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General Certificate of Secondary Education

Additional Science 4463 / Chemistry 4421

CHY2F Unit Chemistry 2

Report on the Examination

2011 examination – June series

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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.
In the multiple choice style questions there are still a few candidates who give more than the required number of responses.

Question 1 ***(Low Demand)***

(a) Part (a) tested the ability of the candidates to interpret the information given in a simple diagram. Most candidates gave correct responses. Ionic was a common incorrect response in part (iii).

(b) and (c) This question was a good discriminating question. A significant number of candidates mistakenly thought that nitrogen is obtained from natural gas and that hydrogen is obtained from air. The vast majority of candidates identified that the symbol means 'reversible'. Much guesswork was evident in (b)(iii) and (c).

(d) (i) Candidates were able to answer this question well in terms of expressing an idea of the loss of jobs or people having to move away from the town. Credit was also given by relating the closure of the mine to loss of income or local businesses losing trade. No credit was given for repeating the question and stating that the mine would be closed without further qualification of an effect on the people of Humberstone. Vague answers discussed the problems caused by the manufacture of ammonia by the Haber process rather than the effect on the people of Humberstone.

(d) (ii) Many candidates gave vague answers such as 'easier or quicker to get' or they mentioned 'cheaper, quicker or safer' without any further explanation. Likewise many references to the economy lacked detail. Candidates who scored credit had the correct idea of lower transport costs and less pollution because of less transport if the ammonia was manufactured in the UK.

Question 2 ***(Low Demand)***

Factors that increase the rate of a reaction are generally well understood. Most candidates scored full marks though some thought that using larger lumps of phosphate rock would increase the rate. A number of candidates ignored the instruction to tick three boxes and ticked four boxes and were penalised.

Question 3 ***(Low Demand)***

(a) This part was generally well answered although some of the candidates named lead as the element.

(b) Here some failed to gain credit because they discussed the idea of weak bonds and atoms rubbing off, often in great detail and sometimes referring to friction, but made no reference to the layers in the graphite which were weakly held together or could slide over each other. Others gave answers in terms of layers which were strongly bonded.

(c) Less than half of the candidates correctly identified that covalent bonds held the carbon atoms together in the layers in (c)

Question 4 *(Low Demand)*

(a) and (b) Parts (a) and (b) were both well answered. The most common incorrect responses were 'are too small' in part (a) and 'petrol' in part (b).

(c) (i) The vast majority of the candidates chose the correct property, 'a positive charge'.

(c) (ii) The type of bonding was less well known in this part with a substantial number of candidates choosing 'compounds' or 'molecules'.

Question 5 *(Low Demand)*

(a) Many of the candidates were able to answer the question by utilising the definition of an exothermic reaction as heat or energy being given out. Incorrect answers referred to the wire getting hot. Many vague answers stated that smoke was produced or that burning and light showed the reaction to be exothermic.

(b) Potential energy was a common incorrect response.

(c) Most of the candidates were able to complete the word equation using the information in the question. The most errors in not obtaining the mark were using incorrect formulae, oxide or carbon dioxide instead of oxygen and omitting the oxide from aluminium. Some random guesses were evident.

(d) This part was very well answered.

(e) Much confusion was seen here. A significant number of candidates thought that electrons were positively charged in (e)(i). In questions (e)(ii) and (e)(iii) a lack of knowledge and understanding was evident. The majority of candidates believed that when an aluminium atom turns into an aluminium ion that electrons are gained. Similarly when oxygen atoms form oxide ions that electrons are lost. Most candidates realised that two electrons were involved and scored partial credit in (iii).

Question 6 *(Standard Demand)*

(a) Most of the candidates were able to recognise that bacteria were killed by the action of silver here; some answers lacked detail and waffled about the silver trapping smells.

(b) The majority of candidates were aware of the need to write smaller rather than just small as a comparison.

(c) This question was a good discriminator and was less well answered. The idea that nanoparticles have a larger surface area was not well understood and there were very few correct answers. Most of the answers referred to the small size of the particles and as a result more could be packed into a small area or fit into the particles more easily. Other responses discussed the trapping of bacteria and smells and preventing them escaping.

(d) This question was well answered and most candidates scored full credit. Most candidates linked the ideas of not being washed out into rivers, therefore not harming the fish. A number of candidates wrote 'if silver is released…..' and only implied that it would be better not to release the silver and did not give sufficient detail.

Question 7 ***(Standard Demand)***

(a) This question was not very well answered with the majority of the candidates being unable to pick out the idea of 'gases from the equation. Most answers indicated that the water and carbon dioxide were used and burnt in the flame or that the water evaporated and the carbon dioxide was burnt. Vague references to waste products escaping were also prevalent.

(b) Parts (b)(i) and (b)(ii) were quite well answered. In general Foundation Tier candidates are getting better at calculating relative formula mass. Over half of the candidates gained both of the marks in part (b)(i) which is similar to the same type of question last year. A correct answer gained two marks but one mark could be gained if there was evidence of an intention to add the correct numbers. Common errors included multiplying the atomic masses '64 × 16 = 1024' and subtracting '64 – 16 = 48'. Foundation Tier candidates have for many years found the calculation of the percentage of an element in a compound very difficult so it is pleasing to note about a third of candidates gained both marks. A number of candidates gained one mark by showing 64/80 or a suitable error carried forward from part (i). Here the most common error was not to have used 100 in their calculations. The most common answer gaining no marks was 51.2 % derived from 64 × 80/100.

(b) (iii) A considerable number of candidates copied the information from the results table given for 7(c) instead of using their answer from 7(b)(ii) and wrote 3.3.Only a minority of candidates scored a mark for this question. Many answers were far in excess of 4 grams even though their answer to (b)(ii) was much less than 100 %. Many candidates did not use the 4 grams in their calculation and therefore guesses abounded.

(c) (i) A significant number of candidates did not have a calculator. Common answers were 10 as they forgot to divide by 3 and some included the 4.0 in the calculation.

(c) (ii) The idea of smaller scale division eg measuring to more decimal places was not widely understood. The majority thought that comparing or repeating the test made it more precise. Many candidates were confused and suggested that rounding up to the nearest whole number improved precision.

(c) (iii) This part was not answered well with only a small percentage of candidates scoring both marks. The main problem was that answers were too vague or not qualified. For example the responses 'measuring error' or 'reading error' were common as well as 'measuring the amount of copper/copper oxide'. In the latter case it was required that candidates demonstrated that they knew that it was the mass of copper/copper oxide being measured or at least that the apparatus being used was a balance. The sloppy use of scientific terms was prevalent, such as interchanging copper and copper oxide in statements as if they were the same substance. The difference between the terms temperature and heat is not understood. Another common incorrect response was the issue of reliability and candidates responded in terms of not enough repeats as an experimental error.

Students are also unaware of the consequences of systematic errors. The most common correct responses were those detailing that the copper/copper oxide had been weighed incorrectly, recording the results wrongly and the balance being faulty. Other creditworthy responses referred to the heat control between experiments and the regulation of the amount of methane passed during the experiments.

Mark Ranges and Award of Grades
Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

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