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Examiners' Report
June 2013

GCSE Chemistry 5CH1F 01

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Introduction

This paper is now well established and it is clear that candidates are well prepared for the format. The paper contains six questions with a total of 60 marks. The final two questions contain extended writing.

Many candidates made a good response to the paper. However, candidates should be encouraged to use more scientific vocabulary. The ability to describe and analyse practical work in Chemistry is important, and may sometimes be an area of weakness. Another aspect recommended for practise is the construction of word equations.

Question 1 (a) (i)

Most candidates correctly identified electrolysis.

(i) Give the name of this process in which substances, such as hydrochloric acid, are decomposed by a direct electric current.

(1)

decomposition

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Examiner Comments

A rephrasing of the question is not creditworthy.

Question 1 (a) (ii)

This question asked for this well known test in a slightly different way. It was well answered, with "squeaky pop" a frequent response. Some candidates just stated "squeaky pop test", which is rather lacking in detail as a description (but was credited). Some answers just mentioned "pop"; the fact that the question was worth 2 marks should indicate that this answer is insufficient. The alternatives of the hydrogen burning or water being formed (allowed in this case due to the way the question was phrased) were rarely seen.

Where the answer was incorrect there was confusion particularly with the test for oxygen - "splint relights" - or just stating that the "splint goes out".

(ii) Describe what happens when a burning splint is applied to a mixture of hydrogen and air in a test tube.

(2)

When a burning splint is applied there is a squeeky pop as the hydrogen is ignited.

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Examiner Comments

A good, clearly written answer that even explains why a squeaky pop occurs.

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Examiner Tip

Try to spell words correctly!

(ii) Describe what happens when a burning splint is applied to a mixture of hydrogen and air in a test tube.

(2)

The burning splint will go out.

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Examiner Comments

The candidate has not learnt the gas tests.

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Examiner Tip

Tests are an important part of Chemistry and often feature in exam papers.

Question 1 (b) (iii)

This part was well answered. Most candidates knew that the indigestion remedy neutralised the acid (although poor terminology let some down - the remedy "breaks down" or "dissolves" the acid).

Many candidates also knew the remedy was an alkali/base or that the acid was in excess. In fact, some answers covered three or four of the available mark points. It was a pity that some answers knew about neutralisation but stated that the pH would be lowered. Incorrect responses often seemed to reflect advertising - cooling, calming or soothing the acid. Others did not read the question and referred to functions of the acid - aiding digestion/ breaking up food or killing bacteria.

(iii) Explain how an indigestion remedy works when it cures acid indigestion.

(2)

an indigestion remedy is called a antacid, people take them when there is too much acid in one stomach. The antacids neutrelise the excess stomach acid.

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Examiner Comments

A well expressed answer.

(iii) Explain how an indigestion remedy works when it cures acid indigestion.

(2)

The remedy clears the body of the acid build up.

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Examiner Comments

This answer is not worded correctly to allow credit - what do 'clear' and 'build up' mean?

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Examiner Tip

Use scientific terminology in your answer - in this case, neutralised and excess.

Question 1 (c)

Many answers scored one mark for water which just needed to be transposed (although a significant minority did not include water as a product). Most candidates did not recognise that nitrates are formed from nitric acid, so naming the salt was a good discriminator. A very large number just gave "salt". Other incorrect responses included magnesium nitric, magnesium acid, nitrogen oxide, hydrogen or oxygen. Some answers gave too many products, when the answer space clearly indicated the correct number.

(c) Metal oxides react with acids to form a salt and water.

Complete the word equation for the reaction of magnesium oxide with nitric acid.

(2)

magnesium oxide + nitric acid → Salt + water

(Total for Question 1 = 9 marks)

ResultsPlus
Examiner Comments

The most common answer to this question.

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Examiner Tip

Remember that the salt formed depends on the acid used.

(c) Metal oxides react with acids to form a salt and water.

Complete the word equation for the reaction of magnesium oxide with nitric acid.

