

Examiners' Report
March 2012

GCSE Chemistry 5CH1F 01

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March 2012

Publications Code UG031172

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Introduction

This was the second examination for this unit for the new specification following the first one in November 2011. The paper contained good opportunities for candidates to express their knowledge with questions of varying difficulty and accessibility. There were good quality answers to many of the questions although candidates would benefit from being more specific in their answers to questions involving the environment, recycling and pollution. It was very pleasing to see so many candidates make very good responses to the first of the six mark questions concerning fuels but the electrolysis question proved much less familiar to candidates and hence the marks were much lower.

Question 1 (b)

Generally well answered with over half of the candidates gaining full marks.

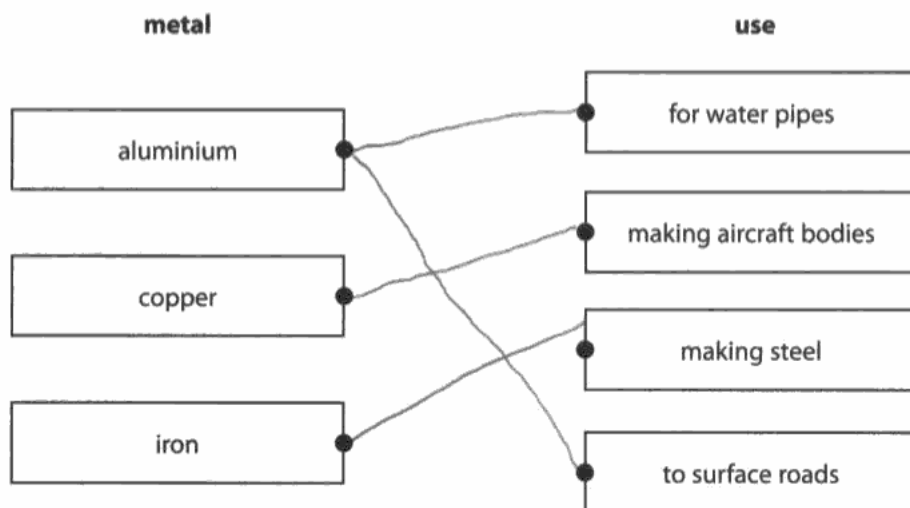
(b) Aluminium, copper and iron are metals.

Aluminium has a low density, copper is very unreactive and iron is strong when alloyed.

These metals have many uses.

Draw **one** straight line from each metal to a use of the metal.

(3)



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Examiner Comments

Some candidates did not just draw one line as asked in the question.



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Examiner Tip

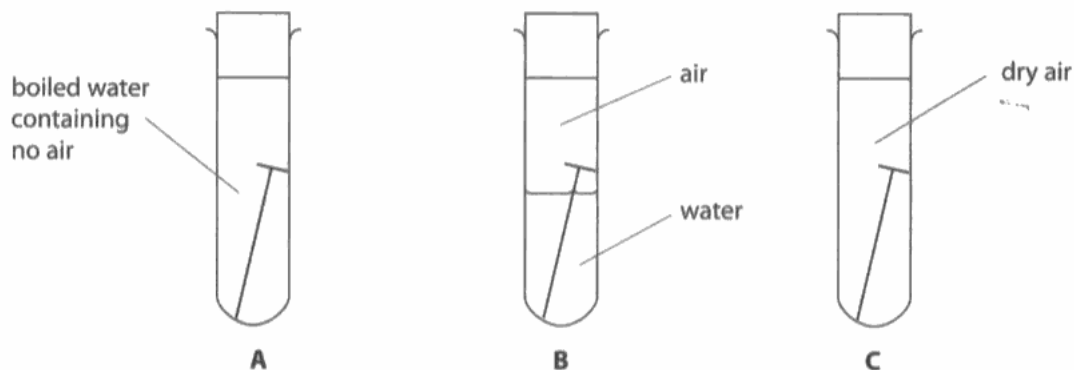
Candidates should follow instructions by drawing one line. Even if one of the two lines from aluminium had been correct no marks would have been awarded.

Question 1 (c)

This question concerned interpreting and explaining conditions needed for rusting.

(c) An experiment was carried out to investigate the conditions necessary for iron to corrode.

Three test tubes, A, B and C, had identical iron nails placed in them as shown.



After two weeks,

- the nail in tube A had not rusted
- the nail in tube B had rusted
- the nail in tube C had not rusted.

Explain why the iron nail in test tube B rusted and the iron nails in test tubes A and C did not.

(2)

Be The iron nail rusted in tube B because the iron reacted with oxygen which is called ~~oxidation~~ and water however the test tube A ~~it~~ does not have any air and test tube C did not have water and it is ~~it~~ only dry

(d) Scrap iron can be recycled air.

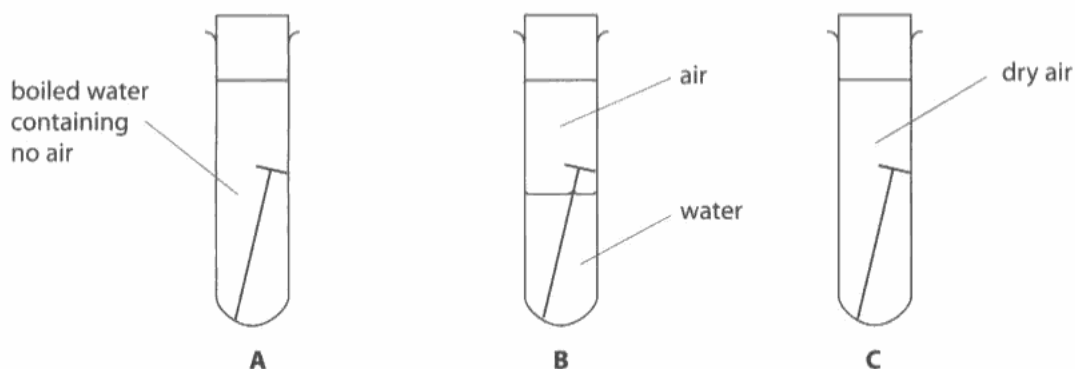


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Examiner Comments

A good response gaining both marks.

(c) An experiment was carried out to investigate the conditions necessary for iron to corrode.

Three test tubes, A, B and C, had identical iron nails placed in them as shown.



After two weeks,

- the nail in tube A had not rusted
- the nail in tube B had rusted
- the nail in tube C had not rusted.

Explain why the iron nail in test tube B rusted and the iron nails in test tubes A and C did not.

Because ~~of~~ nail B had ~~air~~ (2)
trapped in the tube so the
iron had ~~extra~~ addition of air (oxidation)
which then reacts with the iron
causing a reaction



ResultsPlus Examiner Comments

Significant numbers thought only air or oxygen was required. Others gained the first mark and then stopped. Some candidates thought that both A and C had no air or no water. This example scored no marks.

Question 1 (d)

(d) Scrap iron can be recycled.

Explain an advantage of recycling scrap iron rather than extracting iron from iron compounds found in the Earth.

(2)

It is an advantage as you are saving energy because extracting the iron will use more energy.



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Examiner Comments

Answers that gained marks usually referred to energy saving or reducing landfill. However there were many vague answers given. Often candidates gave generic answers such as "cheaper", "better for the environment", "saves on pollution", "saves iron", "saves time" etc. Another common answer which did not gain credit was about using the iron to make other things.

This example scored one mark for the idea of saving energy.



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Examiner Tip

Candidates need to be more specific and ensure they refer to the situation given in the question and not just give generalised answers.

(d) Scrap iron can be recycled.

Explain an advantage of recycling scrap iron rather than extracting iron from iron compounds found in the Earth.

(2)

The advantage are recycling the scrap iron it can be reused to make something else, its better for the environment, extracting iron from iron compounds can waste it



ResultsPlus
Examiner Comments

This answer was too vague.

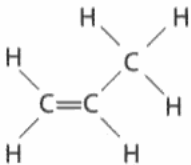
Question 2 (a) (i)

This was expected to be a fairly straightforward question about recognising chemical symbols and many found it as such.

