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Examiners' Report
June 2015

GCSE Chemistry 5CH2F 01

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June 2015

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Introduction

Candidates who sat this paper were presented with a range of questions with a variety of levels of demand, with some designed to be accessible for the weakest and others to be challenging for the strongest candidates.

In general, in relevant questions on the paper, the stronger candidates could:

- assimilate and use information given
- suggest sensible safety precautions
- construct a word equation
- write a simple balanced equation
- show understanding of some separation and purification techniques
- show knowledge of atomic structure
- show understanding of chemical bonding
- carry out simple calculations involving relative atomic masses

In comparison, other candidates were less successful in these aspects and often did not read the question carefully resulting in answers that were not relevant to what had been asked.

It was disappointing to see candidates sometimes contradict themselves in their responses, often at the end of their answer, and so spoil their earlier good work.

It was particularly pleasing to see so many good responses to the first free-response six mark question although the second one proved much more difficult.

This report gives examples of typical responses and some comments on them.

Question 1 (a)

Many candidates gave yellow as the colour for chlorine and orange as the colour for bromine. It seems possible that many candidates had seen bromine water but were not familiar with pure liquid bromine. It was good to see that many students identified iodine as a solid although some did think it was a liquid, possibly suggesting confusion with iodine solution being used as a test for starch.

Halogens

1 The table gives information about the colours and physical states at room temperature of the halogens, chlorine, bromine and iodine.

(a) Complete the table.

(3)

name	colour at room temperature	physical state at room temperature
chlorine	yellow	gas
bromine	clear	liquid
iodine	grey	solid

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Examiner Comments

Yellow was commonly seen as the incorrect colour for chlorine. "Clear" is not a colour and solid iodine was awarded a mark.

Halogens

1 The table gives information about the colours and physical states at room temperature of the halogens, chlorine, bromine and iodine.

(a) Complete the table.

(3)

name	colour at room temperature	physical state at room temperature
chlorine	~~Clear~~ Clear	gas
bromine	Orange	liquid
iodine	grey	liquid

ResultsPlus
Examiner Comments

These answers were commonly seen. "Clear" is not a colour for chlorine, orange was not credited for bromine and was possibly due to candidates thinking of an aqueous solution of bromine. Iodine as a liquid was possibly due to confusion with iodine solution which is often used as a test for starch.

Question 1 (b)

Most candidates scored at least 1 mark but many did not answer the question instead describing what the symbols meant. Others were too vague when discussing precautions and answers such as 'wear protective equipment/clothing' frequently appeared which could not be credited.

(b) These two hazard symbols are attached to a container of liquid bromine.

A chemist uses bromine in an experiment.

Use the hazard symbols to suggest safety precautions the chemist should take when using the bromine.

(2)

The use of the hazard symbols are Corrosive and harmful

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Examiner Comments

Answers such as this were unfortunately quite common. The candidate is trying to explain the meaning of the hazard symbols rather than suggesting safety precautions which the chemist should take.

(b) These two hazard symbols are attached to a container of liquid bromine.

A chemist uses bromine in an experiment.

Use the hazard symbols to suggest safety precautions the chemist should take when using the bromine.

(2)

The chemist should wear gloves so the chemicals do not touch the skin. The chemist should also wear safety goggles so nothing touches the eyes.

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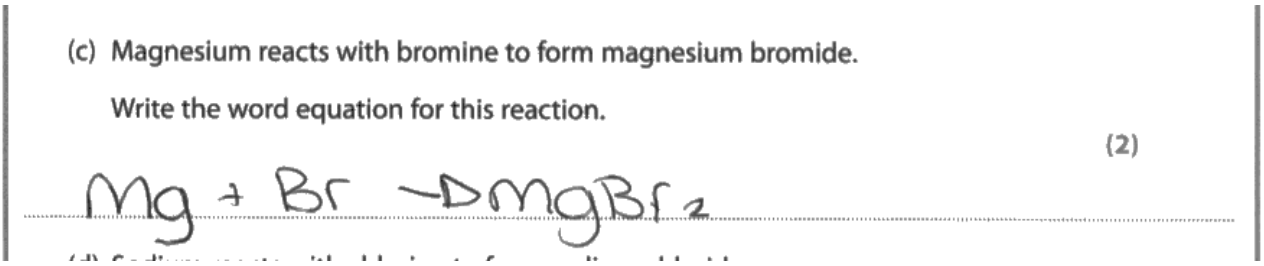
Examiner Comments

This was the most common way of scoring two marks.

Question 1 (c)

This was often well answered. However some candidates added extra reactants or products and others tried to write symbol equations in place of word equations, usually incorrectly with MgBr often been quoted as the formula for magnesium bromide.



(c) Magnesium reacts with bromine to form magnesium bromide.

Write the word equation for this reaction.

(2)

Mg + Br → MgBr2

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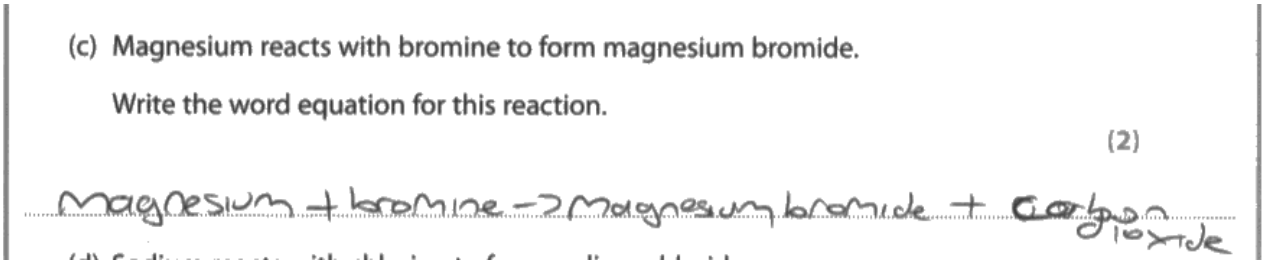
Examiner Comments

This candidate did not give a word equation as requested but made the question harder for themselves by trying to write a formula equation. They were awarded 1 mark for the correct formula of magnesium bromide on the right hand side of the equation.