(2)

magnesium oxide + nitric acid → magnesium nitrate + oxygen

(Total for Question 1 = 9 marks)

ResultsPlus
Examiner Comments

There were examples of correctly identified salts.

ResultsPlus
Examiner Tip

It's a pity that the candidate has completed the hard task of identifying the salt but has not read the question where water was given as the other product. The examiners give lots of clues in the questions.

Question 2 (a) (i)

This question was not well answered, and candidates showed a lack of understanding of the chemistry involved and hence why the volume would decrease. Some candidates may have understood what was occurring, but used unfortunate terminology, such as "the copper absorbed / took in the gas", not really showing they knew that a reaction had happened. Others talked about copper and "the gas" without identifying oxygen as the part of air that reacted. Only a few answers correctly stated that copper oxide was formed, or that copper had been oxidised.

Common wrong answers talked about the contraction of the gas (as the apparatus cooled), or gases escaping from the apparatus.

(i) Explain why the volume of gas had decreased.

(2)

because of the amount of pressure and the copper has reacted ~~reacted~~ with it.

ResultsPlus
Examiner Comments

It is a pity that this answer does not specify that the "it" is the oxygen in the air.

ResultsPlus
Examiner Tip

Try to understand the reason behind experiments - the question is about finding the percentage of oxygen in the air, so a reaction with oxygen is involved.

Question 2 (b) (ii)

Many candidates produced a good answer to this question with clear points, well linked. Most achieved at least one mark, with many scoring two. A 3 mark answer was a good discriminator. The most popular response was that the water vapour condensed and formed the oceans, with a point lost for missing that the Earth/atmosphere cooled.

Some candidates did not appreciate the time scale and were talking about changes today and global warming. This included plants photosynthesizing and removing water; the water vapour evaporated as the Earth heated up due to global warming; volcanoes not

erupting anymore. What is most critical is a clear understanding of the terms evaporate and condense.

(ii) The Earth's early atmosphere contained a larger percentage of water vapour than the Earth's atmosphere today.

Explain what happened to cause the percentage of water vapour in the Earth's atmosphere to decrease.

(3)

plants started to grow which take the water vapour out the air. volcanoes staped erupting so they weren't releasing more and oceaned were formed

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Examiner Comments

This answer shows that oceans were formed, but does not say how.

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Examiner Tip

The early atmosphere refers to the Earth before human history when the Earth was very hot, and it was the cooling down that caused the water vapour in the atmosphere to condense.

(ii) The Earth's early atmosphere contained a larger percentage of water vapour than the Earth's atmosphere today.

Explain what happened to cause the percentage of water vapour in the Earth's atmosphere to decrease.

(3)

As the earth ~~eett~~ cooled down, the water vapour condensed to form oceans, also volcanoes do not produce as much water vapour any more

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Examiner Comments

The candidate has linked together clearly three ideas: cooled down.... condensed.... oceans. (The part about volcanoes is irrelevant and ignored).

Question 3 (b)

This question elicited many muddled responses. A large number either rephrased the question, stating what was reduced and what was oxidised, or rephrased the equation. There were a lot of "the lead has lost the oxide....". To score marks it was essential to refer to **oxygen**. It is important that candidates understand that reduction and oxidation are opposites and that, in chemistry, the word 'reduction' has a particular meaning.

(b) Lead oxide can be converted into lead by heating it with carbon.

The word equation for the reaction is

lead oxide + carbon → lead + carbon dioxide

Explain how this equation shows that lead oxide is reduced and carbon is oxidised.

(2)

The lead is no longer with oxygen, but carbon dioxide is formed using the lead oxide's oxygen.

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Examiner Comments

This answer shows a clear understanding about the transfer of oxygen.

Question 3 (c)

The important part of this question was to realise that a contrast was required. Most answers scored 1 mark for comparing the densities of the metals, but not all described the fact that both metals conducted well. The alternative response, explaining why a low density was preferable, was not often seen, although some described aluminium cables as "safer" (i.e. less likely to fall if the cables were lighter).