Hydrocarbons

2 (a) Propene is a hydrocarbon.

The diagram shows the structure of a molecule of propene.



(i) Give the names of the **two** elements combined together in propene. (2)

polyene.



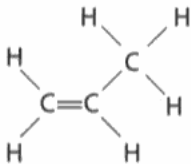
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Examiner Comments

However some did not understand what was being asked and a variety of answers were seen.

Hydrocarbons

2 (a) Propene is a hydrocarbon.

The diagram shows the structure of a molecule of propene.



(i) Give the names of the **two** elements combined together in propene. (2)

Hydrocarbon and carbon dioxide



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Examiner Comments

An example of another unexpected but not uncommon answer.

Question 2 (a) (ii)

- (ii) Propene is an alkene.
Alkenes are unsaturated.

State what you would **see** when orange bromine water is shaken with propene.

(1)

It changes colour



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Examiner Comments

The majority of candidates did not gain the mark. The most common errors included the expected "clear" instead of colourless but there were also vague answers referring to change in colour or "went cloudy".

Question 2 (b) (ii)

(ii) Describe what is meant by the term **polymer**. (2)

Polymer is an hydrocarbon ⁽²⁾
~~alkane~~
you can make lots of stuff
with this eg Poly ethene ~~poly~~ is
plastic bags.



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Examiner Comments

A lot of answers related to plastics and what you can make from them. Others realised that a polymer was a multiple of something but were not able to say what. Answers like "polymer is a large plastic, a polymer is made from hydrocarbons, a polymer contains hydrogen and carbon" were all common. Others confused polymers with cracking.

(ii) Describe what is meant by the term **polymer**. (2)

a ~~group~~ polymer is a group of joined
together monomers. And it has more
than one molecule.



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Examiner Comments

This was worth two marks.

(ii) Describe what is meant by the term **polymer**. (2)

Polymer is when there is lots of the
same compound. So if it was poly(propene)
it would be lots of propene molecules joined
together.



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Examiner Comments

Credit given for named alkenes being used.

Question 2 (b) (iii)

(iii) Many items made from polymers have a symbol like this.



This symbol shows that the polymer can be recycled.

Explain why it is an advantage to recycle polymers.

(2)

If you burn polymer they would give a toxic gas. If you bury polymers they would still be there after a few years but you can recycle

(Total for Question 2 = 8 marks)

this and make things out this can be good for the environment.



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Examiner Comments

Many candidates did not use a link in their explanations but just gave two separate points which did not constitute an explanation. Typical examples were often similar in approach to the earlier question on recycling iron. Candidates were giving generic answers such as 'cheaper', 'less pollution' used to make other things etc. Few candidates seemed to acknowledge in their answers that the raw material for many types of plastic is crude oil which is a finite resource. The idea of plastic going into landfill was where many candidates were able to gain a mark although there were a number of candidates who stated that all/most polymers are biodegradable. A number of candidates made reference to polymers placed in waste sites producing toxic or poisonous gases (or carbon dioxide) and made no reference to incineration or burning. However some good answers did make the necessary connection.

(iii) Many items made from polymers have a symbol like this.



This symbol shows that the polymer can be recycled.

Explain why it is an advantage to recycle polymers.

(2)

recycling polymers would mean less waste, it can be used for products, won't contain pollution, to the atmosphere.



ResultsPlus
Examiner Comments

This answer was too vague.

(iii) Many items made from polymers have a symbol like this.



This symbol shows that the polymer can be recycled.

Explain why it is an advantage to recycle polymers.

(2)

An advantage of recycling polymers is that you can re-use them. It also is good for the atmosphere because polymers are biodegradable which means they do not rot away.



