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# **Examiners' Report**

## Principal Examiner Feedback

Summer 2017

Pearson Edexcel IGCSE

In Chemistry/Additional Science (5CH2H) Paper 01

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## **Paper Introduction**

As in previous sessions, it was pleasing to see some excellent answers which included sound chemistry knowledge and understanding from the more successful candidates. Calculation questions had been tackled well by these candidates, their answers were set out well and showed a clear understanding of the chemistry involved.

It was found that the candidates that did less well often did so as they had not learnt precise definitions of common terms, they could not write balanced chemical equations using the correct scientific conventions and showed confusion in language or were vague in their answers which lost them marks.

Of the two six mark, extended response questions, all candidates performed better in the first, with many being able to score in level 2 or 3. Candidates found the question on graphite and diamond and the explanation of their properties much more challenging, with many simply repeating the stem or confusing the structures of the two.

## **5CH2H\_01\_Q01a**

### **Question Introduction**

Candidates generally performed well in this question with many candidates being able to state that an endothermic reaction is a reaction that takes in heat energy.

In some cases candidates gained just 1 mark as they simply stated that an endothermic reaction takes in energy.

Heat energy taken in gained both marks.

### **Introduction**

### **Examiner Comment**

Many candidates lost marks by attempting to explain what might cause an endothermic reaction rather than describing what is meant by the term. However, incorrect use of words when attempting to explain the energy released and energy absorbed meant they lost both marks.

### **Examiner Tip**

Candidates should ensure that they understand what the different command words that they will encounter require them to do.

## **5CH2H\_01\_Q01b**

### **Question Introduction**

The majority of candidates knew that the diagram showed that the reaction was exothermic and that this meant that heat energy was given out in the reaction. As with 1a, some candidates commented on bonds making and breaking, again often incorrectly.

### **Examiner Comment**

This is an example of a good answer that gives all three marking points and scored full marks.

## **5CH2H\_01\_Q01ci**

### **Question Introduction**

Most candidates were able to give two ways of increasing the rate of the reaction between the magnesium ribbon and hydrochloric acid.

### **Examiner Comment**

A common answer that scored both marks.

### **Examiner Comment**

In some cases candidates were not specific with their answer and simply stated that the surface area or the temperature were to be changed, however they did not say how these should be changed and so therefore did not gain the marks.

## **5CH2H\_01\_Q01cii**

### **Question Introduction**

Only the better candidates were able to give a concise answer which scored both marks for explaining why increasing the concentration of the acid increases the rate of reaction.

Some candidates incorrectly stated that having an increased concentration meant that the particles had more energy, in these cases a maximum of 1 mark was awarded.

### **Examiner Comment**

Many candidates were able to score 1 mark for showing an understating that an increased concentration means that there were more particles of acid present in the mixture. Many did not achieve the second mark as they simply stated that there were more collisions or more chance of a collision. Only the better candidates were able to state that it meant that this meant that there were more frequent collisions.

## **5CH2H\_01\_Q02aii**

### **Question Introduction**

Better candidates had clearly learned the test and were able to recall the names of the two solutions that are used to test for the presence of sulfate ions in a solution.

Those that did not know both, often scored the first marking point for stating either hydrochloric acid or nitric acid as one of the solutions to be used.

### **Examiner Comment**

An example of a good answer that scored both marks.

### **Examiner Comment**

Another common mistake seen was where the candidates mixed up the test for chlorides with the test for sulphates and stated to use silver nitrate. In these cases however, a mark was still awarded for the use of nitric acid in the test.

### **Examiner Comment**

A common mistake seen was to suggest that barium sulphate solution was used rather than barium chloride.

## **5CH2H\_01\_Q02c**

### **Question Introduction**

Question 2c was generally well answered with many candidates scoring full marks for understanding that the calcium ion transfers its two outer electrons to the oxygen atom and that means that the calcium ion gains a 2+ charge and the oxygen gains a 2- charge.

Some candidates showed the misunderstanding that the calcium shared its electrons with the oxygen rather than transferring them to the oxygen, in these cases candidates were able to score a maximum of 2 marks.

### **Examiner Comment**

This answer scored all 4 marks available.

### **Examiner Comment**

Candidates that did not gain full marks often scored 2 marks for showing an understanding of how the ions were formed but they did not then give the charges that were formed on the ions.

## **5CH2H\_01\_Q03b**

### **Question Introduction**

Candidates found this question hard, with only the best scoring all three marks available.

Where candidates lost marks, it was because they were not specific enough in their answers, for example simply stating that caesium had more electrons than lithium or that it doesn't have a full outer shell.

Candidates need to take care with the use of their scientific language and terms. For the last three marking points, candidates had to identify that it is the outer electron/shell that is relevant, many candidates talked in general terms about electrons but not the outer electron.

Candidates should be taught to use comparatives when answering a question of this nature, e.g. 'caesium has more shells/a larger atomic radius' not just 'caesium has a lot of shells/a large atomic radius'.

### **Examiner Comment**

A good answer that scored all three marks available.

### **5CH2H\_01\_Q03c**

#### **Question Introduction**

Candidates found writing this balanced equation from scratch quite difficult. Only the very best were able to recall the reactants and products for the reaction and balance these correctly.

#### **Examiner Comment**

This example scored no marks, the K for potassium has been represented incorrectly as a lower case. The 2 in the formula of water is also unacceptable.

#### **Examiner Tip**

Candidates must take care when writing chemical formula, ensuring that correct scientific conventions are followed in terms of size of letters and ensuring that numbers are subscript where required.

#### **Examiner Comment**

Many candidates could recall the formula for the potassium and water to score 1 mark. However, the products proved more difficult with many including carbon dioxide even with the correct reactants.

Examiner Comment

A good answer that scored all 3 marks.

### **5CH2H\_01\_Q03e**

#### **Question Introduction**

In this question, many candidates knew that argon is a noble or inert gas but then relatively few showed an understanding as to why it was there, therefore not scoring the second marking point.

#### **Examiner Comment**

A good example that scored both marks.

#### **Examiner Comment**

A common incorrect answer seen was that the argon made the bulb last a lot longer, which was insufficient for credit.

#### **Examiner Comment**

Some candidates did not understand the question posed and gave what they thought were properties of the bulb.

## **5CH2H\_01\_Q04ai**

### **Question Introduction**

Candidates performed better in this second balanced equation on the paper, with many being able to correctly write the formula for the reactants and the products.

Although the formula for the reactants on the right-hand side of the equation were given in the stem some candidates still were not able to transpose these correctly to score this mark. Candidates are still making errors in writing the letter case in symbols, with upper case L's in Cl and lower case h for hydrogen, therefore losing them marks.

### **Examiner Comment**

A common error seen with the products was for potassium chloride, which was often given as  $KCl_2$ , or omitted altogether which limited the mark for the item to 1.

Some candidates are still not familiar with the term balanced equation and wrote the word equation instead which gained no marks.

### **Examiner Tip**

Examiner tip: candidates should be reminded that if a balanced equation is required no marks will be scored for writing a word equation.

## **5CH2H\_01\_Q04c**

### **Question Introduction**

A good number of candidates have learned how to carry out the calculation well and scored full marks on this item. Where answers scored full marks, they were often well set out and showed good understanding.

### **Examiner Comment**

A good, well set out answer that scored full marks.

### **Examiner Comment**

Some managed set up their initial fractions incorrectly however error carried forward was allowed so even though an incorrect answer of  $CuS_2$  was arrived at two marks were still awarded for the correct chemistry from this point.

### **Examiner Tip**

Candidates should be reminded that it is so important to show their working otherwise these marks could not have been awarded.

### **Examiner Comment**

In some cases, candidates arrived at the correct whole number ratio but then lost the third mark as they were not then able to construct the empirical formula for the copper sulfide from their ratio.

### **5CH2H\_01\_Q04d**

#### **Question Introduction**

Candidates found this second calculation more difficult than the second one. Many candidates had used their knowledge of moles and picked up one mark for attempting the calculation and getting to 0.2. Where candidates scored 1 mark, it was generally for calculating 127 and 159. Working in many cases was unclear and there was significant confusion with percentage yield or RAM calculations. Candidates should be encouraged to lay out their working clearly in order that they can easily be awarded marks for working if they do not achieve the correct final answer.

#### **Examiner Comment**

A good answer that was well set out, showed good understanding and scored full marks.

### **5CH2H\_01\_Q05c**

#### **Question Introduction**

This question was generally well answered, many candidates could state which group and period the element is found, but often they were not able to take this further and to explain why this was so.

#### **Examiner Comment**

This example scored all 4 marks for explaining which group and which period of the periodic table the element is found.

#### **Examiner Comment**

This example gained two marks as they have stated the correct group and period for the element. They have however not explained these for the second two marks.

## **5CH2H\_01\_Q05d**

### **Question Introduction**

In general, this was a well answered 6 mark question. Most candidates could give a correct calculation and a basic description of the atom so scored 6 marks.

Where candidates lost marks, it was because they talked about isotopes have differing numbers of electrons, giving the numbers of electrons, protons and neutrons for neon 20 instead of 22, or for having the misconception that neon-22 had 11 protons 11 electrons and 11 neutrons.

### **Examiner Comment**

The candidate has given the number of protons, electrons and neutrons in the neon-22 atom. They have given a qualitative discussion of why the neon sample has a relative atomic mass of 20.2, this would be sufficient for 4 marks. However, a quantitative treatment has also been given at the bottom. The quantitative treatment of the relative atomic mass with the description of the atom was considered worthy of level 3 - 6 marks.

### **Examiner Comment**

The candidate has given a quantitative discussion of why the relative atomic mass is 20.2. There is no discussion of the structure of the atom and so therefore a mark of 4 in level 2 was awarded.

### **Examiner Comment**

In this example, the candidate has given a limited description of the structure of the neon 22 atom. The second part of the answer, adds no value to the answer and therefore a mark of 2 in level 1 was awarded.

### **Examiner Comment**

At first glance this answer looks as though it is worthy of credit, however everything present is a repeat of the stem and therefore not creditworthy.

### **Examiner Tip**

Candidates should be reminded that repeating information that has been given in the stem will gain no credit.

## **5CH2H\_01\_Q06a**

### **Question Introduction**

Many candidates did well in this question, giving textbook answers. Those that did not score both marks, often scored the first but not the second marking point. Weaker candidates thought that the metal needed to be molten or even in aqueous solution. Others described the conduction of heat rather than electricity. A common error was to state that there were gaps in the structure of the metal which allowed the electricity to flow through.

### **Examiner Comment**

A common misconception was to state that there were gaps in the structure of the metal which allowed the electricity to flow through.

### **5CH2H\_01\_Q06b**

#### **Question Introduction**

This question was well answered with the majority of candidates gaining both marks. Most candidates who drew the two shared pairs correctly went on to complete the rest of the molecule correctly. Where marks were lost, it was often because candidates were to draw a single pair of electrons between atoms or to draw just a single atom.

#### **Examiner Comment**

Where marks were lost, it was often because candidates were to draw a single pair of electrons between atoms or to draw just a single atom.

### **5CH2H\_01\_Q06c**

#### **Question Introduction**

Candidates found this question quite difficult. Many understood that a large amount of energy was needed to break up the ionic compound. However, did not discuss what was broken down. Many candidates repeated the stem of the question and stated that ionic compounds have a high melting point which gained no credit.

#### **Examiner Comment**

This is a good example that scored both marks. The use of chlorine rather than chloride was ignored here.

### **5CH2H\_01\_Q06d**

#### **Question Introduction**

Candidates found this, the second of the two six mark questions, much more difficult of the first. Many lost marks as they were not specific with, or used incorrect scientific terms. Some candidates simply copied the information from the stem of the question.

## **Paper Summary**

In future, based on their performance on this paper, candidates should practice calculations, concentrating on setting their working out clearly. Read the question carefully and make sure that they are answering the question asked and using the information given not just repeating it. Learn the formulae of elements and simple compounds in the unit and practice balancing chemical equations.