Wrong answers referred to properties not in the table such as cost, or that aluminium "does not rust", or is stronger. Surprisingly, some linked a lower density to being a better conductor of electricity ("the electricity can flow more easily").

metal	ability to conduct electricity	density / g cm^{-3}
copper	good	8.9
aluminium	good	2.7

Overhead power cables, supported by pylons, are used to carry electricity around the country.

Use the information from the table to explain why aluminium, rather than copper, is used for overhead power cables.

(2)

(2)

Aluminium is as good at conducting as copper but aluminium is less dense which allows electricity to pass through faster making it more effective.

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Examiner Comments

The answer has correctly identified the property contrast. Unfortunately, this has been contradicted by an incorrect assertion about faster conduction of electricity.

(c) The table shows some information about the metals copper and aluminium

metal	ability to conduct electricity	density / g cm^{-3}
copper	good	8.9
aluminium	good	2.7

Overhead power cables, supported by pylons, are used to carry electricity around the country.

Use the information from the table to explain why aluminium, rather than copper, is used for overhead power cables.

(2)

because it is better in density /g cm^3 ~~cop~~ it is 2.7.

ResultsPlus
Examiner Comments

This unclear answer does not score.

ResultsPlus
Examiner Tip

Be clear - what is "better" - is high or low better? The examiner will not guess if the answer is unclear.

(c) The table shows some information about the metals copper and aluminium

metal	ability to conduct electricity	density / g cm^{-3}
copper	good	8.9
aluminium	good	2.7

Overhead power cables, supported by pylons, are used to carry electricity around the country.

Use the information from the table to explain why aluminium, rather than copper, is used for overhead power cables.

(2)

because aluminium is much stronger than copper and it absorbs electricity

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Examiner Comments

The question asks for the answer to use information in the table, but this has not been done.

ResultsPlus
Examiner Tip

Where information is given, use it.

Question 3 (e) (i)

Many answers were correct, although values less than 62.5 or above 63 were commonly seen so the graph had to be read carefully.

Some incorrect answers used the wrong scale - quoting 180 - which makes one wonder what is understood by "180% tin in a mixture".

Question 3 (e) (ii)

A good number of well worded answers were seen here, although some failed to write about both parts of the trend seen, giving a meaningless answer. Some candidates used wording such as "easier/harder to melt", "melted faster/slower" which didn't really mean lower/ higher melting temperature.

A few wrong answers talked about changes in percentage by mass rather than the melting

temperature. Some even mentioned boiling point.

(ii) Describe how the melting temperature changes as the percentage by mass of tin in the mixture increases from 0% to 100%.

(2)

The melting temperature rises as the mass of tin increases

ResultsPlus
Examiner Comments

This is an example of a meaningless answer - the graph clearly shows that the melting temperature drops then rises.

(ii) Describe how the melting temperature changes as the percentage by mass of tin in the mixture increases from 0% to 100%.

(2)

as the percentage of tin gets higher the melting temperature gets lower until a 63, then it starts to rise again.

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Examiner Comments

A clearly described answer.

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Examiner Tip

The candidate did well to mention the point where the graph changes gradient (with % would have been even better).

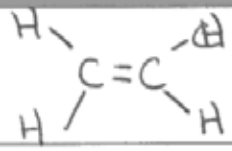
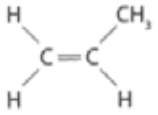
Question 4 (a)

This question elicited a relatively poor response, with a few candidates scoring both marks (and a large number scoring none at all). Some perfect answers were seen for the structure of ethene, but, as one examiner commented, every possibility was seen. Errors included only showing a single bond between the carbons; showing methane; carbons with more or less than four bonds; carbons (and hydrogens) looking like an 'E' or 'e'. Overall, there were a significant number of very untidy/careless diagrams with bonds not clearly drawn. The better candidates did score 1 mark for naming propene. One common error was methene.

4 (a) The table shows information about two alkenes.

Complete the table to show the names and structures of these alkenes.

(2)

name	structure of a molecule
ethene	
Propene	

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Examiner Comments

This candidate was lucky to score 2 marks as the top right symbol is not clear.

