Version 1.0

General Certificate of Secondary Education

Additional Science 4463 / Chemistry 4421

CHY2F Unit Chemistry 2

Report on the Examination

2011 examination – January 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

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. Some excellent papers were seen.
The importance of carefully reading the instructions given in the question cannot be stressed enough. For example a number of candidates when asked to tick or draw a ring around **the** correct answer ringed or ticked two answers rather than one. Similarly, some candidates when specifically asked to tick two answers either gave only one or gave three.

Question 1 (Low Demand)

The Haber process gave the vast majority of the candidates a familiar and friendly start to the paper.
Parts (a), (c) and (d) were all very well answered. In part (b) a fairly large number of candidates gave the answer, 'nitrogen and hydrogen are gases', rather than the correct response, 'the reaction is reversible'.
In 1(d) some candidates thought that the unreacted gases would condense or turn into gases while others discussed the release of the gases into the air.

Question 2 (Low Demand)

a) This part was well answered with many candidates gaining both marks for this comprehension exercise.
Some **v**ague answers were seen referring to the appearance of the wooden bowl e.g. shiny or rotting. Others thought that the dyes did not dissolve in the water or the methanol or that more dyes dissolved in the methanol as opposed to the ease of solubility. A common incorrect answer was that the methanol took longer to soak in.

b) Parts (b)(i) and (b)(ii) were both accessible to most of the candidates.

c) This question was less well known with a large number of candidates choosing, 'It has a giant covalent structure'.

Question 3 (Low Demand)

a) Almost all of the candidates identified the electronic structure correctly in part (a)

b) Many candidates gained one mark but fewer gained two. A surprising number thought that 'the atoms are all joined by covalent bonds'.

c) (i) A surprisingly large number of candidates chose 'hydrochloric acid'

c) (ii) This part was designed to test understanding of equations and state symbols. A large number of candidates thought that 'water is formed', even though water is not in the chemical equation.

c) (iii) A minority of the candidates chose the correct response. The most popular response was 'electrolysis'.

Question 4 (Low Demand)

Part (a) was well answered although a number chose 'low boiling point'. Parts (b)(i), (b)(ii) and (b)(iv) were all well answered. In part (b)(iii) a large number of candidates chose 'ionic' rather than the correct answer 'covalent'.

Question 5 (Low Demand)

a) A large number of candidates thought that the exothermic reaction would make the temperature of the engine decrease rather than increase in part (a)(i). In contrast, the definition of exothermic, in part (a)(ii), was very well answered.

b) (i) This was not well answered with many wild guesses. Many answers gave complete equations which were often incorrect.

b) (ii) A fair number of candidates wrote incorrectly and at length about the role of carbon monoxide in environmental pollution e.g. global warming, formation of acid rain and the destruction of the ozone layer and did not gain credit. Creditworthy answers discussed the poisonous or toxic and harmful nature of carbon monoxide with some referring to 'the silent killer'.

c) Many of the candidates gained both marks for identifying that catalysts can speed up chemical reactions and that different reactions require different catalysts.

d) The vast majority of candidates realised that nanosized particles are smaller the normal sized particles

d) (ii) Many correct answers commented on the expensive nature of platinum. Vague answers referred to the reactivity of platinum or rate of reaction.

Question 6 (Standard Demand)

a) This part was answered incorrectly by the vast majority of candidates. Many discussed the conduction of the electricity by atoms or electrons without reference to ions. The idea of oppositely charged particles attracting was also common. Only a small number were able to identify the role of moving ions.

b) Most answers either stated that chloride ions were negative or that opposite charges attract. Poor answers involved reference to negative electrodes and positive charge.

c) This part was surprisingly poorly answered. The most popular responses were pH 5 and pH 7.

d) (i) Many candidates correctly drew a straight line through 5 points missing out the anomalous point. Some lines only went through some of the points while others included the anomalous point and these lines were not given credit. Multiple lines and curves were also penalised. There was also evidence of lines drawn in ink or candidates with no eraser as a number of answers contained crossed out lines or annotations pointing to the "wrong" line. In some of these it was very difficult for examiners to distinguish which part of the line candidates intended to be their correct answer.

d) (ii) The anomalous result was often correctly identified though 2.2 was a common error and wild guesses were also evident.

d) (iii) This part discriminated very well between the candidates. Weaker answers were vague and candidates often wrote at length but without the required detail to gain credit. Common examples of vague answers were; 'experiment was done wrong', 'there was a mistake or error', 'equipment was faulty' and 'incorrect measurement'.
There were frequent references to human, random and systematic errors, which received no credit unless they were further qualified with a specific idea e.g. error in weighing out sodium chloride or measuring the volume of the hydrogen.

d) (iv) This part was answered correctly by the vast majority of the candidates. The most common correct responses were those with the idea of repeating the experiment or comparing results with others. A few vague responses such as 'do more tests' or 'average results' received no credit.

d) (v) Most candidates realised that there would be an increase in the volume of hydrogen or that it would be produced faster. A minority of candidates confused time and rate and stated that it would take longer.

Question 7 (Standard Demand)

a) (i) A very good number of the candidates gained both marks for this question and showed a good understanding of the meaning of the relative formula mass. One mark was allowed for evidence of correct working, i.e. 81-16, if the final answer was incorrect e.g. 75. A common incorrect answer was 97.

a) (ii) Error carried forward was allowed from part (a)(i) to part (a)(ii) and many of the candidates gained this mark. Technetium and molybdenum scored credit for 97 using error carried forward from part (i). Some of the candidates confused relative atomic mass with atomic number when using the periodic table. Thallium was a common incorrect answer, even when part (i) was correct, which showed a lack of understanding of the difference between atomic mass and formula mass.

b) (i) This part proved difficult for many of the candidates. The mark scheme gave one mark for the idea of the iron atom losing electrons and one for the idea that three electrons are involved. A fair number of candidates gained one mark for the idea of electrons being lost by an iron atom but fewer candidates realised that 3 electrons were lost. Some confused answers referred to sharing electrons and covalency and iron ions losing electrons**.** Some candidates thