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General Certificate of Secondary Education

Additional Science 4463 / Chemistry 4421

CHY2F Unit Chemistry 2

Report on the Examination

2009 examination – June series

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Dr Michael Cresswell Director General.

Additional Science / Chemistry
Foundation Tier CHY2F

General

The candidates appeared to have sufficient time to answer the paper and the majority of the candidates were able to make a good attempt at almost all of the questions.

Question 1

The question aimed to give the candidates a friendly start to the examination. This worked for the vast majority of candidates who gained the marks in both parts.

(a) The most common incorrect answer in this part was 9.

(b) Incorrect answers were evenly split between 4 and 12.

Question 2

Most of the candidates were able to correctly name CO_2 as carbon dioxide although answers such as carbon oxide, carbon monoxide and cobalt were seen.

(b) (i) The majority of candidates correctly thought that the temperature of the solution would decrease in this part but a sizeable number thought that it would increase.

(b) (ii) This was poorly answered with a large number of the candidates thinking that energy would be given out to the surroundings. It has been noticeable in recent years that most candidates can define the meaning of exothermic and endothermic, but they seem to find great difficulty in applying these definitions to make decisions about whether the temperature will increase or decrease.

Question 3

(a) The majority of the candidates understood that a compressor increases the pressure

(b) The majority of the candidates were able to identify the two reactants.

(c) This part was less well answered with slightly more candidates thinking that the mixture would be heated rather than cooled.

(d) Most candidates gave nitric acid although a sizeable minority gave either hydrochloric or sulfuric acid.

Question 4

(a) Most of the candidates gave the correct response, although a fair number of the candidates thought that the bonding was ionic.

(b) (i) Either solid or gas were frequently seen here.

(b) (ii) This part was often poorly answered, with fluoride, hydrogen and potassium being common responses.

(c) (i) Many of the candidates correctly realised that whether to add fluoride ions to drinking water is a matter of opinion and was a question that cannot be answered by science alone.

(c) (ii) Fewer candidates were able to explain their answer here and answers given were often vague and lacking in detail. A variety of answers was accepted including simple answers such as, it is a matter of opinion or it cannot be scientifically investigated.

Question 5

(a) Many correct responses were seen for this part. A common error was to refer to the copper instead of the carbon and to write at length about the lack of wear or sticking of the copper ring.

(b) (i) Few of the candidates gained both of the marks here but more than half of them gained at least one mark.

(b) (ii) This part was answered correctly by many of the candidates, but a surprisingly large number thought that graphite is soft and slippery because it is made of small molecules or because it is an 'ionic compound'.

Question 6

(a) (i) Most of the candidates were able to use the information supplied in the passage to gain at least one mark and many of them gained both. A few of the candidates did not appreciate that the question wanted to know why hydrogen was an excellent fuel and gave vague answers such as, it can be stored in a cylinder.

(a) (ii) This was mostly well answered though incorrect responses to often described the ability of lithium nitride to absorb or release hydrogen and did not answer the question.

(a) (iii) This was well answered by the majority of candidates.

(b) All three parts were well answered by most of the candidates.

(b) (ii) This was the least well answered part of the three, with incorrect responses being split roughly equally between losing a neutron and losing a proton.

(c) The vast majority of the candidates were able to recognise the reversible reaction symbol.

(d) (i) Most candidates knew that nanosized particles are much smaller than normal sized particles.

(d) (ii) This part was less well answered, with only about one third of the candidates correctly identifying surface area.

Question 7

(a) (i) The vast majority of the candidates were able to draw a good line of best fit. A number of candidates missed the first point at (0,0) and started their graph at the second point. This was allowed, provided that a good straight line was drawn for the rest of the graph. A number of candidates did not have a ruler and consequently failed to draw a reasonable straight line. Other candidates put a kink in their line to include the anomalous point. Candidates would be well advised to draw their line of best fit in pencil, so that they can rub out their first attempt if they wish to improve their line.

(a) (ii) This was generally quite well answered and reflects the good preparation for ISAs. A wide variety of answers were accepted. The most common misconception seemed to be that some candidates thought that the errors would occur because the intervals between the chosen concentrations were not constant. Some candidates did not understand the question and stated that the errors were as a result of using different concentrations of sodium thiosulfate. A wide range of answers was accepted but we did not accept systematic errors.

(b) (i) Very few candidates made the connection between direct proportionality and a straight line graph. We accepted answers such as, the rate of reaction increases as the concentration increases, and these types of answer proved to be the most common accepted responses. A number of candidates stated that there was positive correlation and were given a mark. Only a small number of candidates used readings from the graph to show that rate and concentration are directly proportional. A fairly large number of candidates gave answers which revealed confusion between rate of reaction and time taken to react.

(b) (ii) The collision theory proved difficult for many of the F tier candidates in this part. Very few of the candidates gained both marks and only about one third of them gained one. A lot of answers discussed the energy or speed of the particles, confusing concentration with temperature effects that had clearly been well drilled. There was also frequent confusion about the difference between rate of reaction and time taken, so that answers such as 'there are more particles so the reaction will take a longer time', were often seen. References to collisions were often too vague and did not indicate that the frequency of the collisions would increase.

Question 8

(a) Few of the candidates were able to identify the ion which makes the solution acidic. All possible answers were seen including OCl^-, Cl^-, Cl_2 and H_2O. Some species not shown in the equation were also given as possible answers.

(b) (i) This was better answered by foundation tier candidates than the equivalent question last year, even though the formula was more complicated. Many candidates gained the correct answer with clear working. However, common errors included incorrect use of the calculator in adding the correct numbers, ignoring the formula and simply adding 40+35.5+16 to get 91.5, misunderstanding the formula and adding $40 + 35.5^2 + 16^2$ or $40 \times 35.5^2 \times 16^2$, and calculation of the correct value of the M_r and then doing further calculations with it so that the final answer is incorrect.

(b) (ii) This part proved very difficult for F tier candidates as in previous years. Very few gained both marks and many made no attempt. The question discriminated well between the grade C and grade D candidates. Grade C candidates showed clear working, calculated the correct answer and appropriately rounded the final answer.

A significant number of candidates gave no working with an incorrect answer so that no marks could be awarded. Others did not multiply by 100 to gain the percentage or performed incorrect calculations such as 143÷71 x 100. A number of candidates used 35.5 for the mass of chlorine rather than 71. Some candidates rounded down their answer to 49 and lost one of the two marks.

(b) (iii) This was also poorly answered with a large number of candidates making no attempt. Many candidates gave impossible answers larger than 20g and should be encouraged to check that their calculated answer is sensible.

(c) (i) Very few candidates were able to make the link between the OH^- ion and the fact that this could be supplied by an alkali. We also accepted any named hydroxide or even just hydroxide. Answers such as, add hydrogen oxide or add acid, were common.

(c) (ii) Few candidates understood the term precipitate here. A common misconception is that it is a waste product or something left over at the end of a reaction. References to gases, liquids and cloudy were common.

(c) (iii) Many candidates who gave the correct answer to the previous part still gave an incorrect response in this part. Evaporation and electrolysis were the most common answers! Some candidates gave a list of methods which often included the correct answer but they should be reminded that the examiner cannot choose the correct answer for them.

Mark Ranges and Award of Grades

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