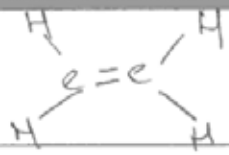
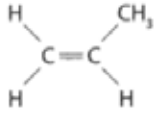
ResultsPlus
Examiner Tip

Take time to draw clear structures.

4 (a) The table shows information about two alkenes.

Complete the table to show the names and structures of these alkenes.

(2)

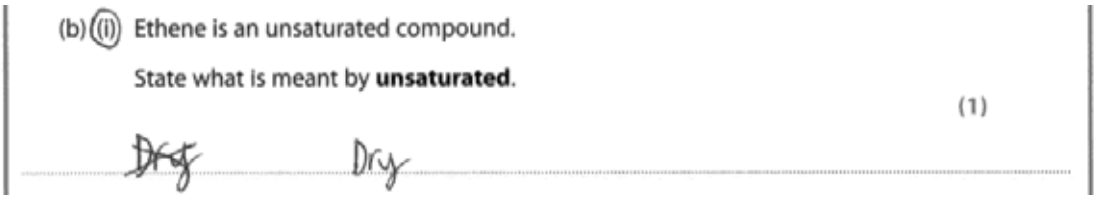
name	structure of a molecule
ethene	
carbon hydrogen	

ResultsPlus
Examiner Comments

Are these C or e?

Question 4 (b) (i)

This basic recall question was poorly answered, with a great many candidates having no notion at all of what 'unsaturated' means. Unfortunately, some wrote the answer the wrong way round ("has no double bond"). Others suggested that unsaturated meant "not saturated" - true, but this is never going to get a mark. Other errors included: not mixed with anything else, answers related to fats, still room for more atoms/bonds. There were a large number of answers related to water e.g. "no water", "unreactive to water", "no added water".


(b) (i) Ethene is an unsaturated compound.

State what is meant by **unsaturated**.

(1)

Dry

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Examiner Comments

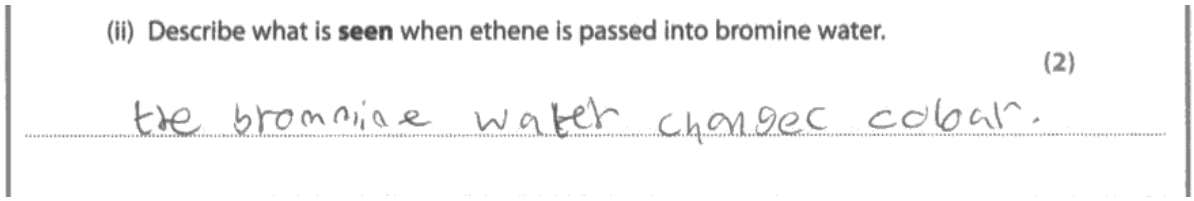
This was not acceptable as an answer to a question on a chemistry paper.

ResultsPlus
Examiner Tip

Learn the meaning of common chemical terms.

Question 4 (b) (ii)

In this question the starting colour of bromine was less commonly seen than the end colour. Many responses correctly stated that the bromine water went colourless, however there were other incorrect descriptions of what happened: bubbles, goes cloudy, milky, orange, brown or yellow. Some answers stated that a colour change occurs, but did not specify the colours. It is disappointing to still see many answers where "clear" or "transparent" are used rather than colourless.


(ii) Describe what is **seen** when ethene is passed into bromine water.

(2)

the bromine water changes colour.

ResultsPlus
Examiner Comments

Correct - but the colours must be given.

ResultsPlus
Examiner Tip

Tests occur often in exams and learning these carefully will be credited.

Question 4 (c)

Many of the answers identified that something was 'broken down', however most did not identify that a long chain alkane is broken down into a smaller chain alkane and an alkene. A lot of candidates scored a mark for being aware of the idea that this is done to create products that are more useful. Some candidates had clearly learned a specific definition to gain full marks. There was much unclear language and answers could refer equally to fractional distillation as much as to cracking ("split up the fractions" or "fractions are separated"). Confusion occurred between alkanes and alkenes, alkenes being broken down. Other things being broken down included atoms or elements.

