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Examiners' Report
June 2015

GCSE Chemistry 5CH2H 01

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Indtroduction

This unit is externally assessed through a one-hour, 60-mark written paper consisting of six questions. As is the case for all science papers, the questions were designed to get progressively more difficult throughout the paper and there were two 6-mark questions that were levels-based in the marking.

Candidates seemed to find the majority of the paper accessible, although there were quite a number of items that were particularly discriminating where the first mark was relatively easy to achieve but the second mark was more challenging. The final 6-mark question was particularly demanding. Some candidates penalised themselves by giving an excellent explanation of a point but then contradicted themselves, often at the end of their response, and negated a mark they had previously achieved.

Successful candidates:

- read the questions carefully and answered the questions that were set;
- understood and used correct scientific terminology, particularly when writing about different types of particles;
- could write balanced equations;
- could carry out calculations.

Some answers were of a lower standard. Less successful candidates:

- did not read the questions carefully and gave answers that were related to the topic being tested but did not answer the Question ;
- were confused between atoms, ions and molecules;
- could not write balanced equations;
- could not carry out calculations.

Generally candidates need to learn correct scientific terminology, revise how to write balanced equations and how to carry out the different types of calculations in the specification.

Question 1 (a) (ii)

The majority of candidates know that a white precipitate is formed when dilute nitric acid and silver nitrate solution are added to a solution containing chloride ions. However, some listed incorrect observations in addition to this, such as fizzing, so they lost a mark. A few candidates gave incorrect colours for the precipitates and some just wrote that the solution turned cloudy or milky. These are not acceptable for white or precipitate.

(ii) A solution of a chloride salt is acidified with dilute nitric acid.
Silver nitrate solution is added to the mixture.

Describe what is **seen** when the silver nitrate solution is added.

(2)

The solution will fizz and a white precipitate of Silver Chloride will appear

ResultsPlus
Examiner Comments

This candidate has written the correct observation of a white precipitate but has also included an incorrect observation of 'the solution will fizz'. This additional observation negates one of the marks so only 1 mark was awarded.

ResultsPlus
Examiner Tip

Only include relevant observations in your answers. You will lose a mark if you include any additional incorrect observations.

(ii) A solution of a chloride salt is acidified with dilute nitric acid.
Silver nitrate solution is added to the mixture.

Describe what is **seen** when the silver nitrate solution is added.

(2)

white precipitate

ResultsPlus
Examiner Comments

This candidate, however, has only written the correct observation, so was awarded 2 marks.

ResultsPlus
Examiner Tip

Learn all the tests for ions that are listed in the specification.

Question 1 (c) (i)

A lot of candidates were able to identify sodium chloride as a product of the reaction. It was disappointing to see that a large number of candidates were unable to write the correct state symbols by the names of the products. A surprising number of candidates thought that the sodium chloride was a solid and the barium sulfate aqueous, even though they were told in the question that a precipitate of barium sulfate is formed and another product is formed in solution. Some just mixed up (aq) and (s) but others did not seem familiar with the use of state symbols and incorrect answers included (AQ), (So), (solid) and (NaCl). A few candidates used (l) instead of (aq). A small number of candidates included additional products such as carbon dioxide or water.

(c) Sodium sulfate solution and barium chloride solution are mixed.
A precipitate of barium sulfate is formed.
Another product is formed in solution.

(i) Complete the word equation for the reaction.

Include state symbols.

(2)

sodium sulfate (aq) + barium chloride (aq) → Sodium chloride (S) + Barium sulfate (aq)

ResultsPlus
Examiner Comments

This candidate has correctly identified the products of the reaction but has mixed up the state symbols so has scored 1 mark.

ResultsPlus
Examiner Tip

Learn the meaning of the state symbols (s), (g), (l) and (aq).

The question stated that barium sulfate is formed as a precipitate so use this information to deduce the state symbol.

(c) Sodium sulfate solution and barium chloride solution are mixed.
A precipitate of barium sulfate is formed.
Another product is formed in solution.

(i) Complete the word equation for the reaction.

Include state symbols.

(2)

sodium sulfate (aq) + barium chloride (aq) → barium sulfate (S) + Sodium Chloride (aq)

ResultsPlus
Examiner Comments

This is a correct answer that scored both marks.

ResultsPlus
Examiner Tip

Use the information that barium sulfate is a precipitate and sodium chloride is formed in solution to help you to work out the correct state symbols.

(c) Sodium sulfate solution and barium chloride solution are mixed.
A precipitate of barium sulfate is formed.
Another product is formed in solution.

(i) Complete the word equation for the reaction.

Include state symbols.

(2)

sodium sulfate (aq) + barium chloride (aq) → Sodium Chloride (aq) + Barium Sulfide (S)

ResultsPlus
Examiner Comments

This candidate has scored 1 mark for identifying sodium chloride as a product. However, they have then written barium sulfide as the other product, even though barium sulfate was given in the question, so they do not score the second mark.

ResultsPlus
Examiner Tip

Copy names of reactants and products carefully from the information given in the question.

Question 1 (c) (ii)

Many candidates were able to score both marks for this item, although the idea that barium sulfate cannot enter the bloodstream was seen more often than the fact that it passes through the body unchanged. However, quite a lot of vague responses were seen about the effect of X-rays on barium sulfate or just that it doesn't cause any harm to the body as the amount taken is so small. Some candidates thought that it was digested in the stomach or was neutralised by the hydrochloric acid.

(ii) Barium salts are toxic.
Before some X-rays, patients have to swallow a suspension of barium sulfate, known as a 'barium meal'.

Explain why it is safe for these patients to swallow the barium sulfate.

(2)

The Barium sulfate will not be absorbed into the ~~blood~~ bloodstream so will not harm the body.

ResultsPlus
Examiner Comments

This candidate scored 1 mark for the barium sulfate not being absorbed into the bloodstream. They omitted to state why the barium sulfate is not absorbed so did not score the mark for barium sulfate is insoluble.

ResultsPlus
Examiner Tip

When a question asks for an explanation, try to give a reason for the statement you have written.

(ii) Barium salts are toxic.
Before some X-rays, patients have to swallow a suspension of barium sulfate, known as a 'barium meal'.

Explain why it is safe for these patients to swallow the barium sulfate.

(2)

The barium sulfate is insoluble, it doesn't go into the blood stream, making the barium sulfate harmless when passing through the body.

ResultsPlus
Examiner Comments

This is a clear answer that includes both points from the mark scheme and it was awarded 2 marks.

ResultsPlus
Examiner Tip

Explanation questions will always be worth at least 2 marks, so try to write two relevant points, including a reason.

Question 2 (a) (ii)

The majority of candidates used the information given that bromine is formed during the reaction and gave a correct colour. However, a rainbow of other colours was seen that were not related to the substances in the reaction. A number of candidates gave the colour of chlorine and a surprising number stated lilac or purple, presumably thinking of the flame colour of potassium or possibly confusing bromine with the colour of iodine dissolved in an organic solvent.

(ii) State the colour of the mixture at the end of the reaction.

(1)

Yellowish - green.

ResultsPlus
Examiner Comments

This is an incorrect answer. Yellow on its own would have scored a mark as very dilute bromine solution can look yellow. However, yellow-green is often used to describe the colour of chlorine.

ResultsPlus
Examiner Tip

Learn the colours of the pure halogens and when they are in solution. The first line of the question stated that bromine is formed in the reaction so you just needed to state the colour of bromine to score a mark.

(ii) State the colour of the mixture at the end of the reaction.

(1)

Orange

ResultsPlus
Examiner Comments

A large number of candidates did know a correct colour for bromine. Bromine in solution is usually an orange colour but can range from brown to yellow, depending on the concentration, so all of these colours were accepted.

Question 2 (c)

Many candidates were able to complete the equation correctly. Some candidates lost a mark for the formula for hydrogen bromide carelessly, for example, using the wrong letter case for one of the letters. Some candidates were unable to write the correct formula for hydrogen bromide so lost both marks as the balancing mark is only awarded if all the formulae are correct. Hydrogen bromide is not a common substance, but candidates should be able to apply their knowledge of the formula for hydrogen chloride. A few candidates added an additional product, such as water, to the equation and lost both marks.

(c) The halogens react with hydrogen to form hydrogen halides.

Complete the balanced equation for the reaction between hydrogen and bromine forming hydrogen bromide.

