

Examiners' Report
June 2014

GCSE Chemistry 5CH1F 01

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Introduction

Even though there is only one examination session a year, the format and style have not changed. There are still six questions with the extended writing in the last two questions with a total of 60 marks for the paper. Each question is ramped in terms of difficulty so allowing candidates to access each question; for some that may be limited within each question.

Overall, writing word equations and knowing the formulae of simple substances remains a weakness at this level. Candidates also need to realise that they may be expected to apply their knowledge to new situations and not just rely on memory. Several examiners reported difficulty in reading some candidates' answers.

Successful candidates:

- read the questions carefully, giving answers that were related to the topic being tested by the question.
- could write word equations.
- could apply their knowledge to unfamiliar situations.
- had learnt their science and could express themselves using scientific terminology.

Less successful candidates:

- had difficulty writing word equations.
- did not know the tests for substances.
- had difficulty answering the extended writing questions.
- had gaps in their knowledge.

Question 1 (b) (i)

The majority of the candidates knew that the Earth's earliest atmosphere contained mainly carbon dioxide, although a significant number hedged their bets by using the same gas twice here and in part (iii). Nitrogen was the favoured alternative, presumably thinking that the atmosphere had not changed.

(i) The Earth's earliest atmosphere is thought to have contained

mainly carbon dioxide



ResultsPlus
Examiner Comments

Many candidates scored with this answer.

(i) The Earth's earliest atmosphere is thought to have contained

mainly Nitrogen



ResultsPlus
Examiner Comments

Many gave this as an answer possibly confused with the current atmosphere.



ResultsPlus
Examiner Tip

Learn how the atmosphere changed in the course of the Earth's history.

Question 1 (b) (ii)

Most scored here with the answer 'carbonates'.

- (ii) Over the years, carbon dioxide dissolved in the oceans and was absorbed by marine organisms.

The marine organisms eventually formed rocks which

are argon



ResultsPlus
Examiner Comments

Several candidates chose this answer - not sure why.

- (ii) Over the years, carbon dioxide dissolved in the oceans and was absorbed by marine organisms.

The marine organisms eventually formed rocks which

are carbonates



ResultsPlus
Examiner Comments

As chosen by the majority of candidates.

Question 1 (b) (iii)

The majority here knew that nitrogen is the main component of today's atmosphere. However, it is surprising to see so many think that it is carbon dioxide.

(iii) The Earth's atmosphere today contains approximately 79%

of Carbon dioxide



ResultsPlus
Examiner Comments

This was selected by a significant number of candidates. It is possible their answer was nitrogen to part (i) and had the two gases mixed up.

(iii) The Earth's atmosphere today contains approximately 79%

of Nitrogen



ResultsPlus
Examiner Comments

Fortunately this was chosen by the majority.

Question 1 (c)

Many candidates scored both marking points in a variety of ways. The popular misconceptions included that water evaporated to form the oceans, there is less water vapour because we are making greater use of water or that we are wasting too much water and that it's because plants are using the water vapour.

(c) There is much less water vapour in the Earth's atmosphere today than in the Earth's earliest atmosphere.

Explain how the amount of water vapour decreased.

(2)

Global warming causes it not to rain as much
so there isn't as much water around the world to
be evaporated.



ResultsPlus
Examiner Comments

This type of answer was seen frequently - the idea that global warming was somehow responsible.



ResultsPlus
Examiner Tip

Understand that as the Earth cooled, so did the atmosphere. This meant the water vapour would condense and fall as rain.

(c) There is much less water vapour in the Earth's atmosphere today than in the Earth's earliest atmosphere.

Explain how the amount of water vapour decreased.

It decreased because of global warming⁽²⁾ and the amount of water vapour decreased due to the activity of volcanoes not being active as usually. Water vapour ^{formed} oceans which condensed to form oceans, it also decreased because of human activity, and photosynthesis.



ResultsPlus

Examiner Comments

About the only thing missing from this list of possibilities was that the Earth cooled.



ResultsPlus

Examiner Tip

Don't give a list of possible answers. Any contradictory answers could negate any marks that may have been awarded for a correct answer.

(c) There is much less water vapour in the Earth's atmosphere today than in the Earth's earliest atmosphere.

Explain how the amount of water vapour decreased.

(2)

Because the primary gases came from increased and some on
the planet and gases that have come are decreasing with
of the water vapour



ResultsPlus

Examiner Comments

It is sometimes challenging trying to interpret writing at this standard. In these situations it may or may not be clear whether marks can be awarded. This obviously puts a candidate at a disadvantage.



ResultsPlus

Examiner Tip

Write clearly so others can read what you have written.

Question 1 (d)

The majority of the candidates did not describe how the atmosphere changed, but gave a correct reason for the change: namely photosynthesis. Most stated that carbon dioxide was taken in by plants and oxygen was evolved without describing what happened to these gas levels, but stated that the atmosphere changed. Common errors here included that the plants 'breathe in carbon dioxide and breathe out oxygen', getting the gas exchange the wrong way round and that the plants evolved using the carbon dioxide that we breathe out. A number of candidates were using CO_2 as a short hand for carbon dioxide, but many were writing this incorrectly as Co_2 or CO^2 and will fail to score in any situation. Candidates should be encouraged to use chemical formulae only when writing balanced equations.

(d) When plants first started to grow on the Earth they caused the composition of the atmosphere to change.

Describe how the composition of the atmosphere changed as a result of plants growing.

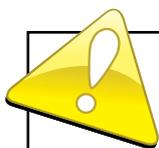
When the plants grow they breathed in CO_2 ⁽²⁾ and gave out Oxygen and the CO_2 was gettin less and less and more oxygen was now in our atmosphere.



ResultsPlus
Examiner Comments

A common misconception held by many candidates is that plants 'breathe'.

This answer did include what happened to the carbon dioxide and oxygen levels in the atmosphere, so described how the atmosphere changed.



ResultsPlus
Examiner Tip

Breathing is a physical action carried out in animals where air is drawn into the body and forced out when exhaled.

Use chemical formulae in balanced equations. A simple slip of the pen here could have resulted in the mark not being awarded.

(d) When plants first started to grow on the Earth they caused the composition of the atmosphere to change.

Describe how the composition of the atmosphere changed as a result of plants growing.

(2)

well plants ~~take in~~ take in carbon dioxide and give out oxygen which shows that the CO_2 has been replaced with oxygen



ResultsPlus
Examiner Comments

A mark was awarded for the exchange of carbon dioxide with oxygen in the atmosphere caused by plants, but there was no mention of HOW the atmosphere changed.



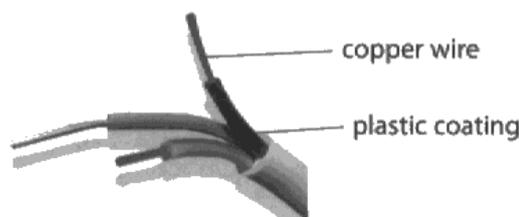
ResultsPlus
Examiner Tip

Read the question carefully to see what is needed in the answer. This candidate has only partly answered the question.

Question 2 (b)

Most candidates stated that copper was used in wires because it is a good conductor of electricity but most failed to give a second reason. Errors included that copper was a good insulator as well as being 'safe'. Where a second correct reason was given, it generally was about the lack of reactivity of copper or that it was 'bendy'. Many confused malleable with ductile and so did not score that point. A disappointing reason that was frequently seen was that copper was used 'because it is cheap'. Several candidates confused their answers by writing about the properties of the plastic coating.

(b) Copper is used as the wire in electric cables.



State **two** reasons why copper is used as the wire in electric cables.

(2)

Copper is used because its a good conductor of electricity and is also cheap/easy to find



ResultsPlus
Examiner Comments

This was probably the most frequent answer seen to this question. It scored only the one mark for good conductor. Copper is neither cheap nor easy to find. Candidates should be deterred from using a cost argument in an answer unless it can be backed up with a fact that influences the cost.

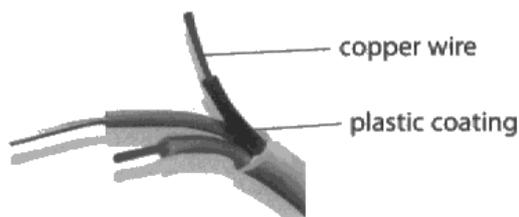


ResultsPlus
Examiner Tip

When asked about why a metal is used to make an article, think about how that article is being used. Electric cables need to conduct electricity and to be flexible to do their job.

Avoid answers such as 'it is cheap' / 'it is expensive' / 'it is easy to use' / 'it is hard to use' as these statements need to be qualified.

(b) Copper is used as the wire in electric cables.



State **two** reasons why copper is used as the wire in electric cables.

(2)

copper is used as a wire in electrical cables because if it gets wet it will cause a problem. So to protect this from happening they can use a plastic coating, were as if it over heated wires would melt.



ResultsPlus
Examiner Comments

It seems that this candidate did not understand the question judging by the answer.



ResultsPlus
Examiner Tip

Think about how things are used when answering questions like this.

Question 2 (c) (i)

This first word equation on the paper had one of the products in the stem of the question and many candidates realised that.

However a significant number struggled to identify the second product and it was acceptable for the candidate to score with the answer 'carbon oxide' without specifying 'monoxide' or 'dioxide', either of which would also have been accepted.

(c) Iron is formed by heating a mixture of iron oxide and carbon.

(i) Complete the word equation for this reaction.

(2)

iron oxide + carbon → iron oxide + carbon oxide



ResultsPlus

Examiner Comments

Carbon oxide was an acceptable alternative to carbon dioxide or carbon monoxide.



ResultsPlus

Examiner Tip

Word equations only contain the names of the substances reacting together and being produced. Chemical symbols should only be used in balanced equations. Things like 'heat' or 'catalyst' do not need to be there.

(c) Iron is formed by heating a mixture of iron oxide and carbon.

(i) Complete the word equation for this reaction.

(2)

iron oxide + carbon → nitrogen + water



ResultsPlus

Examiner Comments

Sometimes answers cannot be explained.



ResultsPlus

Examiner Tip

Use the information given to help you complete or write a word equation.

Question 2 (c) (ii)

Many candidates successfully answered this question by indicating that oxygen was removed from the iron. However, the perennial problem existed of candidates not understanding the chemical meaning of the word 'reduced' and trying to use the common meaning of the word. This caused the majority of candidates to miss a mark here. Often 'it was lowered', 'the mass got less' or similar was seen.

(ii) In this reaction iron oxide is reduced to iron.

Describe what is meant by the term **reduced**.

(1)

Something has been taken away.



ResultsPlus
Examiner Comments

Although 'something' has been taken away, the answer had to specify the loss of oxygen in order to score.



ResultsPlus
Examiner Tip

Learn the meanings of the technical terms used in chemistry.

(ii) In this reaction iron oxide is reduced to iron.

Describe what is meant by the term **reduced**.

(1)

less ~~part~~ of a product that
then there was at the start.



ResultsPlus

Examiner Comments

Candidates need to realise that some terms have a special meaning in chemistry and this is one of them.



ResultsPlus

Examiner Tip

Remember: reduction is loss of oxygen and is the opposite of oxidation.

Question 2 (d)

Of the several points that could score, the favoured one was the preservation of resources. Many candidates tried to explain that recycling was cheaper without stating why and so did not score. Cost factors have to be backed up in order to score. Points made by candidates that also did not score included 'prevents filling up landfill', 'it's environmentally friendly' or similar. Regarding the landfill issue, many candidates did not recognise that putting metals into landfill is a waste of a valuable resource and instead thought along the lines of general waste going to landfill. Few gave the reason that recycling metals uses less energy which was allowed (as the extraction from the ores did not have to take place). Overall a disappointing set of responses where only a very small number scored both marks.

(d) Metals in waste products are often recycled.

Describe the benefits of recycling metals.

(2)

recycling metals costs less than digging up more of that ore and putting it through manufacturing and its more environmentally friendly. friendly to recycle than to dig up more metal.

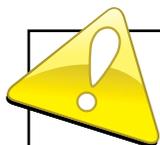
(Total for Question 2 = 8 marks)



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Examiner Comments

Had the first statement included a reference to the amount of energy required, then a mark would have been awarded. Similarly, this was also the case for the second statement about being 'more environmentally friendly'.



ResultsPlus

Examiner Tip

Avoid giving answers such as 'costs less' or 'more environmentally friendly' without an explanation. Marks will not be gained with these answers by themselves.

(d) Metals in waste products are often recycled.

Describe the benefits of recycling metals.

(2)

It stops landfills from piling up, stops the increase in pollution, benefits the economy as less money is spent transporting metals.



ResultsPlus

Examiner Comments

Many candidates mentioned landfills in their answers but missed the point that putting scrapped metal into land-fill was a waste of a valuable resource. Pollution is also a misused answer by many candidates.



ResultsPlus

Examiner Tip

Stopping metals from going to landfill because that is loss of a valuable resource is a benefit of recycling metals. Any answer concerning 'pollution' needs to be explained with what causes the pollution and what is being affected.

Question 3 (a)

Most candidates gave the answer of hydrogen, but a surprising number thought it was carbon dioxide or even oxygen or just left it blank.

(a) Chlorine is one of the gases formed.

Give the name of gas X.

(1)

Oxygen carbon dioxide



ResultsPlus

Examiner Comments

Some answers are difficult to explain. There were many incorrect gases given as an answer to the question.

(a) Chlorine is one of the gases formed.

Give the name of gas X.

(1)

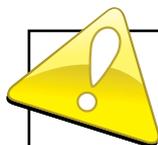
hydrogen



ResultsPlus

Examiner Comments

Not many candidates scored with the correct answer here.



ResultsPlus

Examiner Tip

You need to know the substances produced when seawater, hydrochloric acid, sodium chloride solution and copper sulfate solution are electrolysed.

Question 3 (b) (i)

Very few candidates gave the correct formula for a molecule of chlorine gas. Most wrote Cl. Some gave an answer with an imaginative formula. There is still an issue with the position of the 2 in the formula for many candidates who realised that the molecule involved two atoms of chlorine but failed to score by giving an answer of Cl².

(b) (i) Write the formula for a molecule of chlorine gas.

chlorine + hydrochloric acid → water + carbon dioxide (1)



ResultsPlus
Examiner Comments

The formula of a substance was not understood by this candidate. Many strange answers like this were seen.

(b) (i) Write the formula for a molecule of chlorine gas.

Cl₂

(1)



ResultsPlus
Examiner Comments

Very few candidates scored this mark with the correct formula of chlorine.



ResultsPlus
Examiner Tip

Learn the formulae of the gases hydrogen, oxygen, chlorine, carbon dioxide, and nitrogen.

Question 3 (b) (iii)

Many candidates knew the test to show that a gas is chlorine by using litmus paper which is bleached in the process. Some had an incorrect test by using 'coloured paper' or 'blue paper' (or similar); others did not score the second mark because of an incorrect result 'turns white then red' or some other combination. More concerning was the confusion that some candidates had with the test for hydrogen – 'use a lighted splint and it will pop showing that it is chlorine'. A significant number produced weak answers involving smell and its toxic effects; some even tried using limewater turning cloudy.

(iii) Describe a test to show a gas is chlorine.

(2)

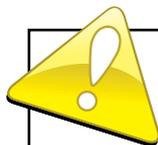
A test to show a gas is chlorine is by doing an observation, conclusion, a plan and a investigation



ResultsPlus

Examiner Comments

Candidates need to be clear as to what is needed to answer the questions on the written paper.



ResultsPlus

Examiner Tip

Aspects of the controlled assessments are not tested in the written papers.

(iii) Describe a test to show a gas is chlorine.

(2)

Blue litmus paper in chlorine turns white/bleached. Spirit put in a tube will pop/create a squeaky noise.



ResultsPlus

Examiner Comments

The first sentence alone would have scored two marks. Unfortunately, the inclusion of an incorrect test negated the first mark, so overall only 1 mark for the correct results of the litmus paper test was awarded.



ResultsPlus

Examiner Tip

Learn the gas tests.

Question 3 (c)

Most knew the role of hydrochloric acid in the stomach, although some said that it dilutes or dissolves the food. Some thought that the hydrochloric acid 'neutralised acidic foods', 'forms a lining for the stomach' or 'neutralised stomach acid'.

(c) Hydrochloric acid is present in the stomach.

Describe what hydrochloric acid does in the stomach.

(2)

hydrochloric acid is an alkali base which neutralises the acid in your stomach.



ResultsPlus
Examiner Comments

The concept of neutralisation - that of an acid reacting with an alkali - did not appear to be fully understood by many of those sitting this paper.



ResultsPlus
Examiner Tip

By the name of it, hydrochloric acid is an acid. Bases and alkalis neutralise acids.

(c) Hydrochloric acid is present in the stomach.

Describe what hydrochloric acid does in the stomach.

it neutralise The excess acid in
The stomach. ⁽²⁾



ResultsPlus
Examiner Comments

It was surprising to see the number of answers of this type where hydrochloric acid neutralised acids in the stomach.



ResultsPlus
Examiner Tip

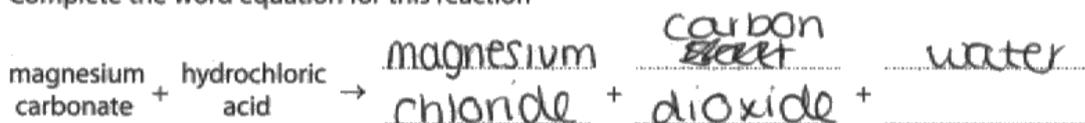
Hydrochloric acid breaks down food in the stomach and kills bacteria.

Question 3 (d)

This word equation was problematic for many candidates. Several scored a mark for carbon dioxide, but fewer scored marks for the magnesium chloride or water. Many candidates were confused by the use of two lines for each product, but it was thought this would be a helpful way for the candidates to know that three products were required as well as providing a place for their answers. Consequently, it becomes difficult when the name of a product involves only one word – namely 'water'. Some candidates were using a mix of words and formulae. This is not acceptable. It is acceptable for candidates to use a balanced equation in place of a word equation, but not a mix of words and formulae.

(d) Magnesium carbonate reacts with dilute hydrochloric acid.

Complete the word equation for this reaction



ResultsPlus
Examiner Comments

This was one of the few answers seen to be given all three marks.

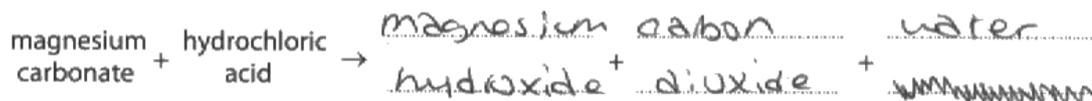


ResultsPlus
Examiner Tip

Know the reactions of acids and practise writing word equations for those reactions.

(d) Magnesium carbonate reacts with dilute hydrochloric acid.

Complete the word equation for this reaction



ResultsPlus

Examiner Comments

The salt formed in the reaction was the least scoring point out of the three. Many candidates scored one mark for carbon dioxide as a product.



ResultsPlus

Examiner Tip

Learn the reactions of acids.

Question 4 (a)

This proved problematic for many where the misconception of 'it can't be used again', 'it can't be recycled' or 'it can't be renewed' were favoured answers by many candidates. Several scored the mark by indicating that crude oil was a finite resource or 'once it's gone it's gone'.

4 Crude oil can be separated into useful products.

(a) Crude oil is non-renewable.

State what is meant by the term **non-renewable**.

Reason

(1)

Non-renewable means that it can not
~~be used again.~~ be made again



ResultsPlus
Examiner Comments

The term 'non-renewable' was badly understood by the majority of the candidates. There was much confusion with recycling and reusing.



ResultsPlus
Examiner Tip

Learn the meanings of technical terms.

4 Crude oil can be separated into useful products.

(a) Crude oil is non-renewable.

State what is meant by the term **non-renewable**.

(1)

non-renewable means once you have used it, it can't be used again.



ResultsPlus

Examiner Comments

Many candidates scored badly here showing a lack of understanding of the term 'non-renewable'.



ResultsPlus

Examiner Tip

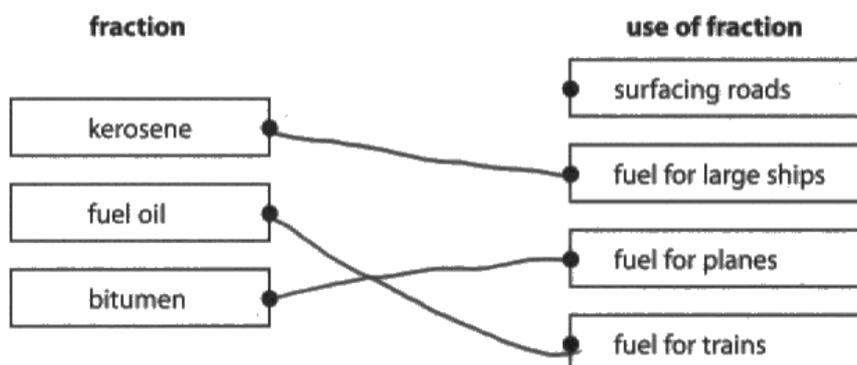
Fuels can be renewable or non-renewable, but all fuels once used cannot be used again because they reacted to form new products.

Question 4 (b) (i)

A fair number scored the two marks for correctly identifying the uses of the three fractions obtained from crude oil. It was surprising to see how many thought that bitumen was used as a fuel for planes or for trains.

(i) Draw one straight line from each fraction to a use of that fraction.

(2)



ResultsPlus
Examiner Comments

All three links were incorrect here.



ResultsPlus
Examiner Tip

Make sure you know a major use of each of the fractions. Bitumen is only fraction that does not have a use as a fuel.

Question 4 (b) (ii)

A good number of candidates scored both marks with the simple statement of 'petrol is more flammable than diesel' or similar using an appropriate property. Some had a correct property, but an incorrect difference. Some used a different fraction rather than diesel oil and so could not score the difference mark. Of the several misconceptions seen, 'petrol is used for small cars but diesel is only used for big cars' proved to be quite a popular choice. Again in this question, some candidates tried using a cost argument. Candidates need to be aware that the cost of an object is not a property of that object. This question also proved to achieve a disappointingly low number of correct answers.

(ii) The petrol fraction and the diesel oil fraction have different physical properties.

Choose one property, describing the difference between the fractions.

(2)

petrol fraction is used for cars
where as diesel oil is used for
boats and large ships



ResultsPlus

Examiner Comments

This answer was seen many times. This confusion between use and property was quite common in this question.



ResultsPlus

Examiner Tip

Physical properties are those that can be measured such as boiling point. Make sure you can identify other physical properties of substances.

(ii) The petrol fraction and the diesel oil fraction have different physical properties.

Choose one property, describing the difference between the fractions.

(2)

Petrol is easier to set a
light than ~~the~~ diesel oil. Also
diesel oil is thicker than petrol.



ResultsPlus
Examiner Comments

This is a good answer as two properties have been identified - ease of ignition and viscosity. This candidate scores both marks just for the first sentence.



ResultsPlus
Examiner Tip

Viscosity is the technical way of describing the thickness of a liquid. The longer the carbon chain in the hydrocarbon, the thicker or more viscous the liquid.

Question 4c

Despite the question appearing many times over the years, many candidates failed to score both marks. A few thought that it was a mixture of hydrogen and carbon and so did not score. Others thought it was a compound of hydrogen and carbon molecules only – here only 1 mark was given as a result of the incorrect use of 'molecule' in the answer.

(c) The petrol fraction contains octane, C_8H_{18} .

Octane is a hydrocarbon.

Describe what is meant by the term **hydrocarbon**.

(2)

hydrocarbon is a mixture of
hydrogen and carbon
only.



ResultsPlus
Examiner Comments

The inclusion of the word 'mixture' caused this answer to score only one mark.



ResultsPlus
Examiner Tip

Hydrocarbons are **compounds** of hydrogen and carbon only.

(c) The petrol fraction contains octane, C_8H_{18} .

Octane is a hydrocarbon.

Describe what is meant by the term **hydrocarbon**.

(2)

hydro carbon means that it has got
hydrogen in it and carbon dioxide.



ResultsPlus

Examiner Comments

No marks are awarded, as although the response indicates that the compound contains hydrogen, carbon dioxide is incorrect. It should read hydrogen and carbon for one mark to be awarded.



ResultsPlus

Examiner Tip

Make sure you learn the meaning of the term **hydrocarbon**.

Question 4 (d) (ii)

The test for unsaturated hydrocarbons has appeared several times over the years in various guises. This year candidates were told that the bromine solution being used was orange coloured and asked to describe what was seen when it was shaken with an alkane and with an alkene. There were many who, judging from their answer of 'it turns colourless' assumed that a mixture of an alkane and an alkene was used. A perennial problem is the use of the word 'clear' as a substitute for the word 'colourless'. Another problem arose when some candidates described the result for alkane as 'it changes to orange'. Poor use of English here can cost marks. Again a disappointing set of responses.

(ii) The shorter chain hydrocarbon molecules produced are alkanes and alkenes.