Question 4 (d) (ii)

Most answers scored 2 marks here, with almost everyone scoring 1 mark, mainly for saying that plastic does not biodegrade. There were very few blanks – everyone had a view! It was clear that some candidates did not direct themselves to the question, and did not focus specifically on plastics or on landfill, by writing about landfill problems in general, such as noise, machinery or by advocating recycling as a better alternative. Others failed to answer the question by going off at a tangent about the effect of burning on plastic, giving toxic gases.

(ii) Poly(ethene) is used to make plastic carrier bags.
Many of these bags are put into landfill sites.

Explain why the presence of waste plastic in landfill sites causes problems.

(2)

They are litter and they take billions and billions off years to decompose the other way is to burn them but then all of the bad gasses will be released into the air

(Total for Question 4 = 10 marks)

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Examiner Comments

This answer has identified one relevant issue but has given much irrelevant material.

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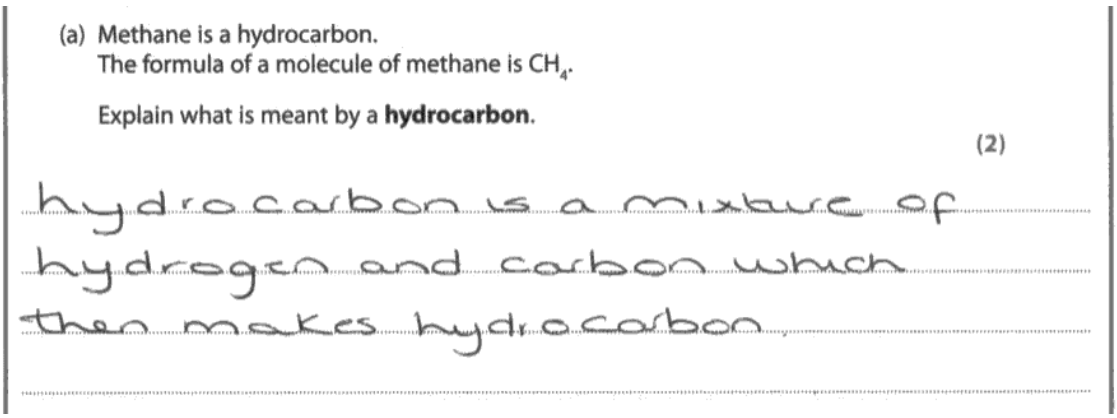
Examiner Tip

It's worth reading the question twice to check that you know what is being asked. Burning is not asked about in this question.

Question 5 (a)

Generally, candidates knew that hydrocarbons contained hydrogen and carbon. Unfortunately, it was often said to be a mixture, and only a limited number of candidates mentioned that a hydrocarbon consisted of hydrogen and carbon only (but a good number of these had clearly learnt the answer accurately as a definition). In general, it seemed that many candidates were not at all clear about the meaning of basic chemical terms such as atom, molecule, element, mixture and compound so were likely to lose marks through their misuse. One other common answer was "made of hydro and carbon".


(a) Methane is a hydrocarbon.
The formula of a molecule of methane is CH_4.

Explain what is meant by a **hydrocarbon**.

(2)

hydrocarbon is a mixture of hydrogen and carbon which then makes hydrocarbon

ResultsPlus
Examiner Comments

A common wrong answer.

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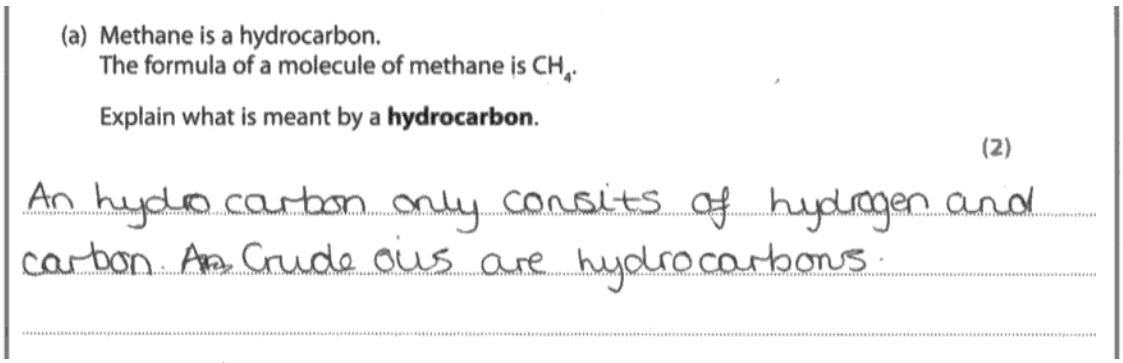
Examiner Tip

Understand the difference between mixtures and compounds - a molecule cannot be a mixture.


(a) Methane is a hydrocarbon.
The formula of a molecule of methane is CH_4.

Explain what is meant by a **hydrocarbon**.

(2)

An hydrocarbon only consits of hydrogen and carbon. ~~An~~ Crude oils are hydrocarbons.

ResultsPlus
Examiner Comments

The critical word 'only' is here.

(a) Methane is a hydrocarbon.
The formula of a molecule of methane is CH_4.

Explain what is meant by a **hydrocarbon**.

(2)

A hydrocarbon is a compound containing hydrogen and carbon atoms only.

ResultsPlus
Examiner Comments

The perfect answer.

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Examiner Tip

It is worth learning definitions like this.

Question 5 (e)

Many answers scored 1 or 2 marks as they knew the problems of carbon monoxide, but surprisingly fewer indicated problems with carbon dioxide (and less surprisingly any issues with carbon and water were largely ignored). It is important to note that a well-developed answer on either carbon oxide, with a relevant mention of the other, scored in the highest band.

Carbon monoxide

This was the best known. Some gave excellent answer stating the biological aspects of carbon monoxide's toxicity, how it prevents oxygen being circulated, with lots of reference to it being invisible and with no odour: the 'silent killer'.

Carbon dioxide

This was less commonly mentioned and not nearly as well understood. The idea that carbon dioxide is a greenhouse gas that causes global warming was mentioned, but the consequences of this were not well explained. There was much confusion with ozone depletion and formation of acid rain being caused by carbon dioxide.

Carbon

Some candidates mentioned that soot was produced, with some of these mentioning asthma.

Water

Fewer mentioned water. Those that did talked about condensation which damaged walls (reasonable) but also flooding which would lead to sea levels rising.

In general, many students just rewrote the stem of the question without explaining what the problems were, or giving meaningless vague answers in terms of pollution/ environmental problems. Others explained the difference in terms of oxygen causing the two types of combustion. Some answers referred to problems but did not state to which gas the problems were linked. Very few obtained full marks as they did not provide a detailed

enough description. Several examples of response are included below for discussion with students.

*(e) When hydrocarbon fuels burn in a plentiful supply of air they undergo complete combustion, forming carbon dioxide and water vapour.

If the air supply is limited incomplete combustion occurs and carbon monoxide and carbon may be formed.

Describe the problems that can be caused by these products of complete and incomplete combustion.

(6)

Complet combustion - the problem is that it Realses a greenhouse gas which is carbon dioxide which is absorbed by the Ozone layer worsening the green house effect.

In complete combustion - the problems are that it Releases carbon monoxide which is potentially fatal and ceban which is a black substance like soot formed when incomplete combustion has occured

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Examiner Comments

Three different issues mentioned (and the erroneous ozone layer reference) but not enough detail.

*(e) When hydrocarbon fuels burn in a plentiful supply of air they undergo complete combustion, forming carbon dioxide and water vapour.

If the air supply is limited incomplete combustion occurs and carbon monoxide and carbon may be formed.

Describe the problems that can be caused by these products of complete and incomplete combustion.

(6)

Carbon dioxide that is produced when coals burn is very very dangerous, with the excessive amount of coal used worldwide the carbon dioxide is very quickly polluting the atmosphere and therefore, speeding up the process of global warming. global warming

caused by carbon dioxide has the potential to eventualy melt the polar ice caps, However is air is in short supply Carbon Monoxide can be produced. Carbon monoxide is an extremely deadly gas that can kill asty inhailing, with no sound, smell or colour it is very deadly.