(2)

$H_2 + Br_2 \rightarrow$ ~~HBr~~ $H_2\ Br_2$

ResultsPlus
Examiner Comments

This was a common incorrect answer that did not score any marks.

The formula of hydrogen bromide is incorrect and no marks can be awarded for an equation with an incorrect formula.

ResultsPlus
Examiner Tip

Learn the formulae, or how to work them out, for the compounds in the specification. Hydrogen bromide is not a common substance, but you should be familiar with the formula for hydrogen chloride or hydrochloric acid as HCl.

(c) The halogens react with hydrogen to form hydrogen halides.

Complete the balanced equation for the reaction between hydrogen and bromine forming hydrogen bromide.

(2)

$H_2 + Br_2 \rightarrow$ 2Hbr

ResultsPlus
Examiner Comments

Some candidates lost a mark for the formula for hydrogen bromide, there must be an upper case B for bromine. The correct formula for bromine is given on the left side of the equation. However, the balancing mark was awarded and this response scored 1 mark.

ResultsPlus
Examiner Tip

Take care to write the symbols of the elements correctly. All symbols start with an upper case letter and if there is a second letter, it is lower case.

(c) The halogens react with hydrogen to form hydrogen halides.

Complete the balanced equation for the reaction between hydrogen and bromine forming hydrogen bromide.

(2)

$H_2 + Br_2 \rightarrow$ 2HBr

ResultsPlus
Examiner Comments

This is a completely correct answer that scored 2 marks.

ResultsPlus
Examiner Tip

Work out the formula for the missing product first, then count the atoms on both sides to balance the equation.

Question 2 (d)

The majority of candidates were able to work out the correct relative formula mass for magnesium chloride. A small number ignored the formula given in the question and just added the two relative atomic masses together.

(d) Calculate the relative formula mass of magnesium chloride, $MgCl_2$.
(relative atomic masses: Mg = 24.0; Cl = 35.5)

(1)

24 + 2(35.5) = 95

relative formula mass = ...

ResultsPlus
Examiner Comments

This candidate has shown correct working and the correct answer, so scored 1 mark.

ResultsPlus
Examiner Tip

Always show your working for calculations. If this candidate had made a mistake in the final answer and written 94 instead of 95, they would still have scored the mark for the correct working. However, if they just wrote 94 with no working, they would not have been given a mark.

(d) Calculate the relative formula mass of magnesium chloride, $MgCl_2$.
(relative atomic masses: Mg = 24.0; Cl = 35.5)

(1)

24.0 + 35.5

relative formula mass = 59.5

ResultsPlus
Examiner Comments

This was a common incorrect answer. The candidate has just added together the relative atomic masses of magnesium and chlorine. The formula for magnesium chloride, showing two chlorines, is given and this should be used in the calculation.

ResultsPlus
Examiner Tip

Look at the formula given in the question and notice how many particles of each type are present.

Question 2 (e)

Many candidates were able to calculate the correct percentage. Many candidates scored 1 mark for calculating the relative formula mass of sodium fluoride. However, some candidates would benefit from more practice at this type of calculation as all possible combinations of calculations involving 19 and 23 were seen.

(e) Calculate the percentage by mass of fluorine in sodium fluoride, NaF.
(relative atomic masses: F = 19; Na = 23)

(2)

Na F NaF
23 + 19 = 42 (23 ÷ 42) × 100 = 54.762
= 55%

percentage by mass of fluorine = 55 %

ResultsPlus
Examiner Comments

This candidate has calculated the relative formula mass for sodium fluoride correctly and scored 1 mark. However, they have then calculated the percentage of sodium in sodium fluoride instead of the percentage of fluorine so did not score the second mark.

ResultsPlus
Examiner Tip

Read the question carefully and check to make sure you have calculated the amount asked for.

(e) Calculate the percentage by mass of fluorine in sodium fluoride, NaF.
(relative atomic masses: F = 19; Na = 23)

(2)

$\frac{1 \times 19}{23+19} \times 100 = 45.2380952\%$

percentage by mass of fluorine = 45.2 (1dp) %

ResultsPlus
Examiner Comments

This is a completely correct answer and scored both marks.

ResultsPlus
Examiner Tip

Show your working for all calculations. Even if the final answer is incorrect, you may still be awarded some marks for correct stages in the working.

Question 3 (a) (i)

Some very good explanations of catalysts were seen that scored both marks. Some candidates lost a mark by not being precise enough with their explanations, for example, stating changes the rate instead of increasing the rate. A few candidates gave an explanation in terms of activation energy and even though this is not required by the specification, they invariable scored 2 marks. A few candidates lost the second mark by stating that a catalyst is 'not used' in the reaction instead of 'not used up'. A few candidates mentioned enzymes in their answer and ignored the context of this question as catalytic converters in cars.

Chemical reactions

3 (a) Catalytic converters in the exhaust systems of cars contain catalysts.

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

(2)

A Chemical that can Change the rate of reaction but is not reacted 'used' in the reaction

ResultsPlus
Examiner Comments

This is an example of a response that did not score any marks. The candidate has stated that a catalyst can change the rate of a reaction, but should have stated that it increases the rate of the reaction. They have also stated that it is not used in the reaction which is not correct. The catalyst is not used up during the reaction but it is used.

ResultsPlus
Examiner Tip

Check your answers to make sure that you have answered the question asked and not missed out important words.

Chemical reactions

3 (a) Catalytic converters in the exhaust systems of cars contain catalysts.

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

(2)

a Substance that speeds up the rate of reaction when put into the reaction

ResultsPlus
Examiner Comments

This candidate has scored 1 mark for 'speeds up the reaction'. There is no mention of the catalyst not being used up so the second mark is not awarded.

ResultsPlus
Examiner Tip

When you see 2 marks for a question, try to write two relevant facts.

3 (a) Catalytic converters in the exhaust systems of cars contain catalysts.

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

(2)

A substance that speeds up a reaction by allowing more frequent and successful collisions but does not not get used up in the reaction

ResultsPlus
Examiner Comments

This is a good answer that scored 2 marks.

ResultsPlus
Examiner Tip

Learn important definitions carefully.

Question 3 (a) (ii)

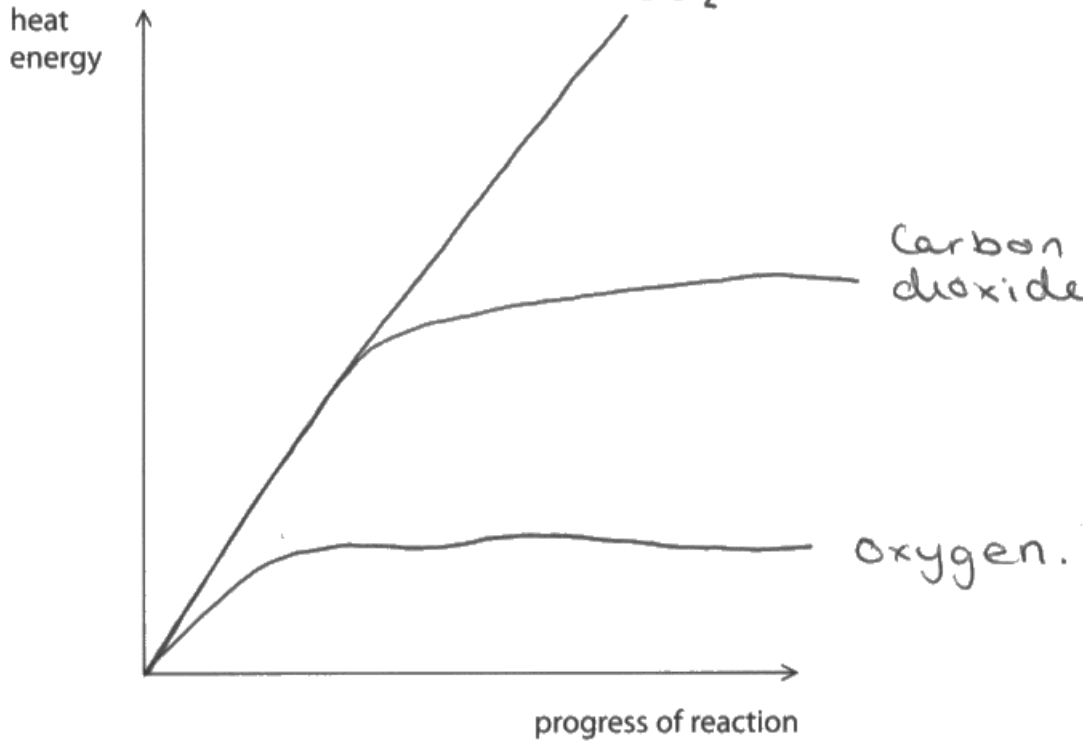
Many candidates were able to draw the correct lines on the axes. However, some did not read the instruction to label the lines and they lost a mark. Some candidates did not read the information that the reaction is exothermic and showed an endothermic process. They did score 1 mark if the lines were labelled correctly. Some candidates were not familiar with energy level diagrams and many different styles of incorrect diagrams were seen including some attempted rate graphs.

(ii) This reaction takes place in a catalytic converter

carbon monoxide + oxygen → carbon dioxide

This reaction is exothermic.

On the axes below, draw labelled lines to show the relative energies of the reactants and products in this reaction. (2)



ResultsPlus
Examiner Comments

Some candidates were unfamiliar with drawing diagrams to show an energy change during a reaction and many diagrams, such as the one shown here, scored no marks.

ResultsPlus
Examiner Tip

Learn how to show the relative energies of reactants and products during an exothermic reaction and an endothermic reaction.

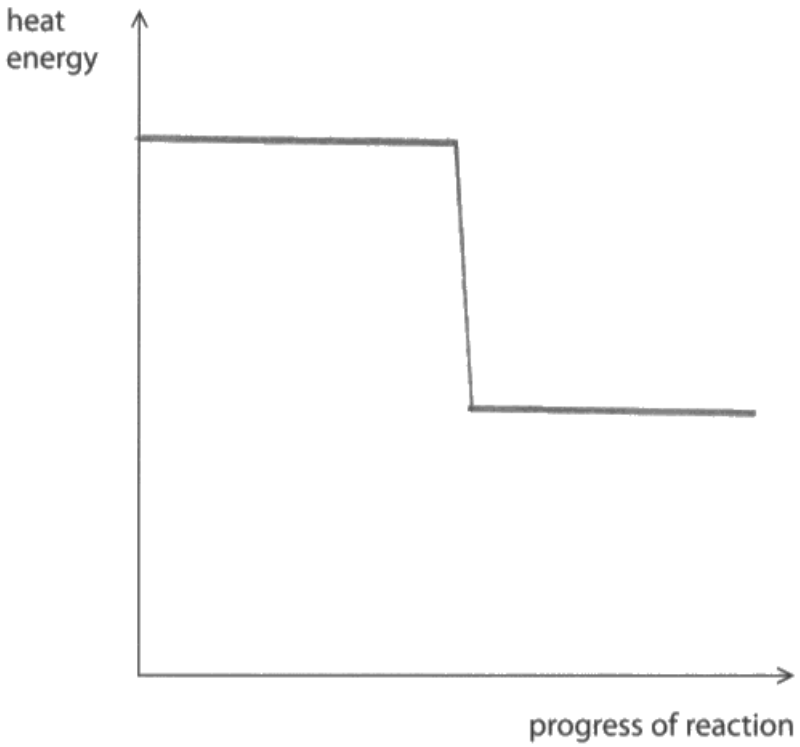
(ii) This reaction takes place in a catalytic converter

carbon monoxide + oxygen → carbon dioxide

This reaction is exothermic.

On the axes below, draw labelled lines to show the relative energies of the reactants and products in this reaction.

(2)



ResultsPlus
Examiner Comments

This candidate has drawn the lines in the correct places on the axes, but has not labelled them and only scored 1 mark.

ResultsPlus
Examiner Tip

If you are asked to draw labelled lines, labels are essential. The words reactants or products would have been sufficient here.

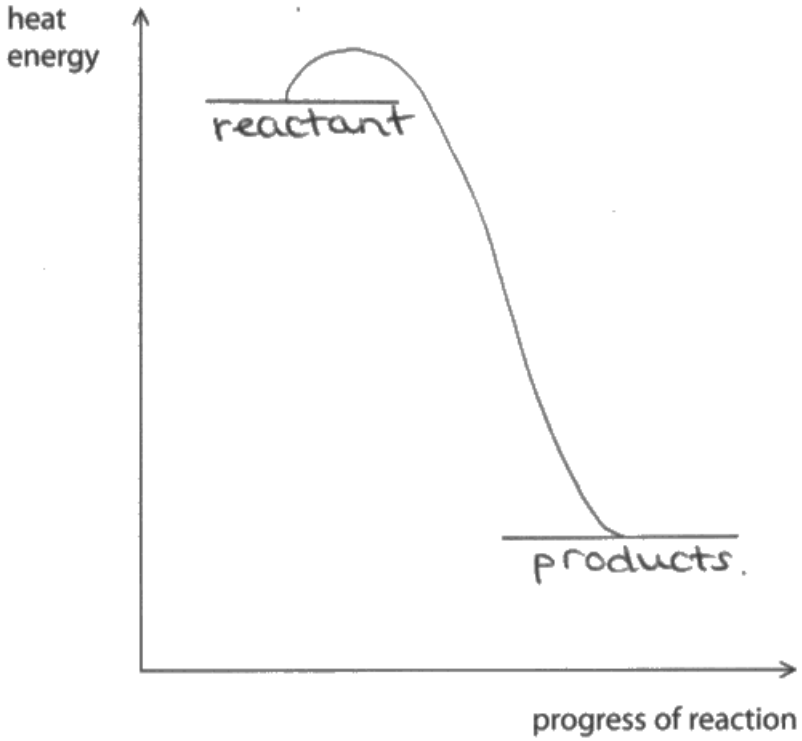
(ii) This reaction takes place in a catalytic converter

carbon monoxide + oxygen → carbon dioxide

This reaction is exothermic. – reactant energy is higher than product.

On the axes below, draw labelled lines to show the relative energies of the reactants and products in this reaction.

(2)



ResultsPlus
Examiner Comments

This is a clear answer with labelled lines and it scored both marks. The curve between the reactant and product line was not needed to score both marks.

Question 3 (a) (iii)

It was pleasing to see a large number of candidates scoring the three marks for this item. Some candidates lost a mark when writing the formulae. All formulae must be correct, including the correct letter case for symbols and numbers must be subscripts. A significant number of candidates just used 'O' for the formula for oxygen so lost the formula mark for the left side and the balancing mark. Some candidates were unable to balance the equation and some did not even try to balance it, but they could still score 2 marks for the correct formulae. A few candidates copied the formula for heptane incorrectly.

(iii) Another reaction in a catalytic converter is the reaction of hydrocarbons with excess oxygen to form carbon dioxide and water.

Write the balanced equation for the reaction of the hydrocarbon heptane, C_7H_{16}, with excess oxygen.

(3)

$C_7H_{16} + 2O_2 \rightarrow$ ~~CH_2O~~ $7CO_2 + H_2O$

ResultsPlus
Examiner Comments

This candidate has given the correct formulae for heptane and oxygen so scored 1 mark. The formula for water is incorrect as the 2 should be a subscript and not a large number so the mark for the formulae on the right side was not awarded. The equation is not balanced correctly so the third mark was not awarded.

ResultsPlus
Examiner Tip

Take care to write formulae correctly, using the correct upper or lower case letters for the symbols and the numbers in the formulae must be subscripts.

(iii) Another reaction in a catalytic converter is the reaction of hydrocarbons with excess oxygen to form carbon dioxide and water.

Write the balanced equation for the reaction of the hydrocarbon heptane, C_7H_{16}, with excess oxygen.

(3)

$C_7H_{16} + 8O_2 \rightarrow 7CO_2 + 8H_2O$

ResultsPlus
Examiner Comments

This candidate has given all the correct formulae for the reactants and products, so scored 2 marks. However, the balancing number is incorrect for oxygen so the third mark was not awarded.

ResultsPlus
Examiner Tip

Balance an equation by counting the atoms on each side of the equation.

There are (7x2) + 8 = 22 oxygen atoms on the right side of this equation, so $11O_2$ are needed to balance it.

Question 3 (b)

Many candidates scored 1 mark for the idea of more particles present. Far fewer scored the second mark as they did not explain why the rate of reaction increases and just wrote generally about 'more collisions' or 'collisions are more likely'. Students should be taught that there **will** be more frequent collisions; it is not just a probability. They should have included some reference to rate or time in their responses, such as, a higher rate of collisions or more collisions in a given time. A few candidates thought that an increase in concentration increases the energy of the particles so they will move faster. These candidates were restricted to a maximum of 1 mark. A small number of candidates wrote about an increase in surface area, even though they were told that this reaction was in solution.

(b) When reactions take place in a solution, the rate of reaction is affected by the concentration in the solution.

Explain, in terms of particles and collisions, why the rate of a reaction increases when the concentration of one of the reactants is increased.

(2)

If the concentration is higher, the particles are able to freely move, causing more collisions overall.

ResultsPlus
Examiner Comments

'More collisions' is not sufficient for the second mark. It needs to refer to 'more frequent collisions' or 'more collisions in a given time'. Hence this response did not score either mark.

(b) When reactions take place in a solution, the rate of reaction is affected by the concentration in the solution.

Explain, in terms of particles and collisions, why the rate of a reaction increases when the concentration of one of the reactants is increased.

(2)

If the concentration is increased, this means there are more particles available in the same amount of space to react with. This therefore increases the number of successful collisions (because there are more particles to react with), therefore speeding up the overall rate of reaction.

ResultsPlus
Examiner Comments

This response scored 1 mark for the idea that there are more particles in the same volume when the concentration is increased. The question asks why the rate of reaction increases and just stating that there are more collisions is not sufficient for the second mark. The candidate would need to state 'more collisions in a given time' or 'the frequency of collisions increases' to score the second mark.

ResultsPlus
Examiner Tip

Check your answers carefully to make sure that you have answered the question. This question is about rate of reaction so your answer needs to mention rate or time in order to score both marks.

(b) When reactions take place in a solution, the rate of reaction is affected by the concentration in the solution.

Explain, in terms of particles and collisions, why the rate of a reaction increases when the concentration of one of the reactants is increased.

(2)

solution

When the concentration of ~~solution~~ increases it provides the particles with more energy, this then causes them to move around quicker and more frequently allowing successful collision to occur more often

ResultsPlus
Examiner Comments

Only an increase in temperature causes an increase in the energy of the particles not an increase in concentration. This response was given 1 mark for the idea of more frequent successful collisions.

ResultsPlus
Examiner Tip

Read the question carefully to make sure you know which factor that affects the rate of a reaction is being asked about. Remember that only an increase in temperature will increase the energy of the particles.

(b) When reactions take place in a solution, the rate of reaction is affected by the concentration in the solution.

Explain, in terms of particles and collisions, why the rate of a reaction increases when the concentration of one of the reactants is increased.

(2)

The rate of reaction increases when the ~~because there~~ concentration increases because there are more particles now present ~~being added~~ which means that there will be more frequent successful collisions which will increase the rate of reactions.

ResultsPlus
Examiner Comments

This is a clear answer that scored 2 marks.

ResultsPlus
Examiner Tip

Many 'explanation' questions have 2 marks, with 1 mark being relatively straightforward to achieve and the second mark requiring a more careful response. In this item, 'more particles' was the straightforward mark and 'more frequent collisions was the mark that discriminated between candidates.

Question 4 (a) (i)

The majority of candidates could calculate the correct numbers of protons, neutrons and electrons in the copper atom.

Atoms and isotopes

4 (a) An atom of copper has an atomic number of 29 and a mass number of 63.

(i) Complete the table to show the numbers of protons, neutrons and electrons in this atom of copper.

(2)

particle	number
proton	+1
neutron	0
electron	-1

ResultsPlus
Examiner Comments

This candidate has written the relative charge on the sub-atomic particles rather than the number of each particle in the atom of copper and so did not score any marks.

ResultsPlus
Examiner Tip

Read the question carefully and check what you are being asked to do.

Atoms and isotopes

4 (a) An atom of copper has an atomic number of 29 and a mass number of 63.

(i) Complete the table to show the numbers of protons, neutrons and electrons in this atom of copper.

(2)

particle	number
proton	29
neutron	63
electron	29

ResultsPlus
Examiner Comments

This candidate has the correct numbers of protons and electrons, so scored 1 mark. However, the number of neutrons is incorrect.

mass number = number of protons + number of neutrons

number of neutrons = mass number - number of protons = 63 - 29 = 34

Question 4 (a) (ii)

Many candidates did realise that copper has 4 shells of electrons. However, some mixed up groups and periods and thought that there were 4 electrons in the outer shell. Some candidates wrote that copper has 4 outer shells and this is incorrect.

(ii) Copper is in period 4 of the periodic table.

State what information this gives about the number of shells that contain electrons, in a copper atom.

(1)

It shows that it has 4 electrons on the outer shell.

ResultsPlus
Examiner Comments

This answer did not receive any credit.

ResultsPlus
Examiner Tip

For elements in groups 1 to 7, the group number is equal to the number of electrons in the outer shell.

The period number gives the number of occupied shells of electrons.

Question 4 (a) (iii)

Many candidates did score 2 marks for this question but a large number lost a mark as they did not refer to atoms in their answer. 'Different forms of the same element' was a common phrase used instead of the more precise 'atoms of the same element'. A few confused isotopes with ions and wrote about atoms gaining or losing electrons and a small number mixed up isotopes with allotropes or alloys. Some candidates were not clear about the difference between mass number and relative atomic mass so they wrote 'different relative atomic masses'. A few candidates did not refer to numbers and wrote 'different neutrons but same protons', which did not score.

(iii) Copper exists as isotopes.

Explain what is meant by the term **isotopes**.

(2)

An isotope is an element such as Copper, but, the different vesions will have different numbers of Protons.

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Examiner Comments

This is an example of an incorrect definition of the term 'isotope'. If there are different numbers of protons then they will be in atoms of different elements.

This response did not score.

ResultsPlus
Examiner Tip

Learn that all atoms of the same element have the same number of protons. Isotopes are atoms of the same element but they have different numbers of neutrons.

(iii) Copper exists as isotopes.

Explain what is meant by the term **isotopes**.

(2)

It's an element with a different amount of neutrons. Number of electrons and protons however, are the same.

ResultsPlus
Examiner Comments

This candidate has scored 1 mark for different numbers of neutrons but the same number of protons. To score 2 marks they should mention atom or atoms somewhere in the answer.

ResultsPlus
Examiner Tip

Remember that protons, neutrons and electrons are particles contained in atoms, so when answering a question like this, you should refer to atoms.

Question 4 (a) (iv)

Many candidates wrote clear answers with working and scored 3 marks. Some candidates just wrote an incorrect number with no working so could not score a mark. Some candidates gave some correct working with an incorrect answer and they scored 1 or 2 marks for any correct stages in their working. A few candidates calculated 63.6 correctly but then rounded it incorrectly to 63.5 to match the value in the periodic table and they lost a mark. Some candidates worked out the total mass of 100 atoms but divided it by 128 instead of 100 to find the average mass. There were a few answers which indicated the candidates lacked any understanding of relative atomic mass.

(iv) A sample of copper contains

70% of copper-63 atoms and

30% of copper-65 atoms.

Use this information to calculate the relative atomic mass of copper in this sample.

(3)

64.4

ResultsPlus
Examiner Comments

This answer is incorrect and there is no working so no marks could be awarded.

ResultsPlus
Examiner Tip

Always show your working in calculations. Even if your final answer is wrong, you may be able to score 1 or two marks for correct working.

(iv) A sample of copper contains

70% of copper-63 atoms and

30% of copper-65 atoms.

Use this information to calculate the relative atomic mass of copper in this sample.

(3)

$\frac{70 \times 63 + 30 \times 65}{63 + 65}$ $\frac{4410 + 1950}{128} = 49.6875\%$

$= 49.7\%$

relative atomic mass of copper = 49.7 %

ResultsPlus
Examiner Comments

This candidate has an incorrect answer but has scored 2 marks as part of the working is correct. They have multiplied 70 by 63 and 30 by 65. The incorrect step was dividing by 128 instead of 100.

ResultsPlus
Examiner Tip

When you are calculating the relative atomic mass of an element from the abundance of its isotopes, the final answer should be somewhere between the two mass numbers of the isotopes. If it isn't, go back and check your working.

(iv) A sample of copper contains

70% of copper-63 atoms and

30% of copper-65 atoms.

Use this information to calculate the relative atomic mass of copper in this sample.

(3)

$$\frac{(70 \times 63) + (30 \times 65)}{100}$$

$$\frac{(4410 + 1950)}{100} = \frac{6360}{100}$$

$$= 63.6$$

relative atomic mass of copper = 63.6

ResultsPlus
Examiner Comments

This is a correct answer with clear working and scored 3 marks.

ResultsPlus
Examiner Tip

You should always try to set out your working clearly like this. If you do make a slip, the examiner can award a mark for any correct stages in the working.

Question 4 (b) (i)

The majority of candidates scored 2 marks for this item. A small number did not mention how many electrons were lost or just stated the electrons were transferred, without saying which way. A few thought that electrons are gained when a positive ion is formed and did not appreciate that electrons have a negative charge. A few wrote that 'copper loses 2 electrons by sharing them' and this contradiction lost them both marks. A small number of candidates thought that copper gains 2 positive electrons or that it gains 2 protons.

(b) Copper nitrate contains copper ions, Cu^{2+}, and nitrate ions, NO_3^-.

(i) Describe, in terms of electrons, how a copper atom, Cu, becomes a copper ion, Cu^{2+}.

(2)

Because it ionic bonds to the nitrate ions and they transfer electrons to have a different charge.

ResultsPlus
Examiner Comments

This answer did not score any marks. It just mentions transfer of electrons, but to form a positive ion the copper must lose electrons. There is also no mention of how many electrons are involved. Transfer of 2 electrons would have scored 1 mark.

(b) Copper nitrate contains copper ions, Cu^{2+}, and nitrate ions, NO_3^-.

(i) Describe, in terms of electrons, how a copper atom, Cu, becomes a copper ion, Cu^{2+}.

(2)

It 'gives away' two electrons to have a complete outer shell therefore it becomes 2+ charge.

ResultsPlus
Examiner Comments

This is a correct answer, scoring 2 marks.

ResultsPlus
Examiner Tip

The number in front of the charge tells you how many electrons are involved.

Electrons are negatively charged so positive ions are formed when atoms lose electrons and negative ions are formed when atoms gain electrons.

(b) Copper nitrate contains copper ions, Cu^{2+}, and nitrate ions, NO_3^-.

(i) Describe, in terms of electrons, how a copper atom, Cu, becomes a copper ion, Cu^{2+}.

(2)

It becomes a cation because it loses electrons and becomes an overall positive charge.

ResultsPlus
Examiner Comments

This candidate knows that electrons need to be lost to form a positive ion, so scores 1 mark. They have not mentioned how many electrons need to be lost for the second mark.

Question 4 (b) (ii)

It was disappointing to see how few candidates could write the correct formula for copper nitrate when given the ions and their charges. A large variation of incorrect responses was seen including: ignoring the charges and showing a 1:1 ratio, writing the 3 of the nitrate outside the bracket, use of superscripts instead of subscripts. Candidates would benefit from much more practice in working out the formulae of compounds when they are given the formulae of the ions.

(ii) Write the formula for copper nitrate.

(1)

$Cu(NO_3)^2$

(Total for Question 4 = 11 marks)

$2NO_3^-$ +

$Cu(NO_3)^2$ $Cu2(N$

ResultsPlus
Examiner Comments

This candidate has realised that 2 nitrate ions are needed for each copper ion and has included the brackets. However, they did not score the mark as they have written the 2 as a superscript instead of a subscript.

ResultsPlus
Examiner Tip

Numbers in formulae are always subscripts.

Superscripts are used to represent charges on ions.

(ii) Write the formula for copper nitrate.

(1)

Cu_3NO_2

ResultsPlus
Examiner Comments

This was a fairly common incorrect answer in which the candidate swapped the 3 from the nitrate formula with the 2 of the charge on the copper ion. The candidate has partly remembered a 'rule' they have been taught for working out formulae.

ResultsPlus
Examiner Tip

When working out the formula for an ionic compound, make sure the **charges** balance. Don't try to change the formulae of any groups such as nitrate or sulfate that you may be given.

(ii) Write the formula for copper nitrate.

(1)

$Cu(NO_3)_2$

ResultsPlus
Examiner Comments

This is a fairly rare example of a correct answer.

Question 5 (b)

Many candidates scored 1 mark for this question as they knew that the layers in the metal slide over each other when pressure is applied. To score 2 marks they needed to give more detail about the structure by identifying the types of particles in the layers. Some candidates just describe the meaning of the term malleable, for example, it is easily shaped, but ignored the instruction to explain it in terms of the structure of the metal. A number of candidates thought that the particles were arranged in rows instead of in layers. A few thought that the delocalised electrons lubricated the layers, allowing movement. A number of candidates misread the question and explained why metals conduct electricity.

(b) Metals are malleable.

Explain, in terms of their structures, why metals are malleable.

(2)

A metal is ~~malleabt~~ malleable if it has a weak structure, this means that the shape of it can be changed with relative ease.

ResultsPlus
Examiner Comments

This answer is too vague to be awarded any marks. The candidate knows that the shape can be changed but just explaining it as 'a weak structure' is not detailed enough.

(b) Metals are malleable.

Explain, in terms of their structures, why metals are malleable.

(2)

Metals have a regular lattice structure, which allows sheets of particles to slide over each other. this makes them malleable as they can be bent.

ResultsPlus
Examiner Comments

This candidate has given more detail about the structure of a metal as they have stated that sheets of particles can slide over each other. 'Sheets' is an acceptable alternative to layers.

This answer scored 1 mark. To score the second mark, the candidate would need to identify the types of particles in the metal.

(b) Metals are malleable.

Explain, in terms of their structures, why metals are malleable.

(2)

The layers of ions can slide easily when pressure is applied.

ResultsPlus
Examiner Comments

This candidate has correctly identified the structure of a metal as layers of ions and stated that they can slide easily. This answers scored 2 marks.

Question 5 (c)

It was pleasing to see a large number of correct calculations with clear working. Some candidates lost a mark as they divided relative atomic mass by mass instead of the other way round, but they could still score 2 marks if they continued to find the simplest ratio and wrote the empirical formula from that. Working is essential in this type of calculation and those candidates who just wrote the correct formula with no working only scored 1 mark. Some candidates need to revise how to calculate an empirical formula as they just wrote a jumble of numbers from the question and multiplied, divided, added and subtracted them in various combinations. A number of candidates calculated the simplest ratio of 1:3 and left that as their answer, rather than writing the empirical formula to gain the third mark.

(c) In an experiment, 3.1 g of phosphorus reacted with 24 g of bromine to form phosphorus bromide.

Calculate the empirical formula of the phosphorus bromide.

You must show your working.

(relative atomic masses: P = 31, Br = 80)

(3)

3.1 × 31 = 96.1

24 × 80 = 1920

1920 + 96.1 = 2016.1

2016.1 ÷ 100 = 20.161

ResultsPlus
Examiner Comments

This candidate has used all the numbers given in the question but has not done anything with them that would give the formula for phosphorus bromide. This response did not score any marks.

ResultsPlus
Examiner Tip

Learn how to determine the empirical formula for a compound from the masses of elements contained in it.

(c) In an experiment, 3.1 g of phosphorus reacted with 24 g of bromine to form phosphorus bromide.

Calculate the empirical formula of the phosphorus bromide.

You must show your working.

(relative atomic masses: P = 31, Br = 80)

(3)

P Br

P^{-3}

Br^{-1}

empirical formula PBr$_3$

ResultsPlus
Examiner Comments

This candidate has the correct formula for phosphorus bromide but the working using the masses of elements is missing. This response scored 1 mark.

ResultsPlus
Examiner Tip

When working out the formula for an ionic compound, make sure the **charges** balance. Don't try to change the formulae of any groups such as nitrate or sulfate that you may be given.

(c) In an experiment, 3.1 g of phosphorus reacted with 24 g of bromine to form phosphorus bromide.

Calculate the empirical formula of the phosphorus bromide.

You must show your working.

(relative atomic masses: P = 31, Br = 80)

(3)

	phos	brom
mass	31 g	24g

ResultsPlus
Examiner Comments

This candidate has started the calculation incorrectly by dividing the relative atomic masses by the masses of elements used, instead of the other way around, so they have lost the first mark. However, they have then divided by the smallest to find the simplest ratio and written a consequentially correct formula. This answer scored 2 marks.

ResultsPlus
Examiner Tip

Show all your working and you may be given one or two marks, even if your final answer is incorrect.

Question 5 (d)

This was the more straightforward of the two 6 mark questions on this paper. A large number of candidates were able to describe the reactions of the alkali metals with water and this could raise them to Level 1 or 2. Different approaches to the question were seen. Some candidates described in detail the observations of the reactions of lithium, sodium and potassium with water in turn, whereas others saved time by giving a summative description of all three metals, pointing out the common features and significant differences. There were some pleasingly good observations indicating that many candidates had enjoyed watching demonstrations of these reactions but other responses suggested that some candidates may not have seen these reactions. Incorrect observations included that all the metals, including lithium, burn with a flame rather than the hydrogen that is produced burns, the gas identified as oxygen or carbon dioxide and the formation of an oxide instead of a hydroxide. To achieve level 3, candidates needed to explain the pattern in reactivity and this discriminated between candidates of different abilities. Some apparently good candidates limited themselves to Level 2 by not giving any explanations. It was pleasing to see a lot of clear explanations in terms of the ease of loss of the outer electron to form positive ions. A few candidates thought that the reactivity increases because the number of electrons in the outer shell increases or the number of outer shells increases and a small number thought that reactivity decreases down the group.

*(d) Group 1 of the periodic table contains the alkali metals lithium, sodium and potassium. The alkali metals show a pattern in their reactivity with water. This pattern is shown when small pieces of lithium, sodium and potassium are added separately to water.

Describe the reactions and what would be seen and explain the pattern in reactivity.

You may include equations as part of your answer.

(6)

Lithium is the least reactive. Sodium the second most reactive and potassium is the most reactive.

When lithium pieces react with water, one would see a fizzle as the water reacts. One would also see this with Sodium and potassium.

ResultsPlus
Examiner Comments

This candidate has given a limited description of the reactions. This is a Level 1 response and scored 2 marks.

ResultsPlus
Examiner Tip

You must write in more detail to achieve a higher mark.

*(d) Group 1 of the periodic table contains the alkali metals lithium, sodium and potassium.
The alkali metals show a pattern in their reactivity with water.
This pattern is shown when small pieces of lithium, sodium and potassium are added separately to water.

Describe the reactions and what would be seen and explain the pattern in reactivity.

You may include equations as part of your answer.

(6)

Reactivity least to most :- Lithium, Sodium, Potassium.

When you add Sodium to water is created a molten ball that floats on the surface (as it is denser) and releases heat.

When you add potassium to water it creates a lilac flame and moves rapidly over the surface of the water.

The further you go down Group 1 the more reactive with water they become.

ResultsPlus
Examiner Comments

This candidate has given quite a good description of the reactions of sodium and potassium with water but they have not tried to explain why the reactivity increases down the group. This type of answer is Level 2 and was awarded 4 marks.

ResultsPlus
Examiner Tip

To achieve Level 3, you must answer both parts of the question.

*(d) Group 1 of the periodic table contains the alkali metals lithium, sodium and potassium.
The alkali metals show a pattern in their reactivity with water.
This pattern is shown when small pieces of lithium, sodium and potassium are added separately to water.

Describe the reactions and what would be seen and explain the pattern in reactivity.

You may include equations as part of your answer.

(6)

Lithium would slowly fizz around the water (containing indicator) and after the lithium has fully became a hydroxide the water changes colour to purple to show that it's alkaline water, an increase in pH; which will also happen with sodium and potassium. Sodium, once dropped in water will fizz around in water and becomes hydroxide much faster. Potassium would react vigorously with water and may even produce a lilac flame, this will be the fastest reaction out of all three; $K_2 + 2H_2O \rightarrow 2KOH + H_2$. This is due to the lone electron being farther from the nucleus, which means that it's easier for the alkali metals to lose it's electron the farther down you go down Group 1, ~~decreasing~~ then increasing the reactivity, of all of the elements, in Group 1.

ResultsPlus
Examiner Comments

This is an excellent answer. It includes a description of how the alkali metals react with water and an explanation of why the reactivity increases down the group. This is a level 3 answer and scored 6 marks.

ResultsPlus
Examiner Tip

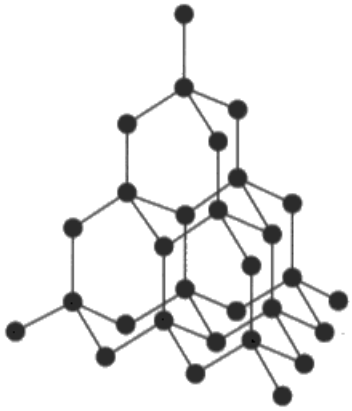
To achieve level 3 your answer must include both parts of the question - a description of the reactions and an explanation of the pattern in reactivity.

Question 6 (a) (i)

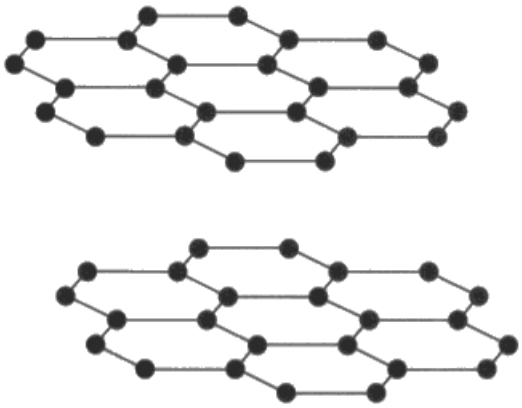
The majority of candidates wrote the correct answer. A few did not read the question carefully and may have looked at the bonds formed in the graphite structure or they may have counted the bonds around one of the carbon atoms on the edge of the diamond structure shown. A small number of candidates counted the total number of bonds in the diagram.

Bonding and properties

6 (a) The structures of diamond and graphite are shown.



diamond



graphite

(i) State the maximum number of covalent bonds formed by a carbon atom in a diamond crystal.

(1)

3

ResultsPlus
Examiner Comments

The correct answer is 4. The candidate seems to have looked at the number of bonds around a carbon atom on the edge of the diamond structure shown or looked at graphite instead of diamond.

ResultsPlus
Examiner Tip

Read the question carefully. It asks for the maximum number of bonds formed and there are plenty of carbon atoms shown with 4 bonds.

Question 6 (a) (iii)

A large number of candidates scored 1 mark as they realised that the layers in graphite can slide over each other. Fewer candidates realised that this question started with 'Explain' and that there were 2 marks available so they had to give a reason for their answer. Some candidates stated that there are no forces between the layers as they could not see them drawn on the diagram. However, they should know that there are weak forces between the layers. A few candidates stated that the layers are rubbed off, but this is more appropriate when graphite is used in pencil leads.

(iii) Explain, in terms of its structure, why graphite is able to be used as a lubricant.

(2)

Because it has layers and delocal-
ised electrons

ResultsPlus
Examiner Comments

This candidate realises that the layers are important in graphite but they have not stated how the layers enable it to be used as a lubricant. This answer did not score any marks.

(iii) Explain, in terms of its structure, why graphite is able to be used as a lubricant.

(2)

Because the layers slide over each other
meaning graphite is easy to utilise.

ResultsPlus
Examiner Comments

This answer scored 1 mark as it describes why graphite is used as a lubricant but it does not explain why the layers can slide.

ResultsPlus
Examiner Tip

Try to give a reason for your answer when the question starts with 'Explain' and there are 2 marks available.

(iii) Explain, in terms of its structure, why graphite is able to be used as a lubricant.

(2)

layers of graphite are weakly banded to each other,
this allows them to easily slide across one another
which is useful. Since the layers slide across
each other, little ~~FF~~ Friction is produced.

ResultsPlus
Examiner Comments

This is a good answer that scored 2 marks.

ResultsPlus
Examiner Tip

This is another example of a question where the first mark is relatively easy to achieve but the second mark discriminates between candidates.

Question 6 (b)

Many candidates did score 2 marks for a correct diagram; however, some lost a mark through drawing the electrons in the shared pairs or by not including the correct number of hydrogen atoms. This is quite a simple molecule but a significant number of candidates drew extra electrons on the hydrogen atoms or the central carbon atom. Some candidates included the 2 electrons from the first shell in carbon on the outer shell.

(b) The atomic number of carbon is 6.

The atomic number of hydrogen is 1.

Draw a dot and cross diagram of a molecule of methane, CH_4.

Show the outer shell electrons only.

(2)

the dots represent the transferred electrons from the Hydrogen atoms to the carbon atom; this ensures that carbon has a full-stable- outer- shell containing 8 electrons.

ResultsPlus
Examiner Comments

This candidate scored 1 mark as they showed 1 correct shared pair of electrons between carbon and hydrogen. They did not score the second mark as they have only shown two hydrogen atoms instead of four.

ResultsPlus
Examiner Tip

Look at the formula of the molecule given in the question. It shows that there is 1 carbon atom and 4 hydrogen atoms. You need to include all of these in your diagram.

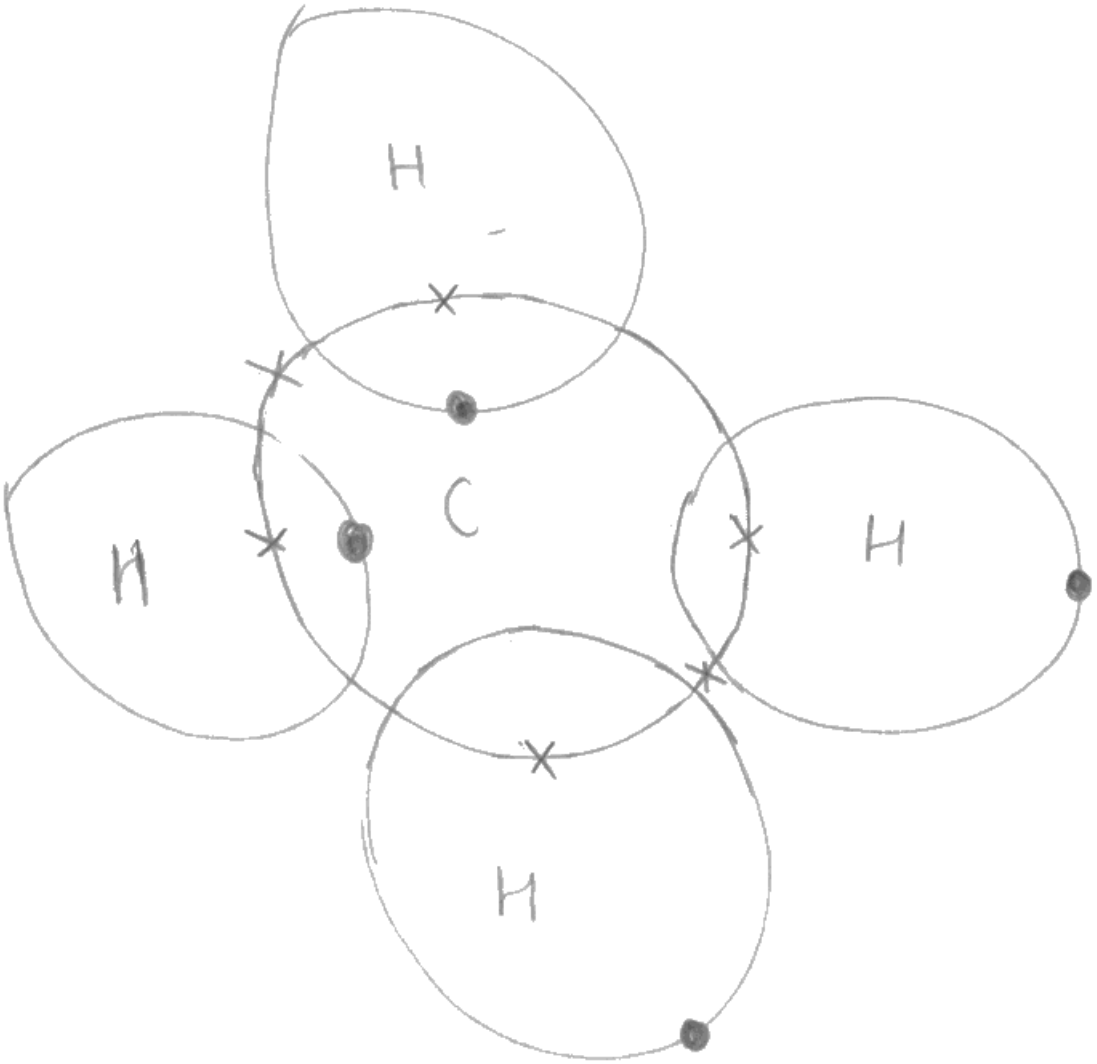
(b) The atomic number of carbon is 6.

The atomic number of hydrogen is 1.

Draw a dot and cross diagram of a molecule of methane, CH_4.

Show the outer shell electrons only.

(2)



ResultsPlus
Examiner Comments

This answer scored 1 mark as the candidate has shown 2 correct shared pairs of electrons between the carbon atom and the hydrogen on the left and the hydrogen at the top. However, the rest of the diagram is incorrect as the electrons with the other 2 hydrogen atoms are not paired and there are a total of 6 carbon electrons instead of 4.

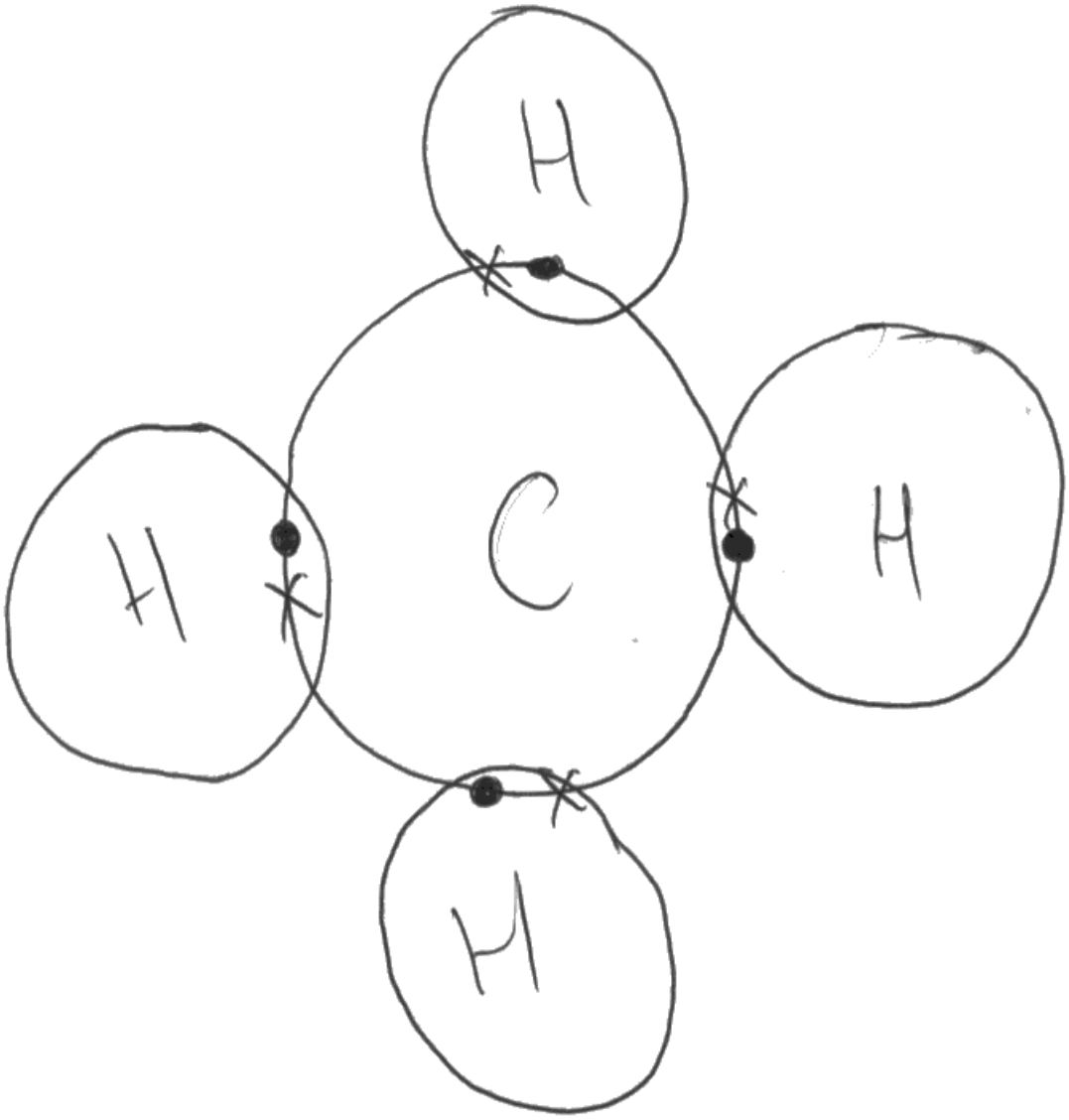
(b) The atomic number of carbon is 6.

