Version 1.0 28/07/10

General Certificate of Secondary Education

Additional Science 4463 / Chemistry 4421

CHY2F Unit Chemistry 2

Report on the Examination

2010 Examination – June series

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Set and published by the Assessment and Qualifications Alliance.

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Registered address: AQA, Devas Street, Manchester M15 6EX

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 were still a few candidates, although fewer than last year, who gave more than the required number of responses.

Question 1 *(Low Demand)*

This question was designed to give candidates a gentle start to the paper and the vast majority of the candidates were able to attempt the question and to gain marks.

(a) Tested the ability of the candidates to interpret information given in a simple equation. Most candidates gave the correct response, although a number reversed the colours and gave, from blue to white. A few candidates gave vague responses such as clear or transparent instead of white. Examiners have noted for a number of years that students do not appreciate the difference in meaning of the terms clear and colourless.

The vast majority of candidates identified that the symbol means reversible. The most common incorrect response was exothermic.

Question 2 *(Low Demand)*

(a) (i) Nucleus and neutron were well known in this part and (a)(ii)

(a) (iii) In this part fewer of the candidates realised that electrons have a negative charge.

(b) (i) The concepts of atomic number and mass number were well understood by most of the candidates in parts this part and (b)(ii) although slightly more of the candidates understood atomic number.

(c) This part was less well known with a large number of candidates opting for $^{8}_{6}C$.

(d) (i) A large number of students gave, CH^4 , rather than the correct answer CH_4

(d) (ii) Most candidates answered this part of the question and part (d)(iii) correctly although a sizeable number gave the alternative responses.

Question 3 *(Low Demand)*

(a) This part was generally well answered although some of the candidates did not read the question carefully and did not answer the question set. Some failed to gain credit because they discussed the rate of the reaction, often in great detail and sometimes referring to collision theory but making no reference to the brightness of the glow stick whilst others gave answers in terms of time which would have been more appropriate to part (b). Vague answers such as the light would be affected did not gain any marks. A number of candidates misinterpreted the data and thought that increasing temperature results in a decrease in light production.

(b) This part was also well answered. We have noticed over a number of years that candidates find difficulty in distinguishing between rate of reaction and time taken for a reaction. In the context of this question, which was intended to be of low demand, we felt that answers in terms of rate or speed of reaction should be accepted as alternatives to answers in terms of time since the candidates clearly understood the underlying concepts. It should be stressed, however, that we do still expect candidates to understand the difference between rate of reaction and time taken and in a different question this concept may be examined. A few candidates gave vague answers in terms of brightness and energy without any reference to time or rate.

(c) This part was well answered with a large number of candidates gaining all three marks. A number of candidates ignored the instruction to tick three boxes and ticked four or in one case five. No marks were gained for ticking all five boxes!

(d) Many of the correct answers centred on repeating the investigation or using a wider range of temperatures. Answers which did not score credit included using catalysts, changing the concentration of the water, leaving the stick in the water longer and comparing results with other students. It should be noted that, as in the ISA tests, a statement such as make it a fair test, was not given credit unless it was qualified by ideas as to how the student could make the test fairer.

Question 4 ***(Low Demand)***

(a) This part of the question was well answered. The most common incorrect responses were nitrogen.

(b) This part of the question was well answered. The most common incorrect responses were some.

(c) The type of bonding was less well known with a substantial number of candidates choosing ionic or metallic. The number of atoms to which each carbon atom is joined was also not well known with more candidates choosing the incorrect response, three, than the correct response, four.

(e) The vast majority of the candidates chose the correct property, hard.

Question 5 ***(Low Demand)***

Many of the candidates over the last few examinations have found difficulty with precipitation reactions and this was also true this year.

(a) (i) Almost half of the candidates thought that the process was electrolysis with only about one quarter selecting the correct answer, precipitation.

(a) (ii) Was better answered but a significant number chose either distillation or evaporation.

(a) (iii) Use of the solubility table proved difficult for many of the candidates.

(b) Discriminated very well between the candidates with significant numbers of candidates scoring 4, 3, 2 or 1. The candidates were expected to use their knowledge of ionic bonding to help them to interpret the diagram and to explain in words the processes taking place. Some very good answers were seen in which the processes of ion

formation in both magnesium and iodine to give magnesium iodide were well explained but there were also many rambling answers in which the key words (ion, atom and electron) were used, but unfortunately in the wrong context.