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Examiner Comments

Two problems mentioned here, but neither in enough detail to get full marks.

*(e) When hydrocarbon fuels burn in a plentiful supply of air they undergo complete combustion, forming carbon dioxide and water vapour.

If the air supply is limited incomplete combustion occurs and carbon monoxide and carbon may be formed.

Describe the problems that can be caused by these products of complete and incomplete combustion.

(6)

The problem that is cused when the air supply is limited and incomplete combustion occurs is carbon monoxide. Carbon monoxide is formed during incomplete combustion and is a deadly poisons gas. It stops your blood cells ability to carry oxygen around the body and practically suffocates you. A big problem with carbon monoxide is the fact that you can not see smell it.

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Examiner Comments

The answer only mentions carbon monoxide. However there is nearly enough for the middle mark band.

*(e) When hydrocarbon fuels burn in a plentiful supply of air they undergo complete combustion, forming carbon dioxide and water vapour.

If the air supply is limited incomplete combustion occurs and carbon monoxide and carbon may be formed.

Describe the problems that can be caused by these products of complete and incomplete combustion.

(6)

The problems occuring about complete combustion is alot of oxgyen is used up for it and it takes along time to do it and there is not enough oxygen to complete it. The problems with incomplete combustion is carbon monoxide is bad for the earths atmosphere so is carbon dioxide

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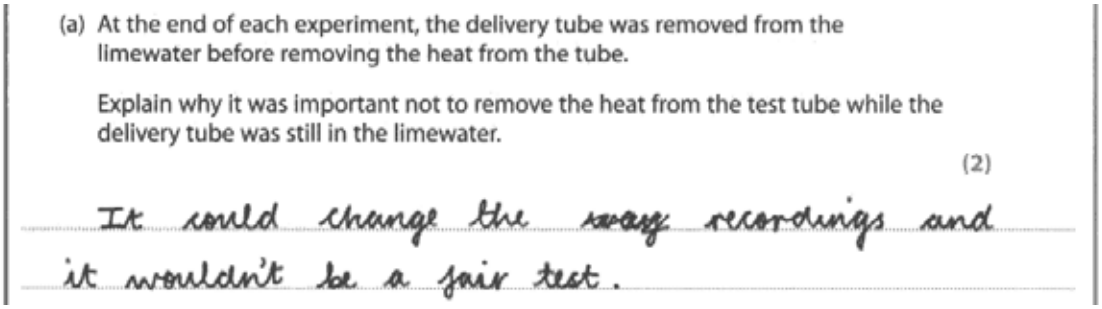
Examiner Comments

Nothing of credit here.

Question 6 (a)

Many candidates did not understand the problem here and the examiners wondered how many had seen this experiment. Very few referred to the test tube breaking because of suck back and many mentioned things exploding, but had no idea why they might explode. Other common wrong answers were that it wouldn't be a fair test, the results would be unreliable, you could burn yourself or the limewater will not react.



(a) At the end of each experiment, the delivery tube was removed from the limewater before removing the heat from the tube.

Explain why it was important not to remove the heat from the test tube while the delivery tube was still in the limewater.

(2)

It could change the ~~way~~ recordings and it wouldn't be a fair test.

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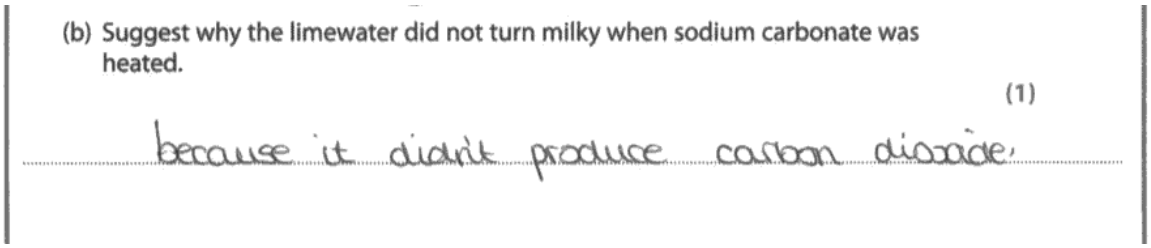
Examiner Comments

A common incorrect answer.