The atomic number of hydrogen is 1.

Draw a dot and cross diagram of a molecule of methane, CH_4.

Show the outer shell electrons only.

(2)



ResultsPlus
Examiner Comments

This is a good answer that scored both marks.

ResultsPlus
Examiner Tip

Draw dot and cross diagrams clearly, as in this example.

Question 6 (c)

This was the more challenging of the 6 mark questions and it discriminated well between candidates of differing abilities. There were some excellent answers where candidates explained the properties clearly in terms of the particles and the forces between them, using correct scientific terminology. Unfortunately some candidates are unclear about the differences between atoms, ions and molecules and they used these words randomly throughout their answer. Electromagnetic was often used instead of electrostatic. Candidates should be reminded that it is important to use the correct name of particles, for example, they should not refer to atoms or molecules in sodium chloride or ions in water. Some did not mention the specific particles at all and if they had identified the particles as ions in sodium chloride and molecules in water, they would have reached Level 1. Some candidates spent time describing how the ions or molecules were formed, which was not required in this question. There were other areas of misunderstanding as well, including that covalent bonds are weaker than ionic bonds so that when water melts or boils, the atoms are separating rather than the molecules. A significant number of candidates think that sodium chloride conducts electricity when molten or dissolved in water as delocalised electrons can flow between the gaps or because it contains a metal. Other common errors included: attraction between the bonds, sharing of electrons between water and hydrogen, not much energy to break the bonds in water with no indication whether these are the covalent bonds or the intermolecular forces. Some candidates just described the differences in the arrangements of particles in solids and liquids.

*(c) Sodium chloride and water have very different properties.

Sodium chloride is an ionic substance.
It is a crystalline solid at room temperature.
It has a high melting point.
It conducts electricity when molten or in aqueous solution.

Water is a covalent substance.
It is a liquid at room temperature.
It is a very poor conductor of electricity.

Explain these properties of sodium chloride and water in terms of the particles present and the forces between them.

(6)

Sodium chloride and water are very different. Water doesn't conduct electricity and so, in that respect, is completely different to sodium chloride. Water is a poor conductor because the particles are more spread out whereas in sodium chloride they are more tightly packed.

ResultsPlus
Examiner Comments

This is an example of an answer that did not receive any credit because the particles in sodium chloride and water are not identified. Also the first sentence is just repeating the information given in the question. The explanation about why water is a poor conductor is not correct.

ResultsPlus
Examiner Tip

Read the question carefully and try to answer at least part of it. If this candidate had identified that there are ions in sodium chloride and molecules in water, they would have achieved Level 1 and 2 marks.

*(c) Sodium chloride and water have very different properties.

Sodium chloride is an ionic substance.
It is a crystalline solid at room temperature.
It has a high melting point.
It conducts electricity when molten or in aqueous solution.

Water is a covalent substance.
It is a liquid at room temperature.
It is a very poor conductor of electricity.

Explain these properties of sodium chloride and water in terms of the particles present and the forces between them.

(6)

Sodium chloride has a high melting point because the ~~forces holding them~~ electrostatic forces holding them together a very strong, ~~which~~ which means lots of energy is needed to break the bonds.

However, water is a covalent bond so the bonds between the two elements are weak. It has a low melting point, hence why it is a liquid at room temperature, so therefore not much energy is needed to break the bonds.

Sodium chloride conducts electricity when molten or in an aqueous solution because ~~it~~ in these states it has delocalised electrons which allow ~~them~~ for movement of particles.

Water does not have any free (delocalised) electrons so is a poor conductor of electricity.

ResultsPlus
Examiner Comments

This response is Level 1 and scored 2 marks.

The candidate has the idea of strong electrostatic forces in sodium chloride but does not mention that they are between ions, they just state 'holding them together' without stating what 'them' refers to. Sodium chloride does not contain delocalised electrons so this was not given any credit.

Water does have covalent bonds, but the candidate has stated that these are between elements and has not mentioned atoms. Covalent bonds are strong but the intermolecular forces between the molecules are weak. The candidate is correct in stating that water does not contain any free electrons so is a poor conductor of electricity.

This candidate has not identified the particles present in sodium chloride or water and their explanation of the forces is inaccurate.

ResultsPlus
Examiner Tip

The question asked the candidates to explain the properties of sodium chloride and water in terms of the particles present and the forces between them.

You need to do both of these in order to reach Level 3.

*(c) Sodium chloride and water have very different properties.

Sodium chloride is an ionic substance.
It is a crystalline solid at room temperature.
It has a high melting point.
It conducts electricity when molten or in aqueous solution.

Water is a covalent substance.
It is a liquid at room temperature.
It is a very poor conductor of electricity.

Explain these properties of sodium chloride and water in terms of the particles present and the forces between them.

(6)

Water has simple molecular ~~[illegible]~~ Cov
bonds between atoms, forming molecules.
Water being a covalent substance means
that it has atoms which share electro
Due to it having a simple molecular cov
bonds they can be easily pulled apart.
However sodium chloride is an ionic
substance, this means that it has a regul
lattice structure of arranged atoms. The
atoms have electrostatic forces of attrac
This means that they have strong bonds. It
able to conduct electricity well when aque
or molten as the atoms are free to
move and carry an electric current with
them. Due to water having weak bonds
it is unable to conduct electricity well.

ResultsPlus
Examiner Comments

This candidate has made a good start to this question as they have given several correct points about water. However, the only correct point about sodium chloride is the lattice structure. The particles have been identified as atoms instead of ions so the explanations are incorrect.

This response is Level 2 and was awarded 4 marks.

If the candidate had written about ions in sodium chloride, they would have scored 6 marks.

ResultsPlus
Examiner Tip

Learn the meanings of the words atoms, ions and molecules and make sure you use the correct one in an answer.

*(c) Sodium chloride and water have very different properties.

Sodium chloride is an ionic substance.
It is a crystalline solid at room temperature.
It has a high melting point.
It conducts electricity when molten or in aqueous solution.

Water is a covalent substance.
It is a liquid at room temperature.
It is a very poor conductor of electricity.

Explain these properties of sodium chloride and water in terms of the particles present and the forces between them.

(6)

Sodium chloride consists of a giant lattice structure with strong electrostatic forces between the Na^+ ions and Cl^- ions in solid form. It has a high melting and boiling point as it takes alot of energy to break the electrostatic forces of attraction apart and seperate the ions, this therefore makes it crystalline at room temprature as room temprature is not enough to seperate the ions apart. Sodium chloride is able to conduct electricity when molten or aqueous because the ions which are present are free to move around therefore can carry electric current. Water is a simple molecular covalent substance Water has strong covalent bonds between the Hydrogen and Oxygen atoms but in contrast the intermolecular forces of attraction ~~are very weak~~ between the water molecules are very weak therefore does not need alot of energy to break these bonds. This is why it is ligiud at room temprature because room temprature

is enough to break apart the intermolecular forces and change the state of the water to ~~liquid~~ liquid. It does not conduct electricity because no ions are present therefore there is nothing to carry the ~~electrostatic~~ electric charge. Furthermore there are no free delocalised electrons to move around in a covalent substance like water as the electrons are shared between atoms, In ionic the electrons are transferred between the atoms which makes them charged.

ResultsPlus
Examiner Comments

This is an excellent answer that is Level 3 and scored 6 marks.

This candidate has a sound knowledge of the particles present and the forces between them and used the correct scientific terminology throughout.

This answer addresses all the properties in the question in detail. It was possible to score 6 marks with slightly less detail.

Paper Summary

In order to improve their performance, candidates should:

- learn the meanings of the terms atoms, ions and molecules and use the correct word in answers;
- show all working for calculations;
- read the questions carefully and use the information given;
- give more detail in questions that require an explanation;
- learn the meaning of the four state symbols and use them when writing equations;
- learn how to draw energy level diagrams;
- learn how to write the formulae of ionic compounds when given the symbols of the individual ions.

Grade Boundaries

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

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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