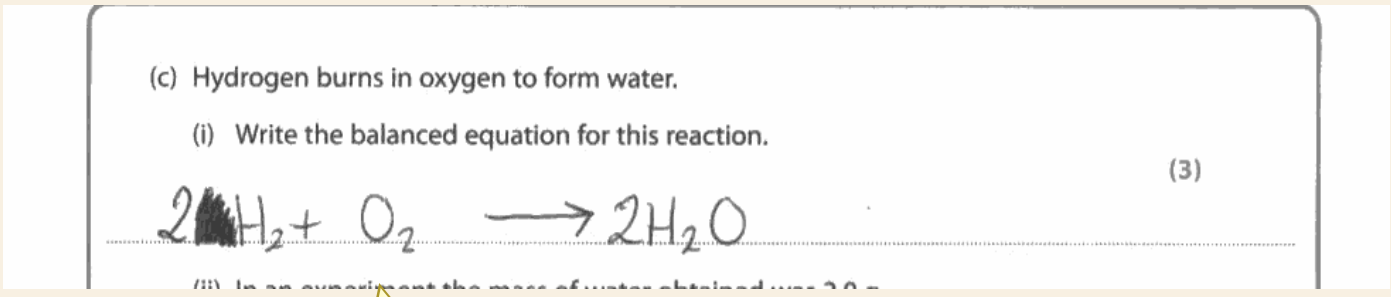
Examiner Tip

Questions involving the calculation of relative formula mass are unlikely to involve complicated formulae on this paper. Candidates should be encouraged to practise examples, and not to think they are going to be beyond their capabilities. Candidates should always show their working, as even if they are incorrect in their final answer, they may often access 1 mark for their working.

Question 4 (c) (i)

Understandably, formulae and equations were a very challenging prospect for many candidates in this paper. However, it was pleasing to see some excellent responses, and most gained 1 mark for a correct formula for water.


(c) Hydrogen burns in oxygen to form water.

(i) Write the balanced equation for this reaction.

(3)

$2H_2 + O_2 \rightarrow 2H_2O$

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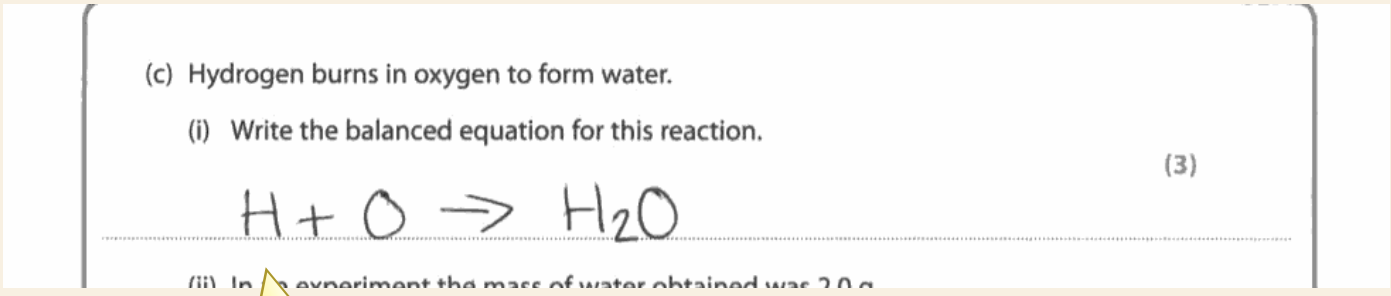
Examiner Comments

A fully correct response.


(c) Hydrogen burns in oxygen to form water.

(i) Write the balanced equation for this reaction.

(3)

$H + O \rightarrow H_2O$

ResultsPlus
Examiner Comments

A common example of an answer with the candidate not appreciating that hydrogen and oxygen are diatomic.

Question 4 (c) (ii)

Many candidates made the correct calculation, although some divided 4 by 2 and suggested an answer of 200%. Some candidates failed to convert to a percentage, having correctly calculated the fraction representing the yield.

Question 4 (c) (iii)

This question was not well answered but some candidates did gain a mark. Many answered in terms of unwanted reactions occurring, despite the impossibility of such a situation given the simple reactants involved.

Question 5 (a)

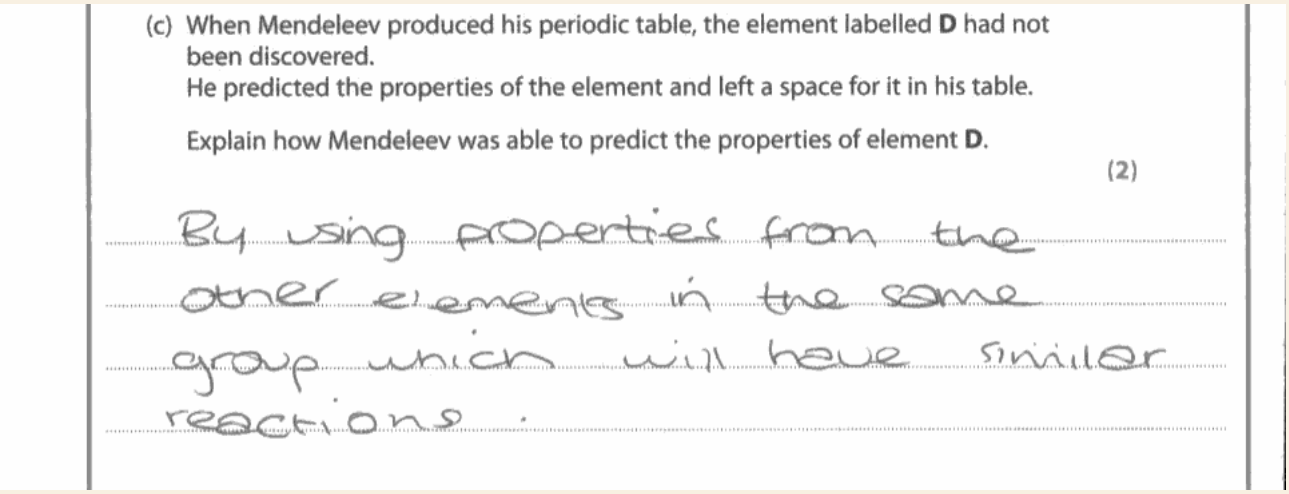
Many candidates answered this question successfully.

Question 5 (b)

This question was well answered by many candidates, who demonstrated an awareness of the relationship between a group of the Periodic Table and chemical properties. Many took it a stage further and were able to talk about equal numbers (one) of outer shell electrons, or both elements being alkali metals.

Question 5 (c)

Most candidates made their explanation insufficiently clear enough to be awarded 2 marks. These candidates wrote rather vaguely about the nearby elements being similar. Other candidates wrote about elements in the same **row/period** having the same properties.



(c) When Mendeleev produced his periodic table, the element labelled **D** had not been discovered.
He predicted the properties of the element and left a space for it in his table.

Explain how Mendeleev was able to predict the properties of element **D**.

(2)

By using properties from the other elements in the same group which will have similar reactions.

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Examiner Comments

This answer was awarded 2 marks.

(c) When Mendeleev produced his periodic table, the element labelled **D** had not been discovered.
He predicted the properties of the element and left a space for it in his table.

Explain how Mendeleev was able to predict the properties of element **D**.

(2)

By just following the Pattern around it.

ResultsPlus
Examiner Comments

Vague answers such as this, were unfortunately quite common.

Question 5 (d)

(d) An atom of element **C** contains 29 protons.

Explain how you can use this information to calculate the number of protons in an atom of element **D**.

(2)

You can use this information, because on the periodic table the number of protons go in order and 1 proton is added each time. e.g D is 2 boxes away from C so 2 protons have been added so D = 31 protons.

*(e) An atom has an atomic number of 9 and a mass number of 19

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Examiner Comments

This answer was worth 2 marks.

(d) An atom of element **C** contains 29 protons.

Explain how you can use this information to calculate the number of protons in an atom of element **D**.

(2)

By following the pattern which is add one proton per element going to the right.

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Examiner Comments

In this example, the candidate appeared to know how to use the information, but did not go far enough to get the second mark.

Question 5 (e)

It was pleasing to see most candidates were able to gain some credit here. Indeed, some excellent responses were seen.

*(e) An atom has an atomic number of 9 and a mass number of 19.

Describe the numbers and positions of electrons, protons and neutrons in this atom.

(6)

The atomic number, which is also known as proton number shows the amount of protons in the atoms nucleus so there are 9 protons in the nucleus of this atom. The mass number of the atom is the amount of neutrons and protons in the nucleus of the shell as we know there's 9 protons there are 10 neutrons in the Nucleus of this atom. The amount of electrons is calculated as the same amount of protons, so this atom shall have 9 electrons so the first shell shall have 2 electrons and the next shell shall have 7 electrons which shall require one more electron for it to be very unreactive as there aren't many shells and electrons that the atom shall be less reactive as the electrons are close to the Nucleus written like 2,7 to shows the amount of electrons on each shell.

(Total for Question 5 = 12 marks)

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Examiner Comments

An excellent answer worth 6 marks.

*(e) An atom has an atomic number of 9 and a mass number of 19.

Describe the numbers and positions of electrons, protons and neutrons in this atom.

(6)

Fluorines mass number is 19 and atomic number 9 so that means there are 9 electrons and 9 protons and it also means there are 10 neutrons so the electronic configuration is 2.7 because of this fluorine might want to become a ion too have a full outer shell. in the nucleas you have neutrons and protons and on the shell you have electrons

ResultsPlus

Examiner Comments

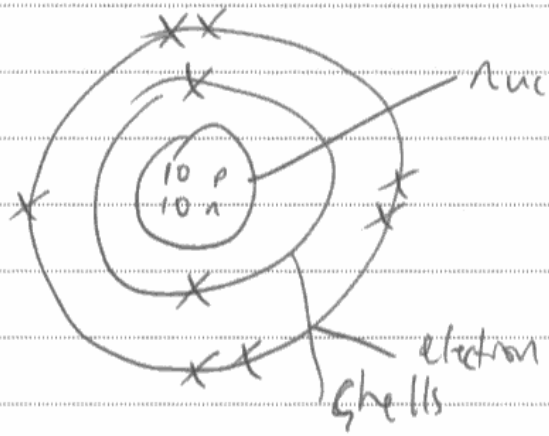
Another excellent answer, also worth 6 marks.

*(e) An atom has an atomic number of 9 and a mass number of 19.

Describe the numbers and positions of electrons, protons and neutrons in this atom.

(6)

The atomic number shows the amount of protons or electrons where the mass number shows the protons + the neutrons, so this atom must have 9 electrons, 9 protons and 10 neutrons positioned like this.



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Examiner Comments

Some used diagrams to help their answers - in this case worth 6 marks.

*(e) An atom has an atomic number of 9 and a mass number of 19.

Describe the numbers and positions of electrons, protons and neutrons in this atom.

(6)

It will 9 electrons and it will have 9 protons and it will have 10 Neutrons.

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Examiner Comments

A succinct answer worth 4 marks.

*(e) An atom has an atomic number of 9 and a mass number of 19. - Protron + Neutrons

Describe the numbers and positions of electrons, protons and neutrons in this atom.

(6)

The atomic number is how many protrons there are in an atom so there are 9 protrons and the number protrons is equal to the number of electrons so it doesn't have an overall charge (ion) and it has 9 electrons.
The mass number is the protrons + Neutrons so you have to subtract the protrons (atomic number) by the mass number. (19 - 9) This would make to neutrons.
10 Neutrons
9 protrons
9 electrons

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Examiner Comments

An answer worth 4 marks.

*(e) An atom has an atomic number of 9 and a mass number of 19.

Describe the numbers and positions of electrons, protons and neutrons in this atom.

(6)

all of the elements in group 7 are a ~~numbers~~ specific group of metals also all of the formulas go in number order so you can find where it is the number is so simple at the very bottom of the element given it has a number and that number shows how many protons their are in that element.