(c) Magnesium reacts with bromine to form magnesium bromide.

Write the word equation for this reaction.

(2)

magnesium + bromine → magnesium bromide + carbon dioxide

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Examiner Comments

An otherwise correct answer spoilt by the addition of carbon dioxide as an extra product.

Question 2 (a) (i)

Almost all candidates gave the correct answer.

Question 2 (a) (ii)

The vast majority of candidates correctly identified the two inks.

Question 2 (d)

This proved to be a good discriminator. Some weaker candidates did not attempt the question. Of those that did, many used the formulae which had been given in the question but some then didn't balance the equation correctly. Other candidates were far too inclined to change the formulae from the ones stated in the question, often by incorrect use of subscripts in the product such as stating H_2Cl_2

(d) Hydrogen chloride, HCl, can be formed by the reaction of hydrogen, H_2, with chlorine, Cl_2.

Write the balanced equation for this reaction.

(2)

$H_2 + Cl_2 \rightarrow 4HCl$

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Examiner Comments

This was awarded 1 mark for the correct formulae but did not gain the second mark as it was incorrectly balanced.

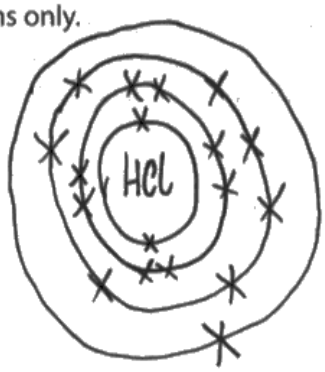
Question 2 (e)

Candidates generally scored 2 marks or no marks on this question indicating they either knew it well or not at all. Many did not attempt the question. Of those that did, many answers saw candidates trying to combine the two elements into one single, combined structure labelled HCl. Many still drew inner shells despite being told not to in the question but were still able to score both marks. Some thought the bonding was ionic and drew diagrams indicating electron transfer from hydrogen to chlorine. However it was pleasing to see some very well drawn fully correct answers.

(e) The electronic configuration of hydrogen is 1.
The electronic configuration of chlorine is 2.8.7.

Draw a dot and cross diagram to show the arrangement of electrons in a molecule of hydrogen chloride, HCl.

Show outer electrons only.



(2)

(Total for Question 2 = 8 marks)

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Examiner Comments

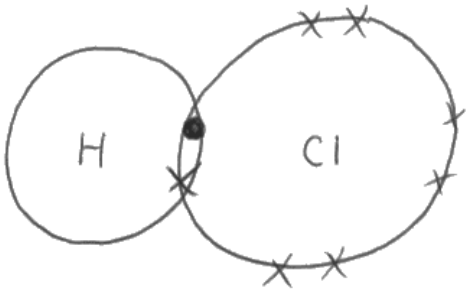
This type of answer was surprisingly common. The two atoms have been combined into one and labelled as one structure HCl.

(e) The electronic configuration of hydrogen is 1.
The electronic configuration of chlorine is 2.8.7.

Draw a dot and cross diagram to show the arrangement of electrons in a molecule of hydrogen chloride, HCl.

Show outer electrons only.

(2)



(Total for Question 2 = 8 marks)

ResultsPlus
Examiner Comments

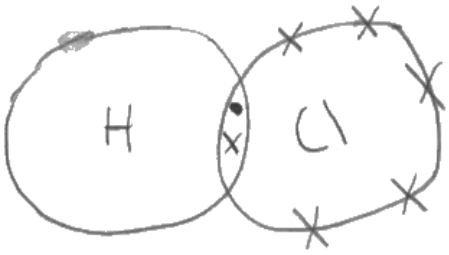
A well drawn fully correct answer.

(e) The electronic configuration of hydrogen is 1.
The electronic configuration of chlorine is 2.8.7.

Draw a dot and cross diagram to show the arrangement of electrons in a molecule of hydrogen chloride, HCl.

Show outer electrons only.

(2)



(Total for Question 2 = 8 marks)

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Examiner Comments

This answer gained one mark for the shared pair of electrons but unfortunately has the incorrect number of electrons in the outer shell of chlorine.

Question 3 (b) (ii)

The majority of candidates did not appreciate that carbon dioxide is produced when dilute hydrochloric acid is added to potassium carbonate. Most students therefore described the test for hydrogen and occasionally the test for oxygen.

Of those who did identify the gas as being carbon dioxide a significant number described a lit splint being extinguished as a viable test for carbon dioxide.

(ii) When dilute hydrochloric acid is added to potassium carbonate, a gas is evolved.

Describe the test for this gas.

(2)

You can use a lit splint and put it into the gas and it should make a popping sound.

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Examiner Comments

An all too common answer suggesting a test for hydrogen.

(ii) When dilute hydrochloric acid is added to potassium carbonate, a gas is evolved.

Describe the test for this gas.