A number of the candidates wrote at length about the sharing of electrons and covalent bonding and then, almost as an afterthought, referred to ions. A minority of candidates discussed the transfer of protons while others detailed the gaining of electrons by magnesium atoms or the loss of electrons by iodine atoms. Some candidates were able to explain how the ions were formed but then lost a mark by describing the bonding as covalent or suggesting that the atoms are sharing electrons.

Question 6 *(Standard Demand)*

(a) (i) Most of the candidates were able to obtain the relevant data from the diagram and correctly complete the word equation in (a)(i). A few candidates included ions or the condenser in the equation.

(a) (ii) Was less well answered. Many answers focused on the properties of iron such as low reactivity, good conductor of heat or simply the idea that it is a metal without explaining why iron is used in this reaction. Simple answers such as it make the reaction go faster or it is a catalyst were all that was required. A small number of candidates gave higher level responses such as, it lowers the activation energy, and these were also accepted.

(a) (iii) We were looking for two of the following three ideas:

- the mixture is cooled
- the ammonia turns into a liquid
- the nitrogen and hydrogen remain as gases.

Very few candidates gained both marks any many did not identify any of these points. If a candidate did not score any of the above points we allowed one mark for either identifying that the mixture is separated in the condenser or for stating that the unreacted nitrogen and hydrogen is recycled. Common misconceptions were that the mixture is filtered or that the ammonia is heavier than the nitrogen and hydrogen. Answers to this question showed that many candidates do not understand the function of a condenser or the process of condensation.

(b) In general F-tier candidates are getting better at calculating relative formula mass. About half of the candidates gained both of the marks which is an improvement on the similar 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 and adding 1+14+16 = 31.

(c) F-tier candidates have for many years found the calculation of the percentage of an element in a compound very difficult. This skill was tested in an unfamiliar way so it is pleasing to note that slightly more candidates gained both marks than in the equivalent percentage calculation last year. A number of candidates correctly identified the correct answer, C, but were not able to show how they arrived at their answer and consequently only gained one mark.

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

(a) (i) This part was very well answered with the majority of the candidates being able to pick out the idea of different properties from the text.

(a) (ii) Many of the candidates gave correct answers related to the status of the scientists. A variety of other answers were accepted including ideas which overlapped with part (iii) such as the idea that experiments could be repeated. We also accepted answers related to the strength of the evidence. Some candidates used the word they in their answers and did not make clear whether they were referring to Crawford and Cruikshank or the other scientists

(a) (iii) We were looking for answers such as: other scientists obtained similar results or the experiments were repeated. A number of candidates simply stated that other scientists agreed with Crawford & Cruikshank and this was insufficient to gain credit.

(b) (i) It is pleasing to note that many of the candidates have a good grasp of the experimental design aspects of How Science Works and were able to gain the mark here. The most common correct responses were that the amount of chloride or the amount of water should be kept the same. We accepted answers which used the term amount but candidates should be encouraged to use terms such as mass or volume. We also allowed the idea that the **starting** temperature should be kept the same. Vague answers which simply stated temperature were not accepted. Some confused answers were seen which suggested controlling the temperature **after** the chlorides had been added to the water and were obviously given no credit! Some candidates thought that the amount of hydrochloric acid used should be controlled confusing the addition of water to strontium and barium chlorides with the preparatory experiment of adding hydrochloric acid to strontianite and barium carbonate.

(b) (ii) This part revealed that many candidates still find difficulty in linking a temperature drop with endothermic. To gain this mark they had to both identify the correct experiment **and** give a correct reason for their answer. Answers such as experiment 1 because the reaction has taken in energy so the temperature goes up showed that the candidate did not really understand the meaning of endothermic. A simple answer such as Experiment 2 because the temperature has gone down was sufficient to gain this mark. Some candidates incorrectly use the words heat and temperature interchangeably.

(b) (iii) This was intended to be a searching question for the grade C candidates. It is pleasing, therefore, to report that about one third of the candidates gave a correct response. A simple answer such as the temperature goes up for one and down for the other was sufficient to gain the mark. Many vague or confused answers were seen for this question.

(c) Many of the candidates gained the mark for the simple answer, it is positive. There were also a number of confused answers involving positive electrodes, electrons or atoms and these were not given credit.

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