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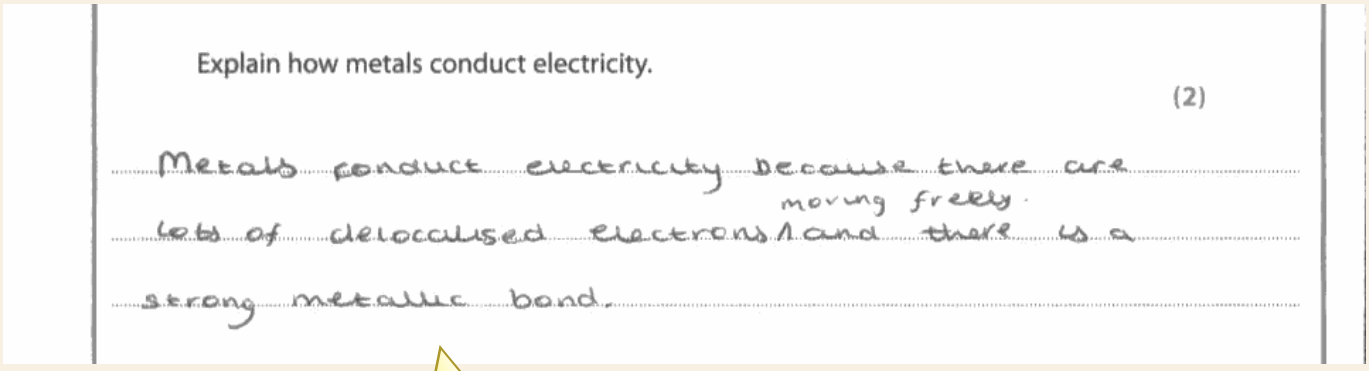
Examiner Comments

Unfortunately no creditworthy information here so no marks.

Question 6 (b)

Most candidates, despite being given a diagram to help them, found this question very difficult. A large number talked of the positively charged ions moving. Some regarded the electrons as positively charged, and others wrongly stated that metals conduct through electrons moving around the ions, rather than being delocalised and moving through the structure. There was some description of moving protons. Many candidates made contradictory statements.



Explain how metals conduct electricity.

(2)

Metals conduct electricity because there are lots of delocalised electrons moving freely and there is a strong metallic bond.

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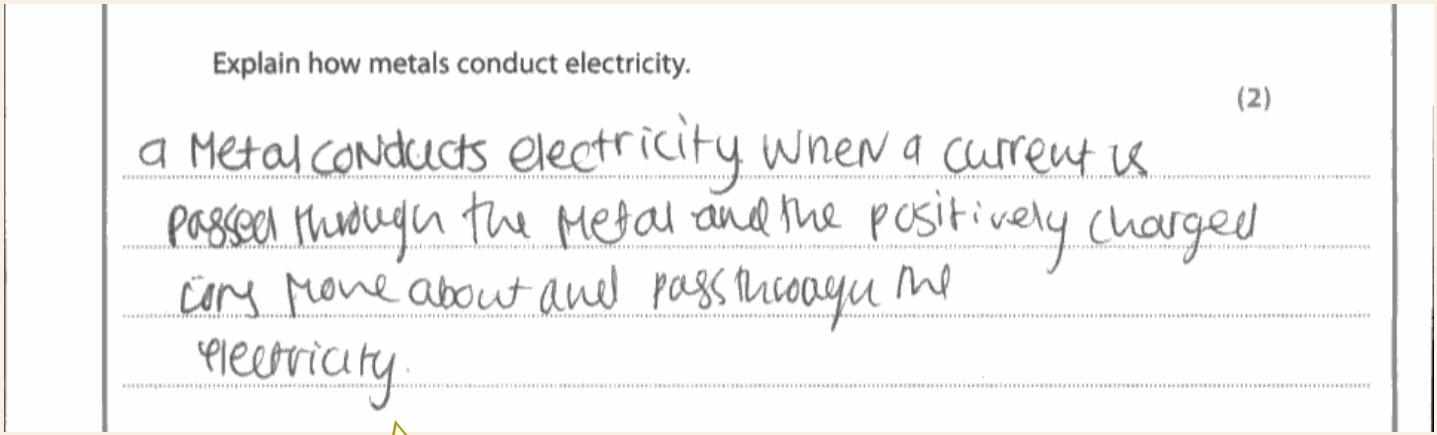
Examiner Comments

This answer was worth 2 marks.



Explain how metals conduct electricity.

(2)

a Metal conducts electricity when a current is passed through the Metal and the positively charged ions move about and pass through the electricity.

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Examiner Comments

An example of a commonly held misconception presented as an answer by some candidates.

Question 6 (c) (i)

The majority of candidates appear to think incorrectly that sodium compounds give an orange, rather than a yellow colour in a flame test.