(2)

Add the potassium carbonate to acid and let the CO_2 molecule go through the delivery tube to lime water and if carbonate is present, lime water will turn cloudy/milky.

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Examiner Comments

An example of a very good response.

Question 3 (c)

It was pleasing to see some candidates score all three marks, often with quite a short, succinct answer.

However many other candidates failed to appreciate the nature of the mixture and often thought that simply heating the mixture would yield the pure barium sulfate. Some failed to score the first mark due to inadequate descriptions of filtering - the use of filter paper *and* a (filter) funnel was required. A significant number suggested the use of a separating funnel and others suggested distillation.

Candidates quite often managed to score two marks but missed the third either by forgetting to wash the sample or just stating 'dry it' without suggesting how.

(c) Barium nitrate solution is added to potassium sulfate solution in a beaker.
A white precipitate of barium sulfate forms in a mixture with potassium nitrate solution.

Describe how you would obtain a pure, dry sample of barium sulfate from the mixture in the beaker.

(3)

Mix the two soluble ~~salts to~~ solutions together. filter the solution. The insoluble salt should stick to the filter paper. clean the salt with pure water. Dry the salt by leaving it on the filter paper or put in oven to dry.

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Examiner Comments

This is an example of an answer awarded all three marks.

Question 3 (d)

Good answers were seen but unfortunately many began by correctly describing the movement of electron but later contradicted themselves by stating that the atoms share electrons, although still calling this ionic bonding. Some gave an incorrect direction of electron transfer whilst others vaguely referred to the 'joining of the electrons' in the outer shells to make eight.

(d) Magnesium oxide is an ionic compound.

The electronic configuration of magnesium is 2.8.2.
The electronic configuration of oxygen is 2.6.

Describe, in terms of electrons, how a magnesium atom and an oxygen atom form ions in magnesium oxide, MgO.

(3)

A magnesium atom and an oxygen atom form ions in magnesium is due to the transfer of electrons. Also they ~~w~~ are two compounds from different groups and contain two compound/ each.

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Examiner Comments

This answer was awarded one mark for correctly stating transfer of electrons in the first sentence. The rest of the answer was ignored.

(d) Magnesium oxide is an ionic compound.

The electronic configuration of magnesium is 2.8.2.
The electronic configuration of oxygen is 2.6.

Describe, in terms of electrons, how a magnesium atom and an oxygen atom form ions in magnesium oxide, MgO.

(3)

magnesium atoms ~~to~~ lose electrons to gain positive charge and an oxygen atom ~~to~~ gains electron to lose a charge, ~~so when both~~ ~~to~~ to form ions.

ResultsPlus
Examiner Comments

This answer has the idea of electron transfer and in the correct direction but has not mentioned the number of electrons transferred so scores two marks.

Question 3 (e)

It was possibly a little surprising that only just over half of candidates gave a correct answer. Significant numbers of candidates multiplied the relative atomic masses whilst others decided to subtract or divide them. Others obtained the correct answer but then carried out extra operations on it, often involving 100.

(e) Calculate the relative formula mass of magnesium oxide, MgO.
(relative atomic masses: O = 16; Mg = 24)

(1)

16 × 24

relative formula mass = 384

(Total for Question 3 = 11 marks)

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Examiner Comments

This was a common incorrect response.

(e) Calculate the relative formula mass of magnesium oxide, MgO.
(relative atomic masses: O = 16; Mg = 24)

(1)

24 ÷ 16 = 1.5 x 100

relative formula mass = 150

(Total for Question 3 = 11 marks)

ResultsPlus
Examiner Comments

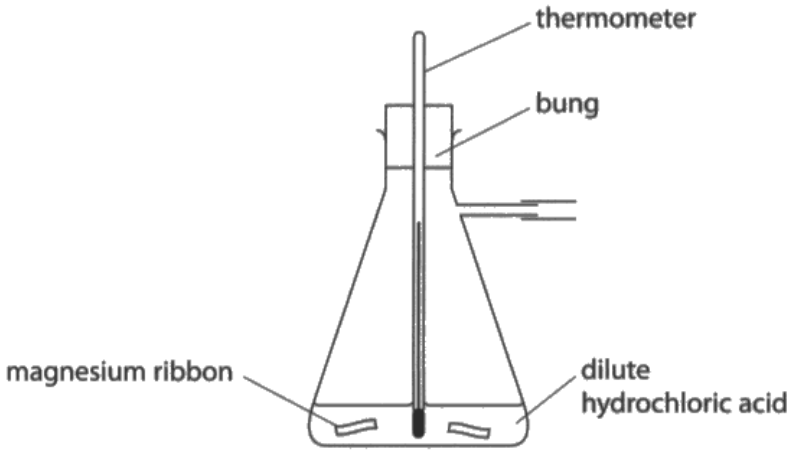
Two incorrect operations given here.

Question 4 (a)

There were many misconceptions and misunderstanding of the meanings of the state symbols. There were many who did not understand the meaning of (aq) and several different alternatives were suggested. Surprisingly, some who gave correct meanings of (aq) then proceeded to say (l) meant either a solid or a gas. It was not unusual to see statements such as 'aq is more reactive'.

Chemical reactions

4 The apparatus shown was used by a student to investigate the reaction between strips of magnesium ribbon and **excess** dilute hydrochloric acid.



The word equation for the reaction is

$$\text{magnesium(s)} + \text{hydrochloric acid(aq)} \rightarrow \text{magnesium chloride(aq)} + \text{hydrogen(g)}$$

(a) States of substances in reactions can be shown by state symbols.

Explain the difference between magnesium chloride(aq) and magnesium chloride(l).

(2)

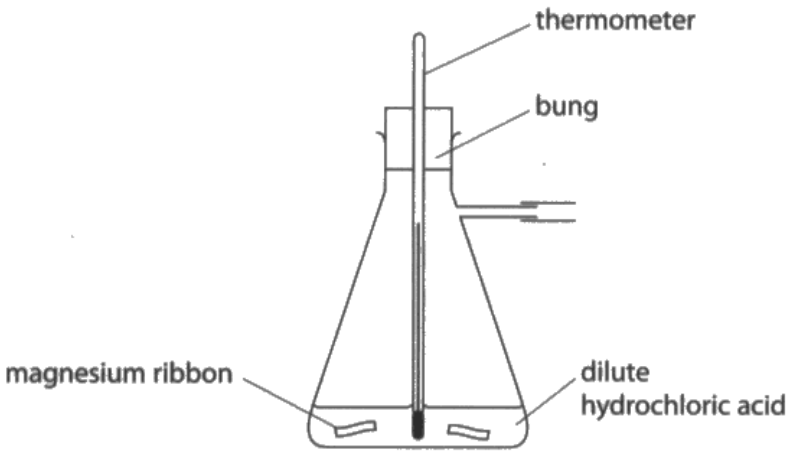
(aq) is a solid and magnesium chloride (l) is a liquid.

ResultsPlus
Examiner Comments

This type of response was surprisingly common.

Chemical reactions

4 The apparatus shown was used by a student to investigate the reaction between strips of magnesium ribbon and **excess** dilute hydrochloric acid.



The word equation for the reaction is

$$\text{magnesium(s)} + \underset{\text{acid}}{\text{hydrochloric}}\text{(aq)} \rightarrow \underset{\text{chloride}}{\text{magnesium}}\text{(aq)} + \text{hydrogen(g)}$$

(a) States of substances in reactions can be shown by state symbols.

Explain the difference between magnesium chloride(aq) and magnesium chloride(l).

(2)

Magnesium chloride (aq) is a gas and Magnesium chloride (l) is a Liquide

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Examiner Comments

Another common incorrect explanation of (aq)

Question 4 (b)

Many candidates correctly suggested fizzing or bubbling. Temperature rise was common too. This was an acceptable answer as a thermometer was shown in the diagram. However, many candidates then lost the mark by also giving an incorrect observation such as a white flame or suggesting would be seen.

(b) Describe what you would **see** when magnesium ribbon reacts with dilute hydrochloric acid.

(1)

Bubbles., a gas is being released

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Examiner Comments

The mark was awarded for reference to bubbles but other candidates simply gave the second part of the response - "a gas/hydrogen being produced/ released" which was not sufficient to gain a mark.

(b) Describe what you would **see** when magnesium ribbon reacts with dilute hydrochloric acid.

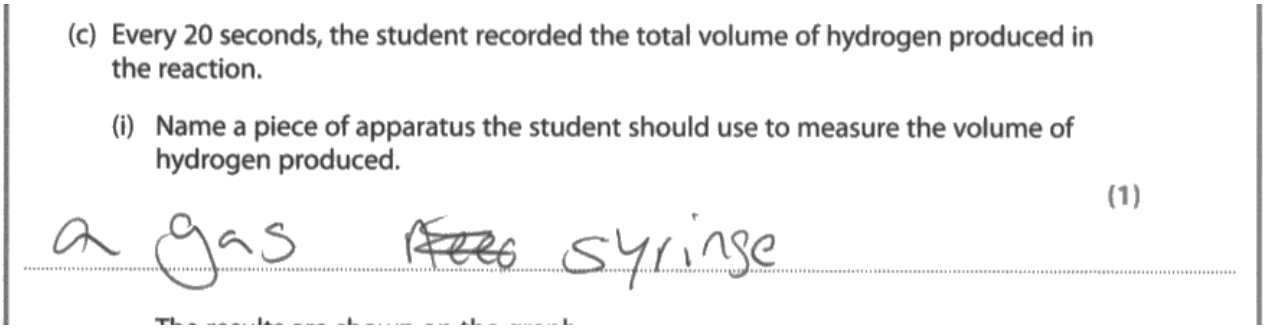
It sets on fire with a bright light. (1)

ResultsPlus
Examiner Comments

This candidate, like many others, incorrectly thought the magnesium would set alight.

Question 4 (c) (i)

The mark was most frequently awarded for a gas syringe but a measuring cylinder was also commonly seen. A variety of incorrect responses were given, some quite surprising such as thermometer, stop watch and ruler.



(c) Every 20 seconds, the student recorded the total volume of hydrogen produced in the reaction.

(i) Name a piece of apparatus the student should use to measure the volume of hydrogen produced.

(1)

a gas ~~flask~~ syringe

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Examiner Comments

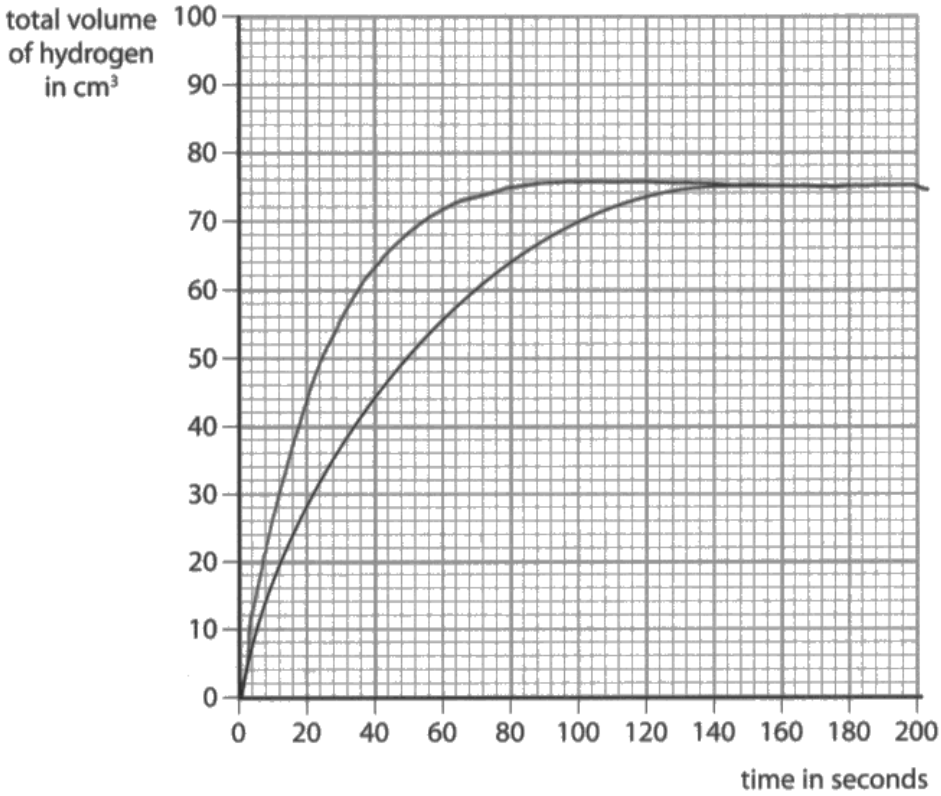
This was the most common correct answer.

Question 4 (c) (ii)-(iii)

(ii) The majority of candidates did not appreciate when the reaction ended and gave an incorrect answer of 180cm^3.

(iii) Many candidates scored 1 mark for drawing a line above the original, but many fewer realised the curve should end at the same volume as the original.

The results are shown on the graph.



(ii) After how many seconds had all the magnesium reacted?

(1)

140 seconds

(iii) The experiment is repeated using the same volume of a more concentrated hydrochloric acid solution.
All other conditions were kept the same.

On the graph draw a curve to show how the volume of hydrogen changes with time during this experiment.

(2)

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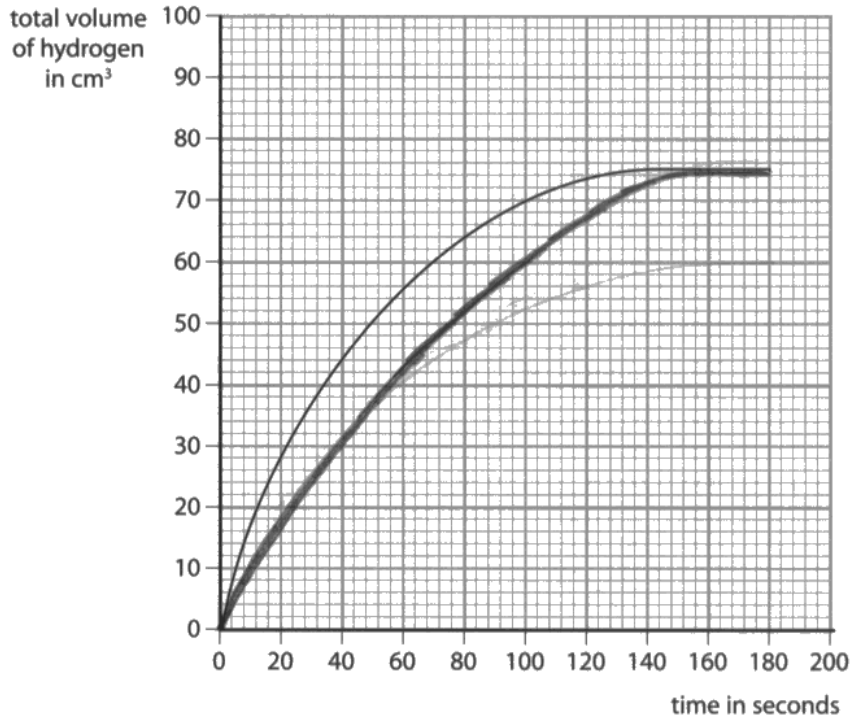
This is an example of a response worth all 3 marks.

The results are shown on the graph.



(ii) After how many seconds had all the magnesium reacted?

(1)

180 seconds

(iii) The experiment is repeated using the same volume of a more concentrated hydrochloric acid solution.
All other conditions were kept the same.

On the graph draw a curve to show how the volume of hydrogen changes with time during this experiment.

(2)

ResultsPlus
Examiner Comments

180 is incorrect and does not score a mark.

The curve is below the original one and so did not score the first mark but it finishes at the correct volume and so was awarded 1 mark.

Question 4 (d)

The majority of candidates correctly stated that the rate of reaction increased or that the reaction was quicker, and many also gave a correct explanation. However it was common for candidates to mistakenly suggest that the reason for the increased rate was that the powder had a smaller surface area. A small but significant number gave an incorrect relationship stating that the reaction would be slower.

(d) A student repeated the original experiment using the same mass of magnesium as a powder instead of as ribbon.
All other conditions were the same as in the first experiment.

Explain the effect on the rate of reaction of using magnesium powder instead of magnesium ribbon.

