

Examiners' Report  
June 2013

GCSE Chemistry 5CH1H 01

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## Introduction

The unit is assessed through a one hour, 60 mark, written examination containing a mixture of question styles, including objective questions, short answer questions and extended writing questions. The quality of the candidates' written communication is assessed in the extended writing questions.

Some excellent answers were seen from the more successful candidates. It seems that candidates that have used past papers to revise have become more proficient at answering the long answer question and this style of examination paper in general. Candidates are becoming better at writing balanced equations, however, recall of the formulae of common compounds and balancing harder equations is still an issue that needs to be addressed.

Less successful candidates:

- used generalizations without explanation e.g. environmentally friendly, carbon neutral, pollution etc,
- could not write balanced chemical equations,
- showed confusion in language e.g. clear instead of colourless, spare bonds instead of double bonds,
- did not fully attempt the extended writing questions e.g. explained the formation of limestone and marble but did not attempt to describe the formation of granite or wrote a comprehensive account of the advantages of bio-methane but gave no disadvantages.

## Question 1a

Candidates seem to have a good understanding of what is meant by electrolysis. The majority of candidates knew that it is a process that requires electricity and some knew that a d.c. supply was used. However many candidates are still stating that it is the process of separating compounds, which is not sufficient as a response and does not score the second marking point.

Electrolysis is the decomposition of a compound into its constituent element using direct current electricity



**ResultsPlus**  
Examiner Comments

A perfect answer including the decomposition of a compound and using direct current.

The Separating of a compound using electricity



**ResultsPlus**  
Examiner Comments

Many candidates are still stating that it is the process of separating compounds, which is not sufficient as a response and does not score the first marking point.



**ResultsPlus**  
Examiner Tip

When thinking about electrolysis remember  
*electro* – electricity  
*lysis* – splitting.

## Question 1aii

This question was answered well by the majority of candidates with most being able to state that litmus paper bleaches. Although many candidates are not stating that the litmus is blue and that it is best when damp, marks were not lost for omitting these details.

It will turn damp litmus paper red,  
then bleach white.



**ResultsPlus**

**Examiner Comments**

Whilst this candidate has not stated to use blue litmus the first marking point is still scored for litmus, they then state that the litmus turns red and is then bleached, so is awarded full marks overall.

~~It~~ If damp blue litmus paper turns red and then bleaches white it shows chlorine is present.



**ResultsPlus**

**Examiner Comments**

A perfect answer, fully describing how damp blue litmus paper turns red then is bleached white.

using a damp litmus paper should  
change colour



**ResultsPlus**

**Examiner Comments**

This candidate knows that damp litmus should be used so gains the first marking point. However, they have then not given sufficient detail of the colour change to be able to gain the second marking point.



**ResultsPlus**

**Examiner Tip**

If a colour change is occurring that you need to describe, always give the starting colour and the end colour of whatever substance is used.

### Question 1a iii

Candidates found this question very difficult and only the best candidates scored the mark here.

Chlorine



**ResultsPlus**

**Examiner Comments**

This candidate has not given the complete name of the compound, just the name of one of the atoms that is present.

polyethane



**ResultsPlus**

**Examiner Comments**

This candidate has recognised that a polymer is present but has not given the correct name of the compound.



**ResultsPlus**

**Examiner Tip**

When naming a compound ensure that all parts of the structure are accounted for

*poly* – to show that it is a polymer

*chloro* – it contains chlorine

*eth* – from ethene

*ene* – as it formed a polymer from its double bond.

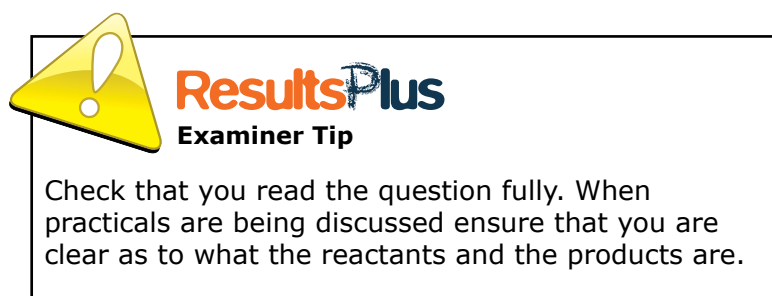
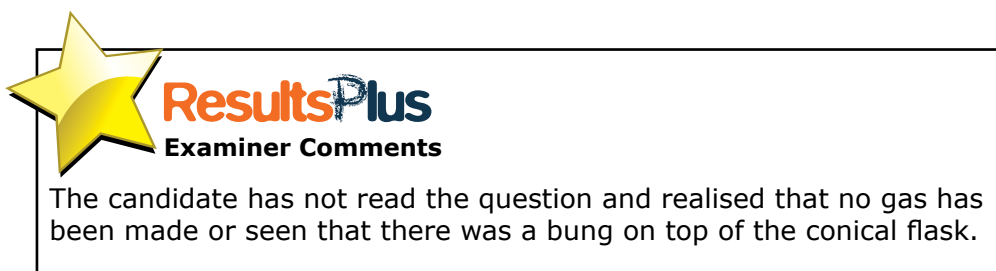
## Question 1bii

Many candidates did not score here. Candidates that did not get the mark, did so as they thought that a gas was produced and so the mass decreased. They did not read the question fully and did not take on board that no gases were produced in the reaction and that a bung was in the top of the apparatus. There was also evidence of some fundamental misunderstandings such as the magnesium oxide condensing or water vapour being produced, condensed and therefore increasing the water level.

It will stay the same

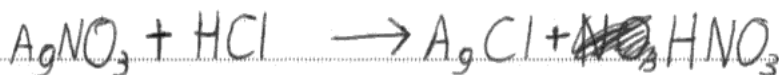


would be lighter because some is now a gas.



### Question 1biii

Candidates showed that they could write equations and many scored here. However candidates that had not learnt the formulae of the common laboratory acids did not score here.



**ResultsPlus**  
Examiner Comments

Fine, 2 marks awarded.



**ResultsPlus**  
Examiner Comments

Whilst the reactants side of the equation was correct for one mark, this candidate could not recall the formulae of nitric acid, the only other product in the reaction.



**ResultsPlus**  
Examiner Tip

It is important that candidates can recall the formulae of common laboratory compounds used in the specification such as hydrochloric acid and nitric acid.



## Question 2a

It was clear that many candidates had not performed this experiment as very few could state how they could successfully prevent suck-back occurring. Many candidates thought that removing the test tube as soon as it was full, altering the angle of the delivery tube or replacing the delivery tube with a longer version would prevent the suck-back.

you should take the delivery tube out before you stop heating. This will prevent it.



**ResultsPlus**  
Examiner Comments

A good answer, which was rarely seen.

Put a bung in the test tube.



**ResultsPlus**  
Examiner Comments

Many candidates did not know what to do and so guessed.

block off the delivery tube as soon as the experiment is complete.



**ResultsPlus**  
Examiner Comments

Again, here the candidate has attempted to think of a solution but sadly unsuccessfully.

## Question 2c

The majority of candidates could correctly identify what is meant by the term unsaturated. Many candidates are still using the term 'spare bonds', which is insufficient to gain credit.

Unsaturated means the hydrocarbons aren't completely bonded.



**ResultsPlus**  
Examiner Comments

Not completely bonded is insufficient to gain credit.

they have double bonds



**ResultsPlus**  
Examiner Comments

Fine for one mark.

It has spare bonds.



**ResultsPlus**  
Examiner Comments

Spare bonds is not an acceptable alternative to double bonds, sadly many candidates responded using this term only and did not get the mark.



**ResultsPlus**  
Examiner Tip

When stating what is meant by specific terms, ensure that correct scientific terminology is used rather than terms used to help teach or remember concepts.

## Question 2d

Many candidates scored well on this question, however some candidates lost marks due to their poor examination technique. It is important in questions like this when you are distinguishing between two tests that detail is given. For example candidates that state the one goes colourless and one changes colour, will not gain any marks as they are not making it clear which does what and are therefore are not answering the question.

the bromine water would turn clear when propene is added. when propane is bubbled through, the bromine water will stay orange.



### ResultsPlus Examiner Comments

This candidate scores two marks for the colour of bromine water and the fact that it remains orange when mixed with propane. Clear is not the same as colourless so the candidate has not scored the third marking point for what would be seen when bromine water is mixed with propene.

when testing propene you would see no colour change in the bromine water, but with propane a ~~small~~ colour change would occur due to the double bonds.



### ResultsPlus Examiner Comments

This response gains no marks, it does not state what colour the bromine water was seen to be at the beginning of the experiment nor does it state which colours either of the samples would go when mixed with the bromine water.



### ResultsPlus Examiner Tip

When asked for what is **seen** ensure that the answer states what is **seen**. Answers that relate to what reactions are happening such as the double bonds break will not answer the question and will therefore not gain credit.

When the propane is bubbled through bromine water the bromine water will stay its original color, orange whereas when propene is passed through the bromine water the water will go colorless.



### ResultsPlus Examiner Comments

A good answer scoring all three marks.

## Question 2e

Candidates performed well in this question, many were able to state that there is a shortage of short chain fractions and that the process helps meet the demand.

Cracking is important because cracking can break down less useful long hydrocarbon chain molecule to into a more useful small hydrocarbon chain molecule. also which has more demand.



**ResultsPlus**  
Examiner Comments

A good answer which scores full marks.

It is important because the molecules ~~are~~ need to be different sizes so they can be separated to be used in different things.



**ResultsPlus**  
Examiner Comments

Not enough detail in any of this to be able to give any credit.

### Question 3a ii

Candidates performed well in this question, with many giving good descriptions of more than one process which have caused the percentage of carbon dioxide to decrease. Many stating dissolution of carbon dioxide into the oceans and the increase of plants which removed carbon dioxide.

When oceans formed carbon dioxide was absorbed into the oceans. Also marine organisms took in  $\text{CO}_2$  for ~~respiration~~ and green plants formed and converted  $\text{CO}_2$  into  $\text{O}_2$



**ResultsPlus**

**Examiner Comments**

A very good answer, which explains more than one process that has caused the percentage of carbon dioxide to decrease.

### Question 3a iii

Candidates did not perform so well in this question, many gave quite vague answers and a large proportion were confused between processes and stated that these gases were involved in the ozone layer.

These gases trap in the rays that the sun transmits and they get trapped in like like a greenhouse



**ResultsPlus**

**Examiner Comments**

The question asks about how the gases keep the Earth warm, this answer does not relate to the heat provided by the sun, just rays which is insufficient to get the mark.

They get stuck in the ozone layer



**ResultsPlus**

**Examiner Comments**

Many candidates incorrectly referred to the ozone layer and scored no marks.

### Question 3b

In general candidates performed well in this question. However many lost marks as they referred to a blown out splint instead of a glowing splint. A 'blown out' splint would not relight.

Put a glowing splint in the top of the test tube. If oxygen is present it will relight.



**ResultsPlus**  
Examiner Comments

A good answer.

blow out a lighted splint and place it into a test tube if it relights then there is oxygen



**ResultsPlus**  
Examiner Comments

This is an example of a very common mistake, the candidate has stated that the splint has been blown out, if the splint has been blown out, it will not relight if it was placed in a test tube of oxygen and so the whole response gains no credit.



**ResultsPlus**  
Examiner Tip

Scientific terms are important, ensure the correct terms are used as using less scientific terms can lead to answers that are inadequate as the science behind them would no longer be correct.

### Question 3ci

Candidates did not perform well in this question, many just re-stated the question. They simply stated that the magnesium reacts with oxygen to form magnesium oxide. There was also evidence of some fundamental misunderstandings such as the magnesium oxide condensing or water vapour being produced, condensed and therefore increasing the water level.

Oxygen in the bell jar had reacted with the magnesium. This removed the oxygen from the bell jar and left space. The water rose to fill this space as it was pulled up. as it was pulled up.



#### ResultsPlus Examiner Comments

A rare correct answer, although the first part restates some of the question, it goes on to gain both marks for the removal of oxygen and the water rising to fill the space.



#### ResultsPlus Examiner Tip

Ensure that when answering the question, the answer does not just restate information that is given in the question, as anything given in the question will not be given credit in the answer.

The water that had been evaporated from the magnesium ribbon had condensed to produce water.



#### ResultsPlus Examiner Comments

Many candidates thought that water was produced from the reaction and so the water level rose as there was more water present in the bell jar.

### Question 3cii

This question was generally well answered.

~~10000 cm<sup>3</sup>~~ 21 = 979      100 - 21 = 79

10000 - 79 = 9921 cm<sup>3</sup>

volume of gas = 921 cm<sup>3</sup>



#### ResultsPlus Examiner Comments

This candidate has correctly calculated the remaining gases present, but then could not complete the next step so just scored the first marking point.



#### ResultsPlus Examiner Tip

Ensure that when answering calculation questions all your working is given.

Marks are awarded for chemistry not for using the calculator so if the working is correct but it written down incorrectly by mistake then credit can still be awarded.

### Question 3d

This question was generally well answered, with many candidates being able to give the name of the salt formed as magnesium sulphate.



## Question 4a

Many candidates did well in this question. However, those candidates that did not do well failed to use the information in the table to answer the question and did not make a comparison between the metals and so did not answer the question.

the cost of tin is more ~~expensive~~ expensive than aluminium or ~~steel~~ steel.

reason 2

tin is rarer to find than aluminium or steel.



**ResultsPlus**

**Examiner Comments**

A good response which uses the table and compares the materials stated in the table.

reason 1

It is easy to recycle as it is ~~less~~ <sup>less</sup> reactive.

reason 2

It is easy to get ~~now~~ <sup>now</sup> need little ~~of~~ now



**ResultsPlus**

**Examiner Comments**

This response has not used information from the table as asked to by the question.



**ResultsPlus**

**Examiner Tip**

When asked to use information from a table, it is important the information is used to help answer the question.

### Question 4ci

Many candidates knew that an alloy should contain a mixture of atoms rather than a compound, however many also stated that the mixture was of a metals and non-metals.

mixing two metals together to create a stronger material with better/more uses, ~~metals~~



**ResultsPlus**  
Examiner Comments

This answer gains full credit as they have the idea of mixing metals.

an alloy is a mixture of two or more metals or one metal with a non-metal.



**ResultsPlus**  
Examiner Comments

If this response had finished after the word metals, it would have scored 2 marks. However, it then goes on to state 'or one metal with a non-metal' which is not creditworthy.



**ResultsPlus**  
Examiner Tip

If you are not sure of an answer, never give a right and a wrong answer as the wrong answer will cancel out the right one and you will always get zero marks.

### Question 4cii

Candidates performed well on this question and could give a concise and detailed account as to why the alloy of magnalium is stronger than pure aluminum.

Aluminium is a pure metal, ~~##~~ all the atoms are the same size and fit together ~~easily~~, therefore they can slide over each other easily. Magnalium is an alloy. All the atoms are of different sizes and don't fit next to one another exactly, they can not slide over each other easily, making it harder to move them. This means Magnalium is stronger.

(Total for Question 4 = 8 marks)



**ResultsPlus**  
Examiner Comments

A very good answer which scores three marks.

### Question 5a

The majority of candidates knew that calcium carbonate could be used to treat acidic gases produced by power stations. Many candidates then went on to describe the problems of acid rain which this question did not ask for and so scored no further credit.

Because Calcium carbonate neutralises waste gases produced so they are less harmful.



**ResultsPlus**  
Examiner Comments

Just one marked scored for neutralising waste gases. Nothing further on the gases or the process has been explained so no further marks.

Calcium carbon can neutralise acids. Sulfur dioxide is produced in coal-fired power stations and is acidic.

$\text{CaCO}_3$



**ResultsPlus**  
Examiner Comments

A good answer which states that the acids are neutralised. The response then goes on to clarify what the acids are. This scores full marks.

### Question 5b

This question was generally well answered, although there were many occasions where candidates lost marks as they were careless when writing the formula.



**ResultsPlus**  
Examiner Comments

Fine for 2 marks.

## Question 5d

Many candidates scored well on this question, being able to give detailed and thorough accounts of the formation of each rock type. The best candidates applied their knowledge to the diagram, explaining how the marble had been formed in the middle of the limestone and granite. When candidates did lose marks, it was often as they have confused marble with granite.

limestone is formed when sediment and dead matter build up over time. The layers are put under extreme pressure by the weight of ~~rock~~ sediment above it and over millions of years the pressure pushes out all the liquid forming <sup>a solid</sup> rock. Marble is formed when a volcanic eruption occurs. The molten lava cools down <sup>one on the ground</sup> to form rock ~~or~~ there are two types of metamorphic rock: extrusive and intrusive. Granite is formed when rocks mix together with other substances and the ~~is~~ heat <sup>and pressure</sup> cause it to form solid rock.

(Total for Question 5 = 12 marks)



**ResultsPlus**

Examiner Comments

Whilst this candidate has a good understanding of the formation of sedimentary rock, the ideas about metamorphic and igneous are confused, so scored level 1 only.

The top layer of sedimentary rock was formed when water in a stream or river brought small rocks and they compacted together creating a sediment, the weight of the sediments compacted the rocks and they stayed together through cementation. Metamorphic rock is formed when another type of rock comes under great heat and pressure manipulating the rock. Marble before being manipulated by heat was limestone.

Igneous rock is formed from magma that is cooling. Magma that cools under the ground has large crystals because it cools slowly whereas magma that cools above the ground has small crystals because it cools quickly.

(Total for Question 5 = 12 marks)

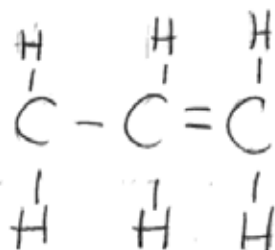


**ResultsPlus**  
Examiner Comments

A very good level 3 response which clearly describes the formation of limestone, marble and granite.

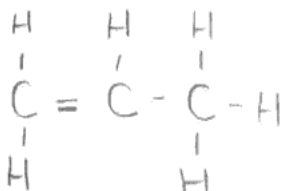
## Question 6b

Many candidates could correctly draw the carbon backbone of propene, including the correct number of carbons and the double bond for 1 mark but then lost the second mark as they did not add the correct number hydrogens to each carbon.



**ResultsPlus**  
Examiner Comments

This response gained one mark for the correct carbon backbone, but did not score the second marking point as the number of hydrogens on the second carbon is incorrect.

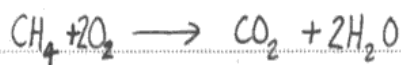


**ResultsPlus**  
Examiner Comments

Fine for 2 marks.

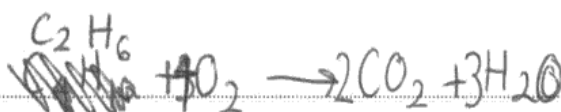
### Question 6c

Many candidates lost out here as they did not know the formula of methane, with many writing it as Me. Many candidates gained one mark for the correct formula of carbon dioxide and water, however only the very best candidates were able to score full marks for writing the complete balanced equation successfully.



**ResultsPlus**  
Examiner Comments

Perfect for 3 marks, reactants (1), products (1) balancing (1).



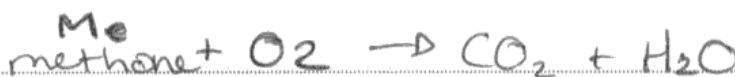
(3)

C	O	H	C	O	H
<del>2</del>	<del>2</del>	<del>6</del>	2	<del>2</del>	<del>6</del>
2	8	6	2	8	6



**ResultsPlus**  
Examiner Comments

Just one mark here for the correct formulae for the products.



**ResultsPlus**  
Examiner Comments

Just one mark here, for the formulae of the products.



**ResultsPlus**  
Examiner Tip

It is important that the formulae of the common compounds in the unit are learnt.



## Question 6d

Candidates performed well on this extended writing question, most gave a good set of advantages and disadvantages of using bio-methane over natural gas as a form of energy. Candidates are still showing the misconception that bio-methane does not produce any carbon dioxide when it is burnt.

Advantage: it is a renewable resource.

it is fairly cheap to produce.

• Better overall for the environment.

• Provides more jobs.

• Less money will be needed to make things

such as oil rigs and tankers.

Disadvantage: Many animals used for making bio-methane

such as cows are responsible for

a lot of global warming.

• Not very efficient.

• Larger areas of land needed.

• Food will need to be provided for animals.

• Less jobs will be needed.

(Total for Question 6 = 12 marks)



**ResultsPlus**

Examiner Comments

A level 2 answer, although many advantages and disadvantages have been given, many are not relevant to this question and so are not given credit.

Bio-methane is a bio-fuel meaning it is a fuel made from living organisms. This doesn't release as much ~~CO<sub>2</sub>~~ carbon dioxide as fossil fuels. It doesn't increase pollution in the atmosphere. The space for growing crops would be taken up for fermentation to make bio-fuels.

Disadvantages are that it may need



release ~~the~~ carbon dioxide to produce it when extracting and electricity. Not all cars can use biomethane meaning they would have to change the mechanics of cars releasing carbon dioxide. <sup>in the making</sup> Not much sufficient energy is being released.

(Total for Question 6 = 12 marks)



## ResultsPlus Examiner Comments

A level 1 answer, whilst some ideas are creditworthy, such as the space for growing crops is taken up, much of the answer has incorrect or irrelevant ideas.

Bio-methane, being produced by plants has the extremely important advantage of being renewable, it can be replaced. Natural gas took millions of years to form and so is non-renewable. The other truly large advantage of bio-methane is its carbon neutrality, that is that it photosynthesises and takes in carbon dioxide ~~in~~ as a plant, then releases it again upon complete combustion, so overall, it has not released any additional carbon dioxide and thus ~~does~~ does not contribute to global warming. However, due to the fermentation and transportation involved in the creation of bio-methane, some may argue it is not entirely carbon neutral. The other main disadvantage of bio-methane is that it needs growing space, which can increase demand for space and competition for space with food crops, natural gas doesn't need

(Total for Question 6 = 12 marks)

growing space, so using this would not <sup>cause food scarcity</sup>

TOTAL FOR PAPER = 60 MARKS

I conclude that due to its renewability and (almost) carbon neutrality, bio-methane is the superior fuel and must play a role in fuel eventually

as supplies of natural gas are limited and  
are running out. So ~~that~~ bio-methane must be  
used despite its requirements for space.



**ResultsPlus**

**Examiner Comments**

A level 3 answer with lots of advantages and disadvantages of using bio-methane rather than natural gas as a source of energy.

## Paper Summary

On the basis of their performance on this paper. In order to improve their performance, candidates should:

- Learn to write and balance equations, using correct symbols for the elements and compounds found within the specification.
- Learn the correct formulae of common compounds in the specification such as common acids, methane and calcium carbonate.
- Learn the tests for common gases such as oxygen.
- Revise the core practicals carried out during the course.
- Avoid vague terms such as environmentally friendly.

## **Grade Boundaries**

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

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