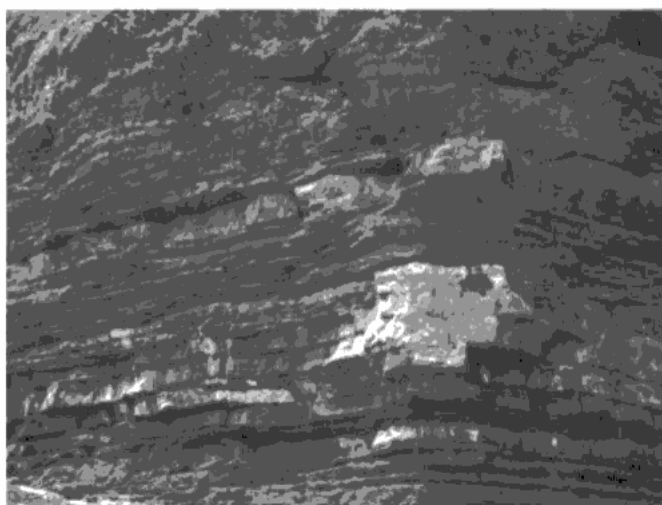
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Examiner Comments

A fairly common example of confusion/contradiction about the term biodegradable.

Question 3 (a)

Carbonates

3 The photograph shows a sedimentary rock.



(a) State what evidence in the photograph shows that the rock is a sedimentary rock.

(1)

It is shown by the different colours that
are in the rock



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Examiner Comments

The majority correctly identified layers or layering but some thought they could see fossils and others thought the lighter-coloured areas were significant.

Question 3 (c) (i)

(c) When metal carbonates are heated some of them decompose giving carbon dioxide.

In an experiment to investigate how fast three metal carbonates decompose, equal masses of the carbonates are heated.

The table shows the changes observed and the time for carbon dioxide to be detected.

	changes observed	time for carbon dioxide to be detected / s
calcium carbonate	none	none detected
zinc carbonate	white powder turns yellow when hot	236
copper carbonate	green powder turns black	40

(i) Explain what evidence in the table shows that a chemical reaction occurs when copper carbonate is heated.

(2)

A chemical reaction is when you do a test a something changes with the copper carbonate. It turned black which is a reaction.



ResultsPlus
Examiner Comments

The majority just referred to the colour change and so gained one mark.

(c) When metal carbonates are heated some of them decompose giving carbon dioxide.

In an experiment to investigate how fast three metal carbonates decompose, equal masses of the carbonates are heated.

The table shows the changes observed and the time for carbon dioxide to be detected.

	changes observed	time for carbon dioxide to be detected / s
calcium carbonate	none	none detected
zinc carbonate	white powder turns yellow when hot	236
copper carbonate	green powder turns black	40

(i) Explain what evidence in the table shows that a chemical reaction occurs when copper carbonate is heated.

(2)

Evidence that shows it are the change in colour (green powder turns black) and carbon dioxide was detected (40s).



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Examiner Comments

The best candidates also mentioned the carbon dioxide being produced.

Question 3 (c) (ii)

(ii) Use the information in the table to explain which of the carbonates is the easiest to decompose.

(2)

I think it is calcium carbonate because it doesn't release any carbon dioxide into the air when heated.



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Examiner Comments

Some candidates gave the wrong carbonate.

(ii) Use the information in the table to explain which of the carbonates is the easiest to decompose.

(2)

Copper carbonate is the easiest to decompose because it doesn't require ~~the~~ as much heat as the other carbonates. ~~And it takes~~ ^{we know this} because it takes less time for the CO₂ to be detected.



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Examiner Comments

There were also many good answers, as illustrated by this example.

Question 3 (c) (iii)

(iii) Describe an experiment in which copper carbonate is heated and the gas evolved is tested to show that the gas is carbon dioxide.

(3)

An experiment you could do is you would have two syringes but they can't have a gap because the test would be unfair. You would need an bunsen burner but in the middle of both syringes would be copper then you would see how long it would take the ^{copper} oxygen to react with the oxygen then you see how much carbon dioxide is left.

(Total for Question 3 = 10 marks)



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Examiner Comments

Significant numbers confused it with the copper syringe experiment.

(iii) Describe an experiment in which copper carbonate is heated and the gas evolved is tested to show that the gas is carbon dioxide.

(3)

A test you could do is put the carbonate in a boiling tube. Seal it off with a rubber bung. And connect a pipe which connects to limewater in a test tube. Heat the carbonate with a bunsen burner and if the limewater turns milky/cloudy then that means it contains carbon dioxide.



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Examiner Comments

Many candidates knew that carbon dioxide turns limewater milky but not so many could describe an experiment, so they just wrote heat the copper carbonate and didn't state that it should be in a test tube, or they didn't describe how to pass the gas through limewater. There are still many candidates who test for carbon dioxide with a lighted splint.

However there were some very good answers.

Question 4 (b)

(b) State what produced the gases in the Earth's early atmosphere.

Cars and plains started producing other gases into the ⁽¹⁾ earth ~~air~~



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Examiner Comments

The majority correctly identified volcanoes but some candidates gave other suggestions.

(b) State what produced the gases in the Earth's early atmosphere.

chlorine

(1)



ResultsPlus

Examiner Comments

Another unexpected answer.

Question 4 (c)

(c) Describe how carbon dioxide from the atmosphere becomes calcium carbonate in rocks.

(2)

Carbon dioxide reacts with the rocks as they form. ~~to~~
produce Calcium carbonate is produced.



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Examiner Comments

This was found to be a challenging question, with few candidates scoring full marks. Many suggested carbon dioxide reacts with, or is absorbed by rocks, or gets trapped in between rocks. A few correctly suggested it dissolves in the water or mentioned shells.

(c) Describe how carbon dioxide from the atmosphere becomes calcium carbonate in rocks.

(2)

The Calcium Carbonate has carbon dioxide
in it because the sea dissolves the
Carbon dioxide which gets into the sediments
which forms sedimentary rock which forms limestone with
Calcium Carbonate.



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Examiner Comments

One of the better answers.

Question 4 (d)

(d) When primitive plants appeared on Earth, the amount of oxygen in the atmosphere changed.

Explain why.

(2) ^{of}
Plants gave out oxygen and took
carbon dioxide by photosynthesis this
is why the atmosphere changed.



ResultsPlus
Examiner Comments

Some good answers.

(d) When primitive plants appeared on Earth, the amount of oxygen in the atmosphere changed. ^{carbonate}

Explain why.

(2)
As the plants increased so did
the oxygen as plants take in
carbon dioxide but let out
oxygen.

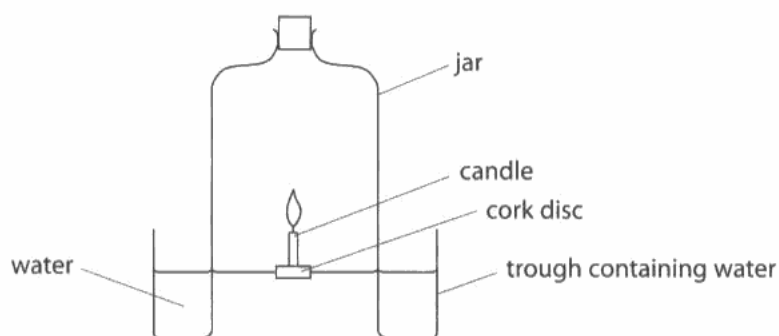


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Examiner Comments

Full marks could be gained without stating "photosynthesis".

Question 4 (e)

- (e) The diagram shows a candle floating in a trough of water. A jar was placed over the candle after the candle was lit.



After the candle flame went out, the apparatus was left to cool to room temperature.

Explain how the water level inside the jar at the end of the experiment will have changed compared with the water level inside the jar at the start of the experiment.

(3)

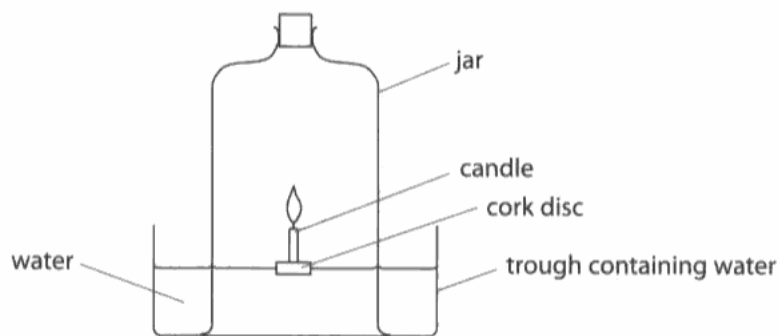
The water level would have gone down due to ~~the heat~~ the heat the water would have gone ~~down~~ evaporated.



ResultsPlus Examiner Comments

The majority of candidates were unable to understand the set-up of this experiment and they could not work out what was happening. Most thought the water level went down because the heat evaporates the water. Some did get a mark for water rising.

(e) The diagram shows a candle floating in a trough of water. A jar was placed over the candle after the candle was lit.



After the candle flame went out, the apparatus was left to cool to room temperature.

Explain how the water level inside the jar at the end of the experiment will have changed compared with the water level inside the jar at the start of the experiment.

The water ^{level} would change because when the candle was lit then after when the candle had used all the oxygen the candle flame went out and the water would go up because to fill the space. (3)



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Examiner Comments

However some good efforts were also seen.

Question 4 (f)

(f) Candles are made of wax which contains octadecane.
Octadecane burns in air to form carbon dioxide and water only.

Write the word equation for this reaction.



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Examiner Comments

A lot more candidates got the products mark as many wrote air as a reactant. If words and formulae were given the formulae were ignored.

Question 5 (a)

Fuels

5 When fuels are burnt, various gases can be given off including carbon monoxide, carbon dioxide, water vapour and sulfur dioxide.

(a) Give the name of the element that burns, in oxygen, to form sulfur dioxide.

(1)

Sulfate



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Examiner Comments

A very common wrong answer.

Question 5 (b)

(b) Sulfur dioxide dissolves in water in the atmosphere to form acid rain.

State **two** problems caused by acid rain.

(2)

acid rain can easily corrode building materials
and destroy the natural environment.

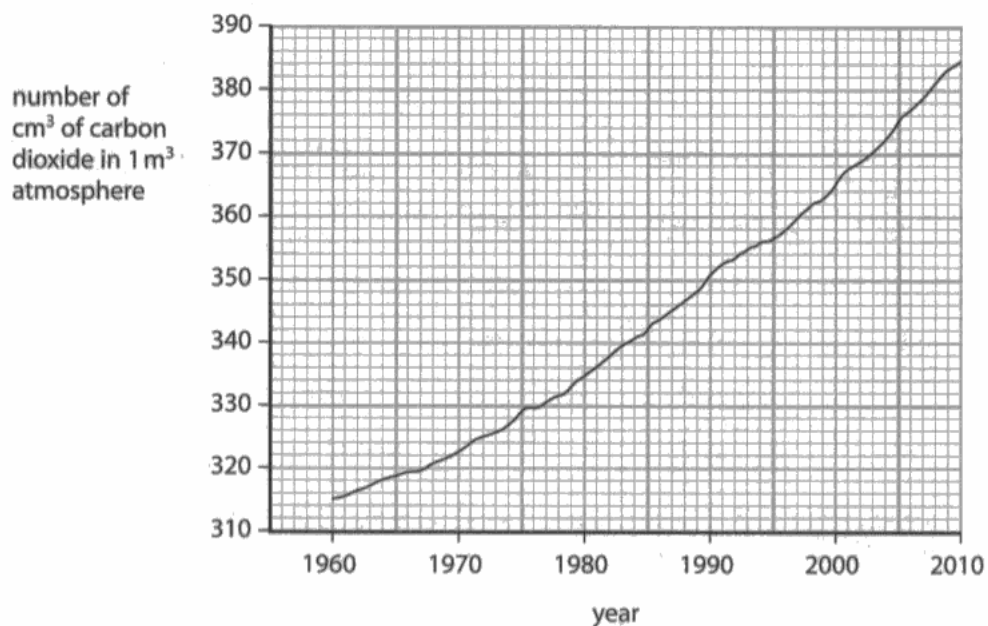


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Examiner Comments

Most candidates scored one or two marks. Those that failed to score gave vague answers such as 'harms/pollutes/bad for the environment', or "affects rivers", or "corrodes rocks" without specifying which rocks.

Question 5 (c)

(c) The graph shows the concentration of carbon dioxide in the atmosphere above Hawaii from 1960 to 2010.



During this time, the average temperature on the Earth has increased by about 0.5°C . Some people think that a change in the amount of carbon dioxide in the atmosphere has caused this change in temperature.

Explain how the data might or might not provide evidence for this idea.

(2)

this data does not show the temperature over this time



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Examiner Comments

This candidate had either not read the question or not understood it.

Question 5 (e)

*(e) An experiment was carried out to determine the amount of heat energy released when different fuels were burned.

Equal masses of four different fuels, A, B, C and D, were burned and the heat energy released was used to raise the temperature of 100 g of water.

The table shows information about each fuel and the results of the experiment.

fuel	state of fuel at room temperature	ease of lighting fuel	relative amount of smoke produced	temperature rise of water/ °C
A	gas	very easy	none	12
B	liquid	very easy	none	20
C	liquid	easy	very little	38
D	liquid	easy	very little	45

Give the advantages and disadvantages of each fuel, explaining which of the four fuels would be best for use in a domestic heater.

A-fuel a is good because it is ^{very} easy to ⁽⁶⁾ light, there is no smoke produced when burnt and it is a gas at room temperature. However it only increases the temperature of the water by 12°C.

B-fuel b is good because it is ^{very} easy, light, gives off no smoke and rises the water's temp by 20°C.

C-fuel c is good because it is easy to light and increases the temperature by 38°C. However it gives off a very little amount of smoke.

D-fuel d is good because it is easy to light and increases the temperature by 45°C. However it gives off very little smoke. (Total for Question 5 = 12 marks)

In my opinion I think fuel B would be the best fuel for a domestic heater as it is a liquid so it can be stored easily, very easy to light and gives off no smoke.



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Examiner Comments

This question proved very accessible to candidates and the full range of marks was awarded. It did seem, however, that a number of candidates had possibly not read the question carefully, or simply ignored part of it, because they did not address the issue of explaining which fuel would be best. Some candidates were limited to level one because they only repeated the information that was in the table without any obvious processing. At the other end of the spectrum, some very well written and constructed answers were given.



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Examiner Tip

Students might find it helpful to underline key words/parts of each question to remind them to address all parts of the question. In questions of this type candidates should be encouraged to make comparisons and not just repeat information given to them.

Fuel A would be a good choice, because it is very easy to light, yet the temperature doesn't rise much. In comparison to Fuel B, this fuel is liquid, and is also very easy to light, yet the temperature still doesn't rise much. Fuel C is another liquid, this fuel is slightly harder to light, and compared to fuels A and B, it lets off more smoke. On the other hand, it heats water to ~~more than~~ ^{almost} double the temperature of fuel B. Lastly, is fuel D, this is a liquid, so is less dangerous to use, it also lights quite easily, and produces very little smoke, it also heats water to the highest temperature out of all the fuels, and for those reasons, fuel D is the best. (Total for Question 5 = 12 marks)



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Examiner Comments

A very good answer.

Fuel A would be the best to use because it has the lowest raise of water and its lighting fuel is easy, its also A gas what produces no smoke.



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Examiner Comments

This just meets the criteria for level 2 as the candidate gives a conclusion (having presumably weighed up the advantages and disadvantages) and gives two relevant properties i.e. lights easily and produces no smoke (ignoring the comment about the water).

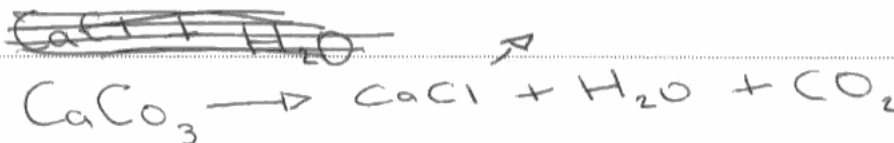
Question 6 (b)

(b) Too much hydrochloric acid in the stomach can cause indigestion. Indigestion tablets work by neutralising the excess hydrochloric acid in the stomach.

Some indigestion tablets contain calcium carbonate. The calcium carbonate reacts with the excess hydrochloric acid to form calcium chloride, water and carbon dioxide gas.

Write the word equation for this reaction.

(1)



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Examiner Comments

A surprising number of incorrect answers were given considering that all the reactants and products were given in the question. A lot of candidates missed out at least one product and some added additional reactants such as oxygen.

Some tried a formula equation with very limited success.

(b) Too much hydrochloric acid in the stomach can cause indigestion. Indigestion tablets work by neutralising the excess hydrochloric acid in the stomach.

Some indigestion tablets contain calcium carbonate. The calcium carbonate reacts with the excess hydrochloric acid to form calcium chloride, water and carbon dioxide gas.

Write the word equation for this reaction.

(1)

hydrochloric acid + calcium chloride → water + carbon dioxide



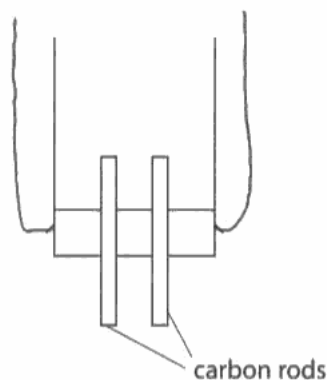
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Examiner Comments

Some missed out a product or reactant and/or got confused as to which side of the word equation substances should be on.

Question 6 (c)

*(c) Electrolysis can be used to decompose hydrochloric acid, HCl, into its elements. Part of the apparatus that can be used is shown.



Explain how you would use this apparatus to carry out the electrolysis of hydrochloric acid in the laboratory, naming the products formed. You may add to the diagram to help with your answer.

(6)

The electrolysis breaks up the hydrochloric acid and forms hydrogen and chlorine. It's broken up through electricity. The electrodes break down the elements. There are two electrodes, the cathode and anode. One breaks down the hydrogen and the other breaks down the chlorine. Electrolysis is very expensive.



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Examiner Comments

A level 2 answer scoring four marks.

Electrolysis is the breaking down of compounds using electricity. If you use electrolysis on hydrochloric acid you will get hydrogen and chlorine. You would use the equipment to do this as the hydrogen would go to the negative carbon rod and the chlorine would go to the positive rod.



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Examiner Comments

This is a good answer scoring full marks.

The electric pulses would separate all the elements from hydrochloric acid. The products formed would be hydrogen and chloride.



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Examiner Comments

A level 1 answer.

Question 6 (d)

(d) A student is given a test tube of oxygen and a test tube of hydrogen.
The test tubes are unlabelled.

Explain how the student could test the gases to identify which test tube contains which gas.

(3)

if they light a splint and put it in the test tube and it ~~relights~~
relights it is oxygen ~~but~~ but if it does a squeaky pop it is
hydrogen



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Examiner Comments

The tests for hydrogen and oxygen were generally well known but some candidates confused the two tests. There were a number of candidates who lost marks in the oxygen test by failing to state that a **glowing** splint was required and made reference to a **blown out** splint which was not given credit.

(d) A student is given a test tube of oxygen and a test tube of hydrogen.
The test tubes are unlabelled.

Explain how the student could test the gases to identify which test tube contains which gas.

(3)

The student could light a splint and blow it out
so that it is still glowing and put it in to each test tube if
the splint reignites oxygen is present in the test tube. for hydrogen they
could heat it up with a carbonate and put a bung and delivery tube
into a test tube of lime water if it goes cloudy hydrogen
is present.



ResultsPlus

Examiner Comments

Limewater also appeared surprisingly often.

Paper Summary

It was pleasing to see few blank spaces, suggesting candidates were attempting all of the questions.

Candidates were attempting the extended writing questions, with question 5 (e) being more accessible.

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