(2)

It will react ~~me~~ Quicker because there is more surface of Area

ResultsPlus
Examiner Comments

A response worth two marks.

(d) A student repeated the original experiment using the same mass of magnesium as a powder instead of as ribbon.
All other conditions were the same as in the first experiment.

Explain the effect on the rate of reaction of using magnesium powder instead of magnesium ribbon.

(2)

The surface area has change so the rate of reaction will increase.

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Examiner Comments

This scored a mark for stating the rate of reaction will increase but has stated the surface area changes not *increases* so was not worth the second mark.

Question 4 (e)

Most candidates indicated the increase in temperature. However it then proved more difficult to gain the second mark with many suggesting the reaction was endothermic or contradicting themselves by saying it was an exothermic reaction as heat was taken in. Some candidates thought the temperature had risen due to various external factors and then explained the effect of raising the temperature on the rate of reaction.

(e) When magnesium reacts with dilute hydrochloric acid there is a change in temperature.

In an experiment the results were
temperature at start = 21 °C
temperature at end = 62 °C

Explain what conclusion can be made about the type of reaction, from these results.

(2)

There was an endothermic reaction as the temperature had increased from the beginning to the end. There was more temperature recorded at the end than there was at the beginning

(Total for Question 4 = 11 marks)

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Examiner Comments

This was a common occurrence as the candidate scores a mark for stating the temperature had increased but then incorrectly states this meant it was an endothermic reaction.

Question 5 (a)

A large number of candidates failed to score marks here because they gave answers which clearly referred to the relative charges rather than the relative masses which were asked for.

Atoms and the periodic table

5 (a) Complete the table to show the relative mass of a neutron and of an electron.

(2)

particle	relative mass
proton	1
neutron	0
electron	−1

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Examiner Comments

Responses like this were very common. The candidate has answered in terms of the relative charge of the particles when the question asked for relative masses.

Atoms and the periodic table

5 (a) Complete the table to show the relative mass of a neutron and of an electron.

(2)

particle	relative mass
proton	1
neutron	1
electron	Negligible

ResultsPlus
Examiner Comments

This response was worth both marks.

Question 5 (c)

It was evident that there was some confusion about the meaning of atomic number and mass number with many getting the numbers of protons and neutrons mixed up. Many candidates also listed electrons in their answer but did not clarify they were not in the nucleus.

(c) The atomic number of lithium is 3.
The mass number of an atom of lithium is 7.

State the name and number of each of the particles in the nucleus of this atom.

(2)

In lithium it has 3 protons and electrons and it has 4 neutrons.

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Examiner Comments

This candidate has correctly stated 3 protons and 4 neutrons but has also mentioned electrons so was only awarded 1 mark.

(c) The atomic number of lithium is 3.
The mass number of an atom of lithium is 7.

State the name and number of each of the particles in the nucleus of this atom.

(in the nucleus) (not in the nucleus) (2)

It has 3 protons and electrons whereas it has 4 neutrons (in the nucleus)

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Examiner Comments

This answer was given both marks because although electrons were mentioned, the candidate made it clear that they were not in the nucleus.

Question 5 (d)

It was very pleasing to see so many good responses with nearly half of the candidates reaching Level 2. The basic structure of the periodic table was generally well known with many correctly identifying and naming some groups. There was however a lot of confusion evident from weaker candidates with groups being described as being rows, and the stepped line on the diagram was sometimes thought to be separating solids and liquids or gases.

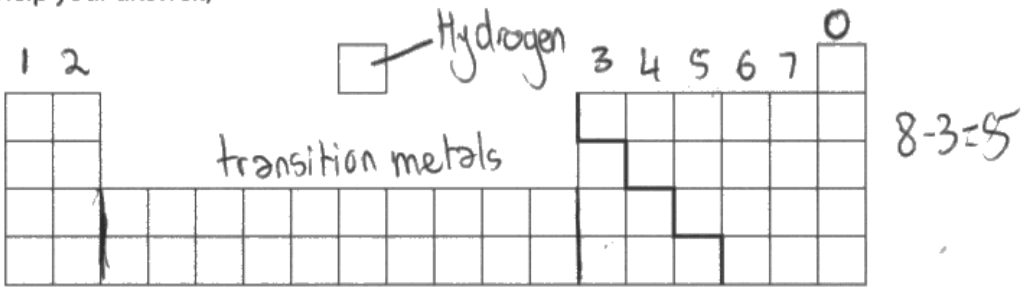
Good information about the atomic structure and chemical properties aspects was much less common than information about parts of the periodic table. The increasing reactivity down group 1 and the inertness of the noble gases were the most frequently mentioned points about chemical properties. A number of candidates failed to gain much credit as they mainly wrote about Mendeleev and the history of the periodic table. Only the best candidates described the elements as being arranged in order of increasing atomic number and the link between the period number and the number of shells.

*(d) Here is some information about the periodic table.

In the periodic table elements are arranged in rows and columns.
The position of an element in the periodic table depends on its atomic structure.
Elements with similar chemical properties are found in the same parts of the periodic table.

Identify different parts of the periodic table and explain how the position of an element in the periodic table is linked to its chemical properties and atomic structure.

(You are provided with an outline of the periodic table below and you may use this to help your answer.)