Question 6 (b)

Some candidates recognised that sodium carbonate does not react and/or that carbon dioxide was not produced, but many did not seem to know, or could not deduce, that sodium carbonate did not decompose at the temperature of the experiment.

A common wrong answer was that the sodium carbonate would not react with the limewater, indicating that they had no understanding of the purpose of the limewater in the experimental set up. Others included that sodium was unreactive or sodium carbonate does not contain carbon dioxide. Some did not distinguish between a metal and its compounds, so a lot of responses referred to sodium.



(b) Suggest why the limewater did not turn milky when sodium carbonate was heated.

(1)

because it didn't produce carbon dioxide.

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Examiner Comments

The answer shows understanding, but "it" should be avoided in answers.

(b) Suggest why the limewater did not turn milky when sodium carbonate was heated.

(1)

Because sodium took longer to decompose.

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Examiner Comments

Confusion here between sodium and sodium carbonate.

Question 6 (d)

Many equations had either carbon dioxide or calcium oxide as products (more commonly carbon dioxide) but not often both. It was a pity that some had both but gave additional product(s) or even reactants (typically oxygen). Incorrect products predictably included copper, carbon or oxygen.

Question 6 (e)

Many candidates were able to give various uses for limestone but only the more able could also give uses of calcium oxide and calcium hydroxide. There was a general recognition by some that all were bases and could neutralize acids but the actual 'use' was not usually stated e.g. in indigestion tablets or treating soil.

Calcium carbonate

Most made simple statements about the use of calcium carbonate in making cement, concrete, glass, and in construction.

Calcium oxide and calcium hydroxide

Those that did write about calcium oxide or calcium hydroxide did not know what they were used for.

Many students just repeated the question or misinterpreted the question (ignoring 'uses') and talked about the negative/positive effects of quarrying (destroys landscape/ provides jobs/ money to the local economy). In both extended writing questions, the quality of written communication was reasonably good – few marks were deducted.

*(e) Calcium carbonate occurs naturally as limestone, which is an important raw material.
Calcium carbonate has many uses and can be converted into calcium oxide and calcium hydroxide.

By describing uses of these three calcium compounds, explain why limestone is such an important raw material.

(6)

glass
cement

lime stone is such an important raw material because it can be used for many things such as: making cement for buildings and walls, making glass for windows in houses and buildings and lastly for construction. without limestone many things wouldnt be available to us today for example glass, cement and bricks.

ResultsPlus
Examiner Comments

The response covers limestone only.

*(e) Calcium carbonate occurs naturally as limestone, which is an important raw material.
Calcium carbonate has many uses and can be converted into calcium oxide and calcium hydroxide.

By describing uses of these three calcium compounds, explain why limestone is such an important raw material.

(6)

- limestone is an important raw material because it can make limestone buildings and houses.
- limestone can be heated and pressurised to turn into marble.
- limestone is a sedimentary rock.
- limestone is very strong and when heated it is very flexible.
- limestone is quarried out of the ground which provides new jobs.
- limestone is strong for building houses but it can be dissolved away by acid rain.

ResultsPlus
Examiner Comments

The response unfortunately does not have much detail related to the question - however, the bullet point format is a useful one.

Paper Summary

The best candidates had carefully leant definitions and tests. They read the questions carefully and used the information given. They had good knowledge of practical chemistry and could construct word equations. Based on their performance on this paper, candidates are offered the following advice:

- Write as clearly as you can - it is very difficult to read some scripts.
- Explain carefully your answers using scientific words. Do not say 'it' - explain what you are referring to.
- Practise word equations, and do not mix in formulae.
- Go over key experiments - many are listed in the specification.
- Learn definitions carefully.
- Learn all of the tests carefully.

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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