Bromine can be used to distinguish between alkanes and alkenes.

Describe what is **seen** when bromine water, which is orange-coloured, is shaken with an alkane and with an alkene.

(2)

Alkane will go ~~clear~~ orange
Alkene will go clear.



ResultsPlus
Examiner Comments

One mark was awarded for the result with the alkane, but not for the result with the alkene. Candidates need to be aware that the word 'clear' does not mean 'colourless'.



ResultsPlus
Examiner Tip

You will gain no credit for using the word 'clear' when it should be 'colourless'.

(ii) The shorter chain hydrocarbon molecules produced are alkanes and alkenes.

Bromine can be used to distinguish between alkanes and alkenes.

Describe what is **seen** when bromine water, which is orange-coloured, is shaken with an alkane and with an alkene.

(2)

When Bromine water is shaken with a alkene it goes colourless & with an alkene it stays the same?

(Total for Question 4 = 10 marks)



ResultsPlus

Examiner Comments

It was good to see this candidate describing the correct result of shaking the bromine water with an alkene - i.e. it turns colourless, but this was negated by a contradictory answer immediately after 'with an alkene it remains the same'. It wasn't clear which 'alkene' should have been 'alkane'.



ResultsPlus

Examiner Tip

Make sure you know test to distinguish between an **alkane** and an **alkene** using bromine water.

Question 5 (b)

This question proved to be problematic for many candidates and only a few scored two or three marks. This threw up a variety of misconceptions judging from the answers. Many thought that hydrogen was formed as a biofuel from plants (growing crops to make hydrogen uses land that could be used for growing food). Several thought that carbon dioxide was formed when hydrogen burned in air and this would suffocate us. A similar number thought that the toxic fumes formed when hydrogen burned in a car engine, we would suffer a shortage of oxygen because it was used up when hydrogen was burnt, the water formed would cause flooding. Various other issues were thrown up in the answers offered by many candidates. Many tried answers such as hydrogen is expensive / hydrogen causes pollution without qualification.

(b) Some people suggest that hydrogen, rather than petrol, should be used as a fuel in cars but there are disadvantages in the widespread use of hydrogen.

Describe the disadvantages of hydrogen, rather than petrol, being used as a fuel in cars.

(3)

Hydrogen ~~will~~ will produce harmful gases into the atmosphere where as petrol doesn't produce harmful gases and is used in cars for petrol.



ResultsPlus
Examiner Comments

Many misconceptions were seen in answers to this question. This was probably prompted by the use of 'disadvantages' in the question.



ResultsPlus
Examiner Tip

The only product formed when hydrogen burns is water vapour. Hydrogen is the cleanest of fuels.

(b) Some people suggest that hydrogen, rather than petrol, should be used as a fuel in cars but there are disadvantages in the widespread use of hydrogen.

Describe the disadvantages of hydrogen, rather than petrol, being used as a fuel in cars.

(3)

Hydrogen is a gas so it is less dependable. If the car with hydrogen in were to catch fire there would be a very ~~loud~~ loud squeaky pop. Also hydrogen is more flammable than petrol.



ResultsPlus

Examiner Comments

Few candidates mentioned difficulties associated with hydrogen as a fuel - storage difficulties, having to use strong tanks to store a gas under pressure and that there are fewer retail outlets for hydrogen than for petrol.

Question 5 (c)

For many candidates this was quite a straightforward question. The sulfur dioxide caused acid rain which damaged buildings etc. proved to be a popular combination of points made. Some got into a tangle when they missed out the formation of acid rain but some still scored for describing breathing problems that the sulfur dioxide could cause.

(c) Sulfur is an impurity in many fuels.

When fuels containing sulfur impurities are burnt, sulfur dioxide is released into the atmosphere.

Describe some problems this sulfur dioxide can cause.

(2)
Sulphur dioxide can cause harmful gases which are toxic and could decrease the amount of oxygen blood carries around the body.



ResultsPlus
Examiner Comments

A distinct confusion with carbon monoxide here.



ResultsPlus
Examiner Tip

Sulfur dioxide is one of the major causes of acid rain and the problems it causes.

(c) Sulfur is an impurity in many fuels.

When fuels containing sulfur impurities are burnt, sulfur dioxide is released into the atmosphere.

Describe some problems this sulfur dioxide can cause.

(2)

It can cause acid rain. It is something that corrodes many things and pollutes lakes.



ResultsPlus

Examiner Comments

It was hoped that most candidates would have given answer along similar lines. Other environmental effects such as 'killing trees', 'killing fish in rivers' were accepted.



ResultsPlus

Examiner Tip

Make sure you know the problems that the polluting gases (sulfur dioxide, carbon monoxide, nitrogen oxides) cause.

Question 5 (d)

This 6 mark question produced a wide variety of answers reflecting how the candidate chose to answer the question. At a simple level, some merely repeated data given in the table and for this they did not gain credit. Many thought that fuel B was the best by stating that it was the cheapest and this, along with a simple interpretation of the data, produced a 'level 1' answer. To produce a level 2 answer, candidates had to give some merits or demerits of using at least two fuels, or interpret the data from one column of the table for all three fuels. A level three answer was seen by many candidates and this involved giving some merits or demerits for all three fuels or giving a case for stating which fuel was best. Overall, the mean mark for this question was about 3.5. In this question, many misconceptions were seen. Some did not recognise that the temperatures provided information about how much energy was released on burning the fuels. Some thought fuel A was dangerous because it had the highest temperature and this could cause a car to blow up. It was surprising to see how many candidates thought that the yellow flame of fuels B and C were better because they were 'safety' flames and so they could be seen and not consider the products of combustion were more likely to be more of a problem here. Similarly several thought that fuels B and C produced carbon dioxide which was 'dangerous' and overlooked the carbon monoxide produced from incomplete combustion. The ideas here of the distinction between complete and incomplete combustion often appeared confused and not well understood.

Here are the results, together with the cost of the mass of fuel burnt in each experiment.

fuel	initial temperature of water (°C)	final temperature of water (°C)	cost of fuel burnt (pence)	observations of the way the fuel burns
A	15	51	3.0	burns with a blue flame - no smoke
B	16	21	0.5	burns with a yellow flame - black smoke
C	15	39	2.0	burns with a yellow flame - no smoke

A student considered these results and decided that fuel B was the best fuel.

Considering all the evidence for the fuels, A, B, and C, explain whether this is a good choice or not.

(6)

Using B to be the best fuel is not a good choice because although it's a very cheap burnt fuel it still doesn't have the highest temperature of water so you would be spending a lot in the long run.

Using fuel B is also a bad idea because although it carries a yellow flame it burns off black smoke, causing all of the chemicals to go up in to the air and cause damage a possible have a great effect on our atmosphere to cause global warming.



ResultsPlus

Examiner Comments

This is a level 1 answer - 2 marks. The candidate has made reference to fuel B being the cheapest as well as a comment about the way in which the fuel burnt. The candidate appeared not to realise the significance of the water temperatures and this was found to be quite common throughout the cohort taking this exam.

This answer could have been improved by making a comparison with the other two fuels.



ResultsPlus

Examiner Tip

Make use of all the data in a question like this. It is normally there for a reason.

Here are the results, together with the cost of the mass of fuel burnt in each experiment.

fuel	initial temperature of water (°C)	final temperature of water (°C)	cost of fuel burnt (pence)	observations of the way the fuel burns
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A student considered these results and decided that fuel B was the best fuel.

Considering all the evidence for the fuels, A, B, and C, explain whether this is a good choice or not.

(6)

Fuel B is a good fuel for the cost of it as it is cheaper than the others, ~~but~~ but that's about all that's good for it. As it produces black smoke and also doesn't have a really high temperature which could be good or bad depending on what you are going to use it for. Fuel A is the most expensive than the rest, ~~at a~~ ~~3p~~ but it is burnt on a higher flame, and has a higher final temperature of ~~water~~ water at 51°C also it does not produce no smoke so it would be more economical. Finally fuel C, is good as it doesn't produce any smoke, burns on a yellow flame, but still has a good final temperature of 39°C. I think the best fuel to have if you wanted a high temperature of water would be Fuel A, but if you wanted one for a bit cheaper and doesn't boil high C would be best.

(Total for Question 5 = 12 marks)



ResultsPlus

Examiner Comments

A level 3 answer - 6 marks. The candidate had made use of all the table making relevant comments about the temperature rise, the cost of the fuel and the type of flame. The candidate also made a good comparison about which would be the best fuel. There were many answers seen of this calibre.



ResultsPlus

Examiner Tip

This is a very good answer where the candidate has made use of all the data. Take care not just to copy the data - credit is not given for that.

Question 6 (a) (i)

The information given about the formula of calcium carbonate and of carbon dioxide should allow a candidate to work out the formula for calcium oxide. However, this proved problematic for many. Some answered this using a word equation, whereas some managed successfully to write a balanced equation which was not expected.

When calcium carbonate, CaCO_3 , is heated strongly, calcium oxide and carbon dioxide, CO_2 , are formed.

(i) State the formula of calcium oxide.

(1)

calcium + oxygen = calcium oxide.



ResultsPlus
Examiner Comments

Surprisingly, this type of answer was seen quite often.



ResultsPlus
Examiner Tip

Think about what the question is asking for. Here a formula is required rather than a word equation.

When calcium carbonate, CaCO_3 , is heated strongly, calcium oxide and carbon dioxide, CO_2 , are formed.

(i) State the formula of calcium oxide.

(1)

CaO_2



ResultsPlus
Examiner Comments

Several made an attempt at the formula, but it was unclear how this one was determined.



ResultsPlus
Examiner Tip

Removing the atoms one carbon and two oxygen from the formula of calcium carbonate, will leave the formula of calcium oxide: CaO .

Question 6 (a) (iii)

Many candidates scored well here writing a complete word equation. Many chose to include the word 'heat' on the left side which was ignored on this occasion. Candidates need to realise that word equations only involve the names of the substances involved in a reaction and such things as 'heat', 'catalyst' etc. play no part in this. Candidates need to be deterred from this as several start to think that 'heat' is a substance involved in the reaction. Some candidates wrote balanced equations, which were not expected, but were credited with full marks if they were written correctly and balanced. Many errors cropped up here as some candidates wrote an equation with a mix of words and symbols. This could not score full marks as it did not answer the question. Many candidates use 'CO₂' as shorthand in incorrect places and should be encouraged to write the full name in when required. Many candidates make errors here by writing Co₂ or CO² which are not acceptable.

(iii) Write the word equation for this reaction.

calcium carbonate + heat = calcium oxide + carbon dioxide (2)



ResultsPlus
Examiner Comments

Candidates should be discouraged from including 'heat' in a word equation. In this example the '=' sign is taken to mean '→':



ResultsPlus
Examiner Tip

Writing word equations: think about which substances are reacting together or are decomposing, and which substances are being formed.

(iii) Write the word equation for this reaction.

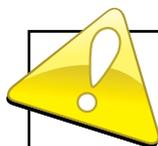
(2)



ResultsPlus

Examiner Comments

One mark was awarded for the correct products of this word equation. The use of the formula for calcium carbonate stopped the second mark being given as word equations should not be a mix of symbols and words.



ResultsPlus

Examiner Tip

Don't mix up symbols with chemical names for word equations.

Question 6 (b)

Surprisingly a significant number of candidates failed to score a mark on this question. Many wrote about 'rocks falling to the bottom of the sea' or 'dead animals / fossils build up'. Some described the formation of layers building up until they were above the level of the sea, and some confused sedimentary rock formation with that of metamorphic rocks. For those who managed to score, most made a comment about layer formation and many wrote about the time period involved. Anything that did not imply 'millions of year' was not given a mark, although the vague statements 'over time' or 'over a long period of time' were credited.

(b) Limestone is a sedimentary rock.

Describe how sedimentary rocks are formed.

(2)

~~They are formed by volcanic activity~~
They are formed by volcanic activity which makes the layers of the rock.



ResultsPlus
Examiner Comments

There was a significant number who wrote about the formation of igneous or metamorphic rocks.



ResultsPlus
Examiner Tip

Learn the formation of the rock types: sedimentary, metamorphic and igneous, and know the differences between the rock types.

(b) Limestone is a sedimentary rock.

Describe how sedimentary rocks are formed.

(2)

Sedimentary is layers of dead organisms and other things such as sand and plants crushed together under a lot of pressure using often water over a long period of time



ResultsPlus
Examiner Comments

Although the expression is not ideal, the relevant points are there for this to score 2 marks.



ResultsPlus
Examiner Tip

When describing a sequence of events, take a little time to get the correct order.

Question 6 (c)

This proved to be a very accessible 6-mark question but a disappointing number of candidates failed to score a mark. The mean mark was 4.78 and more than half of the candidates produced coherent and well written answers worthy of the top mark. It was interesting to see what was considered to be an advantage of opening a quarry; 'the villagers would be able to make things with the limestone', 'many tourists would come to see how a limestone worked' and 'it would make a good location for an educational visit' were often seen as advantages. For disadvantages, several misconceptions were seen: 'alot (sic) of carbon dioxide will get into the air when you dig up the limestone', 'animals will be forced out of their homes', 'deforestation will cause a decrease in oxygen levels' along with a wide variety of vague comments about pollution were frequently seen in weaker answers. Many candidates wrote about what could happen to the quarry after it was used, but these points did not address the question and so were not credited.

Evaluate the advantages and disadvantages to the local area of opening this quarry.

(6)

The advantages of opening the limestone quarry to the local area is that it's part of nature and will attract many tourists, it's a really nice landscaped area. Some of the disadvantages of opening the quarry may be that things may fall, limestone is may be reactive so people could get hurt, people might try steal it.



ResultsPlus

Examiner Comments

The advantages and disadvantages given by this candidate failed to convince and this scored 0.



ResultsPlus

Examiner Tip

Use all information given to you in the question. The photograph shows a big 'hole' in the landscape with heavy machinery - not good to look at, many big trucks - so lots of noise, lots of smoke being released - these are three disadvantages of opening a quarry.

Evaluate the advantages and disadvantages to the local area of opening this quarry. ~~11~~ ~~11~~

(6)

The advantages of opening a limestone quarry ~~are~~ ^{is} that it provides jobs for the local people, there is more money coming into the town and when it gets transported the company will be popular. Some disadvantages are that habitats will be destroyed, there will be noise pollution and dust everywhere which means there won't be any tourists. There will be more traffic around that area. ~~and~~



ResultsPlus

Examiner Comments

A well-constructed answer detailing a variety of advantages and disadvantages of opening a limestone quarry worthy of 6 marks. This type of answer was frequently seen.



ResultsPlus

Examiner Tip

Make a plan to answer this type of question. It will help you to think about the sort of things you will need to include in your answer.

Paper Summary

Based on their performance in this paper, candidates should:

- practise answering past paper questions.
- practise writing word equations.
- learn the tests for substances.
- think through answers before writing, especially for extended writing questions.
- write clearly so other people can read what has been written.
- Stopping metals from going to landfill because that is loss of a valuable resource is a benefit of recycling metals. Any answer concerning 'pollution' needs to be explained with what causes the pollution and what is being affected.

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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