(6)

On the left hand side of the periodic table it is all metals & on the right hand side it is gases, now in groups elements in Group 1 all contain 1 electron in there outer shell, furthermore also Group 1 elements are called alkali metals, so as you go down the group the more soft & reactive they are. In Group 2, elements have 2 electrons there outer shell. In Group 3 they all contain 3 electrons in there outer shell, Group 4 have 4 electrons in there outer shells. Group 5 contain 5 electrons in the outer shell, as well as Group 6 have 6 electrons in there outer shells. In Group 7, the elements are

called Halogens, and as you go down the group the reactivity decreases as well as the softness, furthermore they have 7 electrons in there outer shell. In Group 0 the elements are called Noble Gases, and they are inert which means that they have a full outer shell, which means the atoms are stable compared to the others.

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There is a lot of correct information in this answer with reference to different parts of the periodic table, including on the diagram. Also the link between the position of an element in a group and its electronic configuration was very well made as was a link to trends in chemical reactivity. Hence the candidate was awarded a Level 3 and 6 marks.

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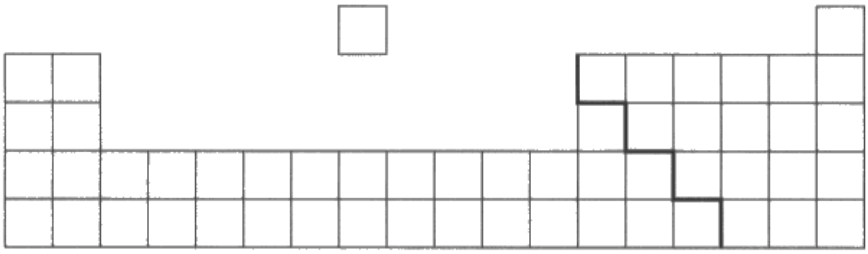

(6)

Group 7 of the periodic table contains the halogens, for example, iodine and bromine.
The verticle columns are known as groups, and the horizontal rows are known as periods.
The elements included in the periodic table are ordered by atomic number.
The metals are placed to the left of the periodic table.

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Examiner Comments

This answer contains references to several parts of the periodic table but in addition only one other relevant aspect i.e. elements ordered by atomic number. It was worthy of Level 2 and awarded 4 marks.

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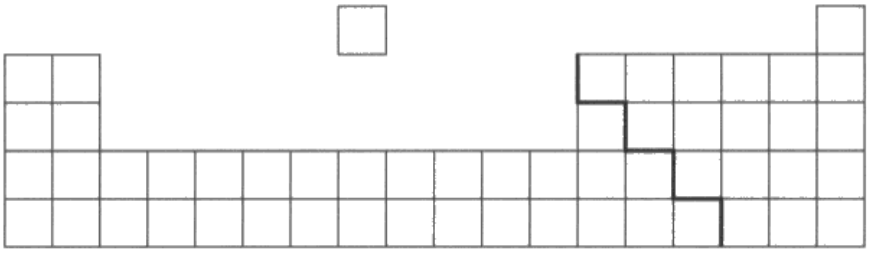


(6)

The numbers on the side of periodic table tells us how many ~~shells~~ electrons each element has. ~~The numbers on the top of the periodic table show us how many~~ the outer shell. The group numbers on the top of the periodic table show us how many shells each element has.

Between group 2 and 3, the periodic table shows us the transition metals, giving us an insight into how they relate to each other when it comes to chemical properties.

From group 7, the periodic table shows the non metals, ~~the~~ giving people the ability to compare the non-metals to the metals and the different properties.

This is also the case for the gases, which are found from group 1 to just over group 2. This also allows us to compare different properties to the metals and non-metals.

ResultsPlus
Examiner Comments

This candidate correctly identified the position of transition metals but unfortunately mixed up groups and periods. The identification of non-metals as only group 7 is not totally correct.

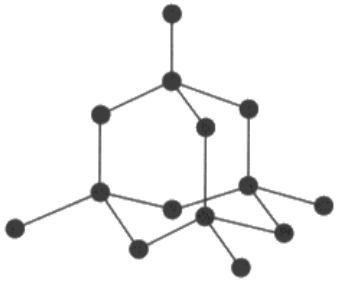
It was awarded Level 1 and 2 marks.

Question 6 (a)

Candidates often gained one mark for referring to diamond having a giant structure or having strong bonds. Many then just went on to state that a high temperature was needed to melt it without recognising that a lot of energy is needed to break the bonds. Some answered this question by writing about intermolecular forces/bonding or even hydrogen bonding, both of which negated other previously given correct answers. Other candidates discussed uses of diamond and so did not answer the question.

Elements

6 (a) The arrangement of carbon atoms in diamond is shown.



diamond

Explain why diamond has a very high melting point.

(2)

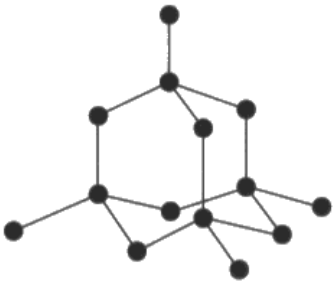
because it has strong covalent bonds

ResultsPlus

Examiner Comments

This proved to a very common way of scoring one mark.

6 (a) The arrangement of carbon atoms in diamond is shown.



diamond

Explain why diamond has a very high melting point.

(2)

because the atoms are so strong and closely formed there fore it takes longer for it to heat up and melt.

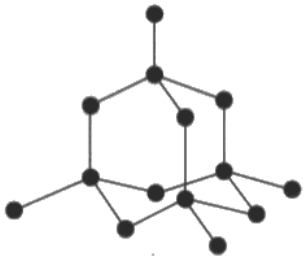
ResultsPlus

Examiner Comments

Answers similar to this were very common. The candidate states the atoms are strong instead of the (covalent) bonds being strong. It "takes longer for it to heat up and melt" is not an acceptable alternative for a large amount of heat/energy (being needed to break the bonds).

