Version 1.0: 0708

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Additional Science 4463 / Chemistry 4421

CHY2F Unit Chemistry 2

Report on the Examination

2008 Examination – June Series

Further copies of this Report are available to download from the AQA Website: www.aqa.org.uk

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334). Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General.

Additional Science / Chemistry Foundation Tier CHY2F

General

The paper discriminated well across the grades C to G while allowing almost all of the candidates to make a reasonable attempt at the majority of the questions. It was only in the last two, standard demand questions that a significant number of candidates made no attempt.

A number of candidates ignored the instructions given in some of the questions and when asked to tick or circle one answer they gave two or even three answers. Candidates should be encouraged to bring a calculator to the examination as there was evidence in questions 7 and 8 that many did not.

Question 1 *(Low Demand)*

Virtually all of the candidates were able to make an attempt at part (a)(i) and more than half of them gave the correct response. Candidates were expected to make the link between the low pH and the presence of an acid.

Part (a)(ii) was not well known. The most popular response was sodium which was given by about 40% of the candidates whereas the correct answer, hydrogen ion, was only given by about 25%.

Part (b)(i) was quite well answered. Most of the candidates gave a response that indicated that it would increase the rate of the reaction. It is pleasing to note that some of the Foundation tier candidates gave high level responses such as it reduces the activation energy and were of course awarded the mark.

Part (b)(ii) was very well answered. Part (b)(iii) however was not well known. Many answers included positive and negative charges and symbols other than H and O were common. Common incorrect answers were O_2H, h_2O, H^2O and H^+O^-.

Question 2 *(Low Demand)*

In part (a) most candidates were able to gain one mark for a simple statement such as, the volume increases but fewer went on to gain the second mark. To gain the second mark they were expected to qualify the fact that the volume increases with a further statement such as quickly at first or until it reaches a maximum. Candidates who interpreted the graph in terms of rate and gave a statement such as, gas is produced quickly at first and then more slowly, were also awarded two marks. Some candidates mistakenly interpreted the graph as a graph of rate of reaction plotted against time and gave confused answers which could not be given credit.

A few candidates completely misinterpreted the question and described what they would see when zinc is added to acid.

Part (b) was quite well answered with the vast majority of the candidates gaining at least one of the two marks. The most common distracter was to use bigger pieces of zinc

Question 3 *(Low Demand)*

This was a very well answered question with a large number of candidates gaining all four marks and almost all gaining one or two marks.

Question 4 *(Low Demand)*

In part (a) a large number of candidates thought that the bag gets cold because heat energy is given out to the surroundings.

In part (b) exothermic and endothermic were given in about equal proportions. Very few candidates gave electrolysis.

Most candidates scored at least one of the two marks in part (c). Simple answers such as, to mix the contents of the bag so that the ammonium nitrate dissolves faster or it dissolves faster so that the bag gets cold more quickly, were sufficient to gain two marks. Some candidates simply stated, to dissolve the ammonium nitrate, and did not gain any credit since this simply restates information given in the question. A few candidates gave more sophisticated answers such as, it dissolves faster because there are more collisions between the particles, and were of course awarded the marks.

Question 5 *(Low Demand)*

The names of the particles in part (a)(i) were generally well known.

The majority of the candidates gave the atomic number 7 rather than the mass number 14 in part (a)(ii).

For part (b) the most popular answer was C rather than the correct answer A.

Part (c)(i) was very well answered with a large proportion of the candidates gaining both marks.

Most of the candidates gave, air, which was the correct response to part (c)(ii), but a significant number gave methane.

The vast majority of candidates gave the correct response to part (d), ammonium nitrate, but a significant number gave ammonia nitrate.

Question 6 *(Low Demand)*

In part (a)(i) the majority of candidates knew that nanoparticles are smaller than normal sized particles. A few thought that nanoparticles are larger!

Part (a)(ii) was also generally well answered. Simple sensible ideas such as, they can pass through the pores of the skin, were accepted. Simply restating the question, they can enter the body, did not gain credit. Similarly vague answers such as, they can pass through, without stating through what, did not gain a mark. Some candidates thought it was because they spread better but this does not explain why they enter the body.

Most of the candidates were able to extract at least one advantage from the passage for part (b). Many gained both marks. However, a few candidates did not understand the passage and thought that it was an advantage because they can enter and pass around the body or because they contain titanium oxide.

Most of the candidates could pick out the fact that they are toxic from the passage for part (c). A number of vague answers such as, they are small, or they contain titanium dioxide, did not gain credit.

Questions 7 and 8 *(Standard Demand)*

These were standard demand questions which aimed to differentiate between grades C and D. Perhaps not surprisingly, a significant number of candidates, between 10% and 20%, did not attempt some parts of these questions. All parts were, however, successfully completed by many candidates and the questions differentiated successfully between the higher grades on this paper.

Question 7 *(Standard Demand)*

A large number of the candidates gained both marks for this calculation in part (a). A number of candidates ignored the formula and simply added 19 + 119 and reached the answer 138. This was awarded one mark since they had shown some understanding of the method of calculation. Some candidates had little understanding of chemical formulae. Answers such as, $(19^2 + 119)$, $(19 + 119)^2$ and $(119^2 + 19)$, were all seen.

Part (b) was not well answered and was only completed by the more able candidates. A number of candidates struggled with long calculations due to lack of a calculator while others did not understand how to calculate a percentage. Candidates were allowed to use an incorrect answer from part (a) in calculating part (b) and could gain both marks if it was calculated correctly. Common errors were (19/157 x 100) or (19/138 x 100). Either of these calculations correctly evaluated was awarded one mark since the candidate understood the principle of the method.

F tier candidates found part (c) very difficult. Candidates should be encouraged to look carefully at an answer, once they have completed a calculation, to ensure that it is sensible. A number of candidates gave answers which were greater than 1.2 g! Candidates could gain this mark using an incorrect answer from part (b) provided that it was correctly calculated.

Part (d) was answered correctly by a good proportion of the candidates. One mark was for identifying that the formation of the ion was something to do with electrons and the second mark was for the idea that an electron is gained. A number of candidates lost the second mark because they thought that an electron is shared or lost. A few candidates thought that the ion is formed by losing a proton.

Question 8 *(Standard Demand)*

Part (a) saw a large number of the candidates able to make the link between the low boiling point of propanone and the fact that it would evaporate faster. A simple statement such as, it has a low boiling point, was all that was required.

Part (b)(i) was correctly calculated by many candidates. A few candidates gave the answer 29 rather than 0.29 g.

Part (b)(ii) was not well answered. Many candidates simply restated information given in the question that the mass lost and gained was not the same. Some were distracted by the lamp suggesting ideas such as more electricity going to one electrode than the other. Timing errors or differences in the size or mass of the electrodes were not accepted. Similarly we did not accept answers such as, there was not enough power, it was not a fair test or the experiment was only done once.

A wide range of answers was accepted such as:

- weighing errors
- electrodes not being completely dry
- impurities in the electrodes
- mass lost in the washing process
- bits of copper falling off the electrodes

Answers to part (c) were disappointing given that this is one of only two electrolyses that are specifically given in the specification. The mark scheme was broad and allowed candidates to gain marks in a number of different ways. For example a simple answer such as, the impure copper is the positive electrode and a piece of pure copper is the negative electrode. The electrodes are dipped in copper sulfate solution. Pure copper collects on the negative electrode, was sufficient to gain four marks.

A number of misconceptions were seen. For example, some candidates thought that the impure copper would be melted and then two electrodes would be dipped into the molten

mixture. Other candidates thought that pure copper atoms would be positive and impure copper atoms would be negative. Some candidates talked about positive and negative electrons where they perhaps meant electrodes.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the **Results Statistics** page of the AQA Website.