Question 6 (c) (ii)

This question revealed a lack of knowledge amongst many candidates, but it was pleasing to also see some good answers.

(ii) Describe how silver nitrate solution can be used to show that solid sodium chloride contains chloride ions.

(2)

Adding nitric acid to a solution of silver nitrate, followed by solution of sodium chloride. A white precipitate would form because chloride gives off a white precipitate, This shows there are chloride ions.

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Examiner Comments

An excellent response.

(ii) Describe how silver nitrate solution can be used to show that solid sodium chloride contains chloride ions.

(2)

Put the two solutions together and you should get a solid.

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Examiner Comments

This example was awarded 1 mark. The candidate would have needed to state a white solid/precipitate would be formed to score a second mark.

Question 6 (c) (iii)

This proved harder than the first 6 mark question. The question and mark scheme allowed for either a practical or theoretical approach, or a mixture of both, to gain credit.

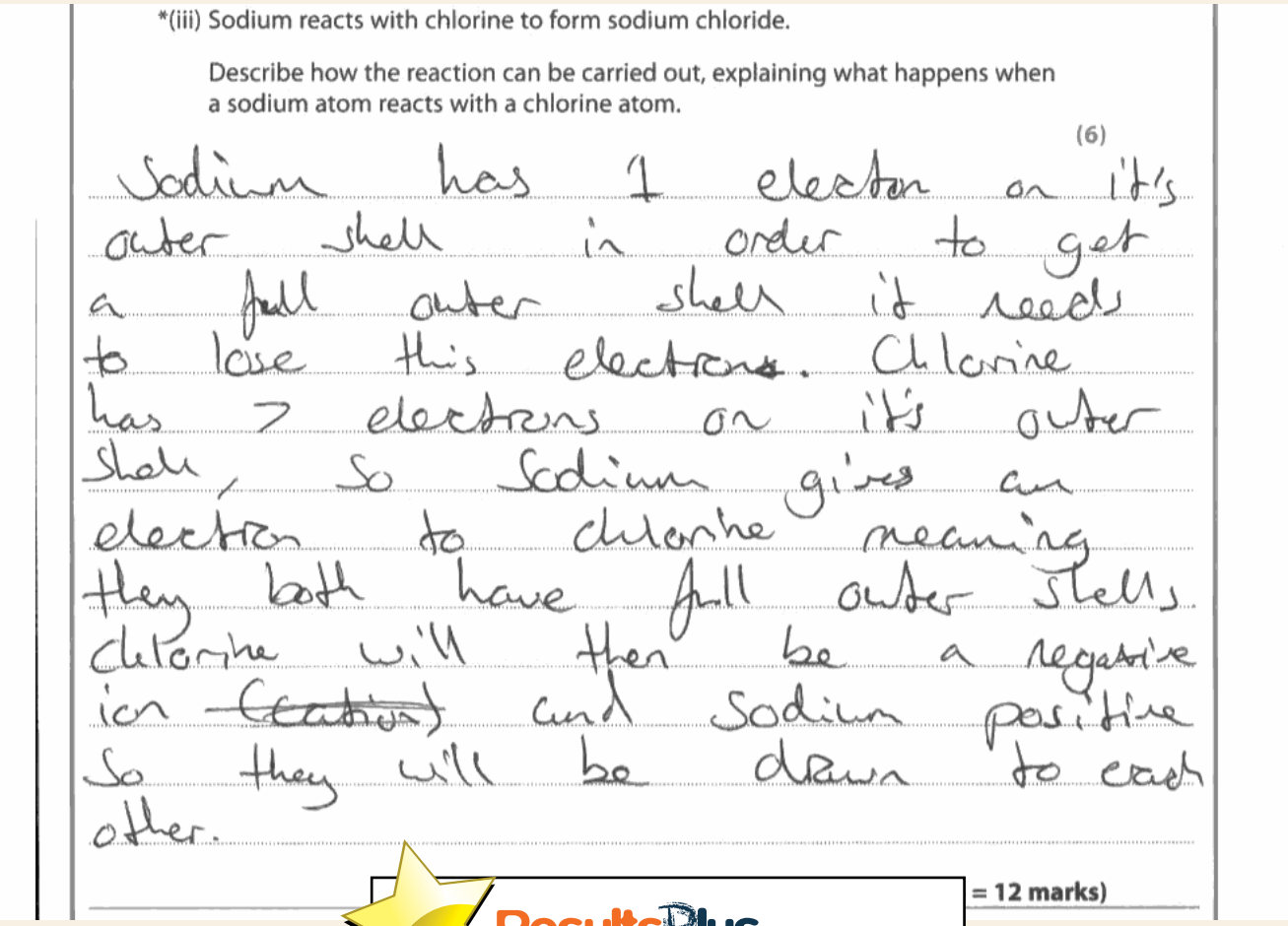
Few candidates took a practical route, suggesting that only a small number had seen the experiment demonstrated, or a recording of it being done. Those that did take a practical route often described something similar to sodium reacting with water. Hardly any candidates mentioned that the sodium should be burning when placed in chlorine.

Most took a theoretical approach and had some success.

Many candidates gave a good summary of the sodium and chlorine electronic structures, but failed to describe what happened to the outer electrons during the reaction.

Some candidates mixed up ionic and covalent bonding.

A good number of candidates scored marks by describing "sodium losing an electron to the chlorine".



*(iii) Sodium reacts with chlorine to form sodium chloride.

Describe how the reaction can be carried out, explaining what happens when a sodium atom reacts with a chlorine atom.

(6)

Sodium has 1 electron on it's outer shell in order to get a full outer shell it needs to lose this electrons. Chlorine has 7 electrons on it's outer shell, so Sodium gives an electron to chlorine meaning they both have full outer shells. chlorine will then be a negative ion ~~(cation)~~ and Sodium positive so they will be drawn to each other.

= 12 marks)

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Examiner Comments

This answer was worth 6 marks.

*(iii) Sodium reacts with chlorine to form sodium chloride.

Describe how the reaction can be carried out, explaining what happens when a sodium atom reacts with a chlorine atom.

(6)

The sodium atom has 11 eleven electrons which means it has two on its first shell eight on its second and one one its last because it's in group one, so it should look like 2.8.1. The chlorine atoms has 17 eletrons, so two on first shell, 8 on it's second shell and seven on it's outer shells (2.8.7). They react by doing ionic bonding which is where the movement of electrons take place. So Sodium would give its one electron to chlorine, so both of them could have full shells. Eventually it would end up with sodium having an electronic configuration of 2.8 and chlorine have an electronic configuration of 2.8.8, so both of the atoms have full shells.

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Examiner Comments

Another very good answer worth 6 marks.

*(iii) Sodium reacts with chlorine to form sodium chloride.

Describe how the reaction can be carried out, explaining what happens when a sodium atom reacts with a chlorine atom.

(6)

when a sodium atom react ~~them~~ they bond together to produce sodium chloride this type of bonding is ionic.

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Examiner Comments

An answer worth 2 marks.

*(iii) Sodium reacts with chlorine to form sodium chloride.

Describe how the reaction can be carried out, explaining what happens when a sodium atom reacts with a chlorine atom.

(6)

The sodium and chlorine are mixed together in a solution of dilute hydrochloric acid. & The sodium displaces the chlorine and forms sodium chloride. The sodium chloride can be extracted from the solution using seperating funnels. The chloride (l) will be filtered out and the sodium (s) will remain as a solid in the filter.

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Examiner Comments

A not uncommon type of answer showing the candidate perhaps has had no experience of the reaction.

*(iii) Sodium reacts with chlorine to form sodium chloride.

Describe how the reaction can be carried out, explaining what happens when a sodium atom reacts with a chlorine atom.

(6)

Get the
Sodium and chlorine as liquids and mix them both together in a beaker. Then heat over a bunsen burner until the Sodium Chloride crystals are formed. A Sodium atom has an unstable outer electron shell and needs to gain an electron and ~~chloride~~ chlorine also has an unstable outer shell and need to either gain eight electrons or lose one. The electron from chlorine will be passed over to sodium and they ~~will~~ will then both have stable outer electron shells.

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Examiner Comments

Another example of the candidate unfortunately writing a lot but not worthy of credit.

Paper Summary

To improve performance in future sessions, candidates would be well advised to take good notice of the number of marks available in each part of a question. Also teachers should try to ensure that candidates are familiar with what is expected when particular command words such as "Explain" are used in a question.

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