Elements

6 (a) The arrangement of carbon atoms in diamond is shown.



diamond

Explain why diamond has a very high melting point.

(2)

Because they have strong bonds that take ~~take~~ a lot of energy to break.

ResultsPlus
Examiner Comments

This was worth two marks.

Question 6 (b) (i)

Many candidates knew that some fraction had to be multiplied by 100, but the majority were unable to give the correct fraction. Many used 35.5 or 71 instead of 40 in the fraction, whilst others unfortunately did not use the relative formula mass value of 111 which had been given to help them.

(b) (i) Calculate the percentage by mass of calcium in calcium chloride, $CaCl_2$.

(relative atomic masses Cl = 35.5; Ca = 40;
relative formula mass $CaCl_2$ = 111)

(2)

35.5 + 40 = 75.5

$\frac{75.5}{111} \times 100 = 68.1\%$

percentage by mass = 68.1 %

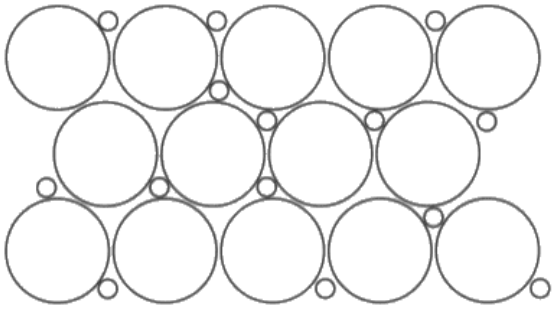
ResultsPlus
Examiner Comments

Many incorrect answers similar to this were seen. Although the fraction was not correct, the candidate was given one mark for appreciating that a fraction had to be multiplied by 100.

Question 6 (c)

This proved to be a much more difficult free response question. There were some good responses but many others were very weak. It seemed that some candidates were not familiar with the diagram of a metal structure which was given to help them.

*(c) The diagram shows the structure of a metal.



Use the diagram to describe the structure of a metal and to explain why metals are malleable and conduct electricity.

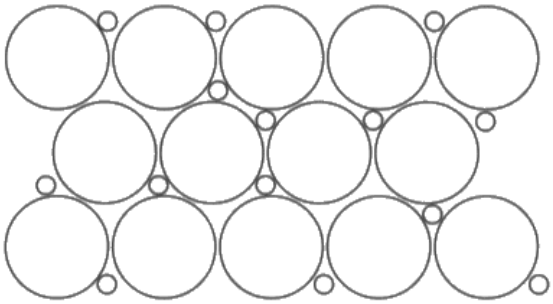
(6)

Metals have many different properties such as they are hard, shiny and are malleable which means they can be hammered into shape, the are also good conductors of electricity and heat, which is why copper is used in wires as it conducts electricity.
The structure shows big particles with small particles inbetween making the metal strong and compact but also allowing movement meaning the metal is malvable and can be hammered into shape with the use of heat.

ResultsPlus
Examiner Comments

The candidate has explained malleable but no other creditworthy information so level 1 with 2 marks.

*(c) The diagram shows the structure of a metal.



Use the diagram to describe the structure of a metal and to explain why metals are malleable and conduct electricity.

(6)

Metals have layers, which means that they can slip over eachother, meaning that they can be bent into shape; this is what makes them malleable.

Metals have a delocalised sea of electrons. The electrons within metal are positive meaning that they're able to conduct electricity.

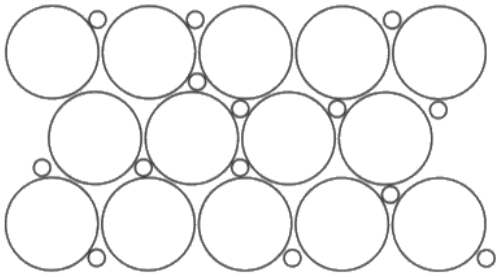
There is also small spaces within metals, allowing electricity to pass.

ResultsPlus

Examiner Comments

This candidate has made two valid points about malleability. Another valid point is delocalised electrons (despite them being positive!) Level 2 and 4 marks.

*(c) The diagram shows the structure of a metal.



Use the diagram to describe the structure of a metal and to explain why metals are malleable and conduct electricity.

(6)

Metals have medium to high melting points and are solids at room temperature except for mercury. Metals can conduct electricity because positive ions are held together by sea of ~~delocia~~ delocalised electrons. Some metals have stronger bonds than others. Metals are malleable because they have layers of ions that can easily slide over one and another. Electrons can move freely in metals ~~meaning~~ so electricity can easily flow through it. As metals are malleable they can be easily bent into shapes and hampered into place/shape.

ResultsPlus

Examiner Comments

This response includes good references to all three aspects including positive ions and delocalised electrons, explanation of meaning of malleability also with layers of ions being able to slide over one another, electrons being able to move enabling electricity to flow. Level 3 and 6 marks.

Paper Summary

Based on their performance on this paper, candidates are offered the following advice:

- Give more precise responses which address the question rather than make general points.
- Give word equations when asked for as attempting formulae equations is more difficult.
- If formulae are asked for then ensure you use the correct upper or lower case for symbols and give subscripts when required.
- Read the question carefully e.g. in 5(a) many gave relative charges instead of relative masses.
- Try to learn how the gases mentioned in the specification are made and how to test for these gases and the results of these tests.
- Practice drawing electron diagrams for the bonding in the substances given in the relevant sections of the specification.

Grade Boundaries

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

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