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# **Examiners' Report**

## **Principal Examiner Feedback**

**Summer 2017**

**Pearson Edexcel GCSE**

**In Chemistry/Science (5CH1F) Paper 01**

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## **Paper Introduction**

This is the last summer sitting of the 5CH1F paper, with a final retake available in the January 2018 series. The paper followed the standard format of six questions, with the final two questions containing the extended writing (6 mark) questions.

### **5CH1F\_01\_Q01aii**

#### **Question Introduction**

The '(filter) funnel' mark was more often correct, the most common error being just 'filter' or 'tube'. The 'residue' mark was often not scored – a rather creative range of substances were offered for the precipitate such as limewater, limestone, sodium chloride, carbon dioxide(!), crystals or powder.

#### **Examiner Comment**

The left hand label cannot be correct as liquids pass through filter paper.

#### **Examiner Tip**

Learn the names of simple apparatus.

### **5CH1F\_01\_Q01bi**

#### **Question Introduction**

Many correct answers, photosynthesis being much more popular than dissolving in oceans. Incorrect answers were when candidates alluded to or described photosynthesis ("absorbed by plants") without using the required term. Other wrong answers included processes adding carbon dioxide - volcanic activity, burning of fossil fuels, respiration/breathing and deforestation. A few answers discussed the formation of shells by sea creatures.

### **5CH1F\_01\_Q01bii**

#### **Question Introduction**

Lots of correct answers here. Most answers talked about volcanic activity. Wrong answers included photosynthesis and breathing (rather than respiration) and referring to human activities like burning fossil fuels, factories and using cars when the question clearly states 'before humans were on Earth'.

### **5CH1F\_01\_Q01ci**

#### **Question Introduction**

Lots of candidates were awarded 1 mark for methane + oxygen → carbon dioxide, but a much lower number identified water as a product. Oxygen, methane oxide and hydrogen were alternatives given for water. Some have 'hydrocarbon' instead of methane. A significant number added 'heat' on the right hand side which (this time) was not penalised, but is discouraged, or on the left hand side, where it was penalised. A surprising number of candidates had more than one → which automatically lost all marks. Some candidates gave hyphens (i.e. lines with no arrowhead) and not arrows. Candidates are reminded that word equations require words and formulae should not be used.

### **5CH1F\_01\_Q02bi**

#### **Question Introduction**

The large majority correctly inserted carbon, and a very good number added 'carbon dioxide', with a few 'carbon monoxide'. Incorrect answers seen on the right hand side included carbon oxide, water and even carbon.

### **5CH1F\_01\_Q02bii**

#### **Question Introduction**

Some candidates mentioned the loss of oxide rather than oxygen, or heat, lead, electrons or mass.

### **5CH1F\_01\_Q02c**

#### **Question Introduction**

Most candidates understood that aluminium was higher in the reactivity series than carbon, and therefore scored 1 mark. Not many went on to carefully explain what this meant in terms of this question for the second mark. Not many candidates used the word reduction or reduce in their answers suggesting they did not realise this was a reduction, and some had the misconception that they were burning carbon. Some thought that there would be an aluminium/carbon reaction.

Language was important, because some who appeared to have some understanding, stated that 'aluminium is stronger than carbon' (meaning more reactive), which of course is actually a very different property.

It was rare to see mention of electrolysis in the correct context.

## **5CH1F\_01\_Q02d**

### **Question Introduction**

Many candidates scored well here, usually for quoting lower density in some form or other, as well as the good resistance to corrosion. Where an explanation was given, it was much more commonly for the link between corrosion resistance and the material lasting longer. Erosion was sometimes used incorrectly here.

Too many candidates just stated data from the table, quite often all of the data in the table without discrimination or evaluation of the data. It was quite common to state that conductivity was important when this was not a distinguishing factor. Low density was often linked to ease of moving the wire around rather than the weight of the cables. Some, not reading the question, expounded the virtues of steel.

## **5CH1F\_01\_Q03ai-iii**

### **Question Introduction**

The majority of candidates plotted the two points accurately, although plotting 126 at 132 was not that uncommon.

The line of best fit – which could be a straight line or a curve – was a little less well done, with some losing the mark as a result of not starting the line from the y axis (instead, starting from the 5 carbon point), or having the line on one side of all points, or dot-to-dot. Some drew two lines without erasing one making it impossible to score.

Most scored well on the description of the trend, even when graph was not correctly drawn. Where candidates lost marks, it was sometimes due to poor language – ‘it goes up’, ‘there are more molecules’ (not more atoms in a molecule).

Those who did not extrapolate the graph just guessed the boiling point of decane (but could still score for units), however very few overall stated units, some giving ° instead of °C. Some tried to calculate the boiling point from the average difference between adjacent alkanes.

### **5CH1F\_01\_Q03b**

#### **Question Introduction**

Whilst many named hydrogen, it was surprising how many candidates could not. Some incorrect responses included: hydrocarbon, ethane, ethene, ethanol, propanol, propene, alkene and a myriad of other (many invented) compounds.

The propene structure offered varied tremendously. Many did not have 3 carbons or any double bonds at all. Those that drew a 3 carbon molecule either did not draw one double bond or, if they did, arranged the hydrogens incorrectly with 3- and 5- valent carbons. Some had  $C=C=C$ .

Here some candidates had apparently not read the question, and drawn extra carbons and hydrogens on to the H-H in the box.

### **5CH1F\_01\_Q04b**

#### **Question Introduction**

Most candidates got the mark. Wrong answers included windows (rather than glass), quarrying, limewater, marble and roof tiles.

### **5CH1F\_01\_Q04c**

#### **Question Introduction**

This question was generally well answered with most candidates able to give two factors affecting people near a limestone quarry. Noisy plus one another disadvantage was the norm. A few referred to damage to habitats and scenery, and a very few to house prices and reduced tourism.

As typical in this type of question, there were vague answers concerning polluting the air or damaging the environment which were not credited. Some candidates thought that the quarry would cause landslides, release toxic gases. Unfortunately, some had not read the questions and gave advantages of opening a limestone quarry.

### **5CH1F\_01\_Q04di**

#### **Question Introduction**

There were many correct equations. The main error was adding 'oxygen' to the left hand side of the equation. Sometimes, limestone was added to the reactants or water to the products.

There some fundamental misunderstandings of the nature of a word equation, by the inclusion of formulae or multiple arrows.

### **5CH1F\_01\_Q04dii**

#### **Question Introduction**

This was usually correct, and where not the masses were often added. 3.2, 7.8, 14 and 1.78 were common incorrect answers. The examiners continue to be amazed at the number of different operations you can do with two numbers!

### **5CH1F\_01\_Q04ei**

#### **Question Introduction**

This part was relatively taxing to the candidates. A large number talked about the colour changes, either stating incorrectly that they (all) changed colour, or that 2 changed colour and one did not (which was interesting logic). There was a lot of vagueness seen: 'because of the observations', 'because of the time taken'.

Some talked about limewater bubbling – which it would with no carbon dioxide. Those that seemed to get the point often avoided a simple statement such as "they all gave off carbon dioxide", and talked about 'time taken' without explaining what this meant.

### **5CH1F\_01\_Q04eii**

#### **Question Introduction**

Most candidates who scored a mark did so for identifying copper carbonate as taking the shortest time for carbon dioxide to be detected, but without relating it to ease of decomposition. Some got the relationship of shorter time means easier decomposition but did not relate it to the carbonates stated in the table. Too often candidates just referred to the table 'as you go down the table time gets longer'. Some just restated the times for each carbonate from the table with no evaluation.

In general, many candidates did not fully grasp the idea of 'ease of decomposition' and often tried to link the time to the reactivity to the metal (carbonate). In this sense this was a very discriminating question.

### **5CH1F\_01\_Q05bi**

#### **Question Introduction**

There were very few correct answers here. Common answers were ethane, polythene, and chlorine.

#### **Examiner Comment**

To find the name of a monomer, just remove poly() from the name of the polymer.

## **5CH1F\_01\_Q05bii**

### **Question Introduction**

Many candidates had no idea what polymerisation was and many talked about cracking instead. Many candidates did not appear to know that a monomer had a double bond in it, or mentioned the breaking of the double bond. Those that did score often did so with the idea of joining molecules. Only a few managed to get the idea of joining monomers together and even fewer then talked about it making a long chain.

## **5CH1F\_01\_Q05c**

### **Question Introduction**

In the definition of a hydrocarbon, 'only' is a key word that was regularly omitted.

Some candidates defined saturated as 'no more atoms can add to the molecule' which is not credited, or that 'a molecule contains single bonds' (or even 'a single bond'), again missing out 'only'. Also common were responses referring to "saturated" being used to describe the proportion of hydrogens compared to carbons, or simply that there were a lot of hydrogens. The simplest correct answer was "no double bonds".

Not all candidates defined saturated and hydrocarbon.

Misconceptions about hydrocarbons included hydrogen and carbon 'molecules', and for saturated all the bonds are full and more hydrogens than carbons.



## 5CH1F\_01\_Q05d

### Question Introduction

In general, many candidates forgot to state what a good fuel is and went straight into petrol/ ethanol/methane as the example. Many did not gain marks for just giving vague statements such as 'damages the environment' or 'air pollution' with no detail, or talking about cost ("..... is a good fuel because it is not too expensive"). Quite a few thought that being flammable was a disadvantage (due to danger). Some answers compared fuels with hydrogen or diesel which were not relevant to the question. Many wasted time talking about all three examples when only one was required.

#### PETROL:

Unsurprisingly, this was the most common of the three fuels chosen. There was a lot of talk about petrol being a good fuel because lots of people use it and we need it in our cars, it makes cars move, it helps us to get about etc – really a discussion of the benefits and disadvantages of the car. Too many students said petrol was renewable, confusing petrol not running out at petrol stations with non-renewable resource that will run out. Petrol being readily available (at many fuel stations) gave some candidates an advantage. Candidates gave reasonable responses on the disadvantages of petrol related to global warming.

#### ETHANOL:

Ethanol was sometimes quoted correctly as a renewable fuel being grown from sugar cane which took up land for food crops. Hardly anything else was considered. Candidates often had mixed ideas about biofuels, and weren't sure whether ethanol was a biofuel. Some talked about ethanol as (close to) "carbon neutral", but others were confused about its carbon dioxide status with a significant number saying it did not produce carbon dioxide when burned.

#### METHANE:

Very little mention of methane, with a lack of understanding of its use as a fuel – many of these responses referred to methane from cows.

In summary, many candidates did not appear to have carefully read the question. The best answers had clearly been planned with annotations at the top of the page aiding in the writing of their answer and this should be encouraged. Candidates need to be discouraged from vagueness and instead focus on the key aspects.

### **5CH1F\_01\_Q06bi**

#### **Question Introduction**

The question was well answered by many candidates.

The breaking down/digesting food was very often correct, although answers such as burnings/melting/corroding food did not score.

When referring to killing bacteria, poor terminology sometimes cost the mark - 'kills germs', 'fighting off bacteria'.

A number talked incorrectly about "breaking down enzymes" or "neutralising acids"/ "preventing indigestion".

### **5CH1F\_01\_Q06bii**

#### **Question Introduction**

Most candidates got 1 mark for the left hand side of the equation, but few got the full equation right. The name of the salt was rarely identified and very often left blank, some stating 'salt + water'. Other gave carbon dioxide or hydrogen. Again, equations with two  $\rightarrow$  were seen.

### **5CH1F\_01\_Q06c**

#### **Question Introduction**

This was completed with many 'Cl' or 'chlorine' but sadly fewer 'Cl<sub>2</sub>'.

## 5CH1F\_01\_Q06d

### Question Introduction

Some candidates referred to 'both' gases in blanket statements or gave vague answers about toxic and explosive gases without specifying which gas they were talking about.

#### CHLORINE

The uses of chlorine are well known, but candidates often just said chlorine is used in or "cleans" swimming pools without detail or proper explanation. The killing of bacteria or sterilisation was required. The main uses for chlorine (after use in swimming pools) were making bleach (and other "household cleaners") although a few did say in PVC and plastics.

The hazard of chlorine was often given as harmful instead of toxic. Some answers mentioned that chlorine was dangerous because it was an acid or explosive or corrosive. The best answers then gave some more detail. Some candidates knew about the use of chlorine in WW1 (which, if explained, could be credited as a hazard).

The test for chlorine was often very well done, although a few confused litmus with universal indicator paper. Inevitably, there were some squeaky pop tests for chlorine.

#### HYDROGEN

Hydrogen was tackled less well in this question, although nearly every student whose answer mentioned hydrogen quoted the squeaky pop test in detail which was irrelevant.

Fewer candidates knew uses for hydrogen ("used to put out fires"!) but some did get its use of as a fuel. Hydrogen being explosive was reasonably well known.

### Paper Summary

Candidates are advised to:

- fully read the question before answering
- learn the names of apparatus
- practise drawing best-fit lines on graphs
- always give units
- learn how to deduce the name of a monomer from the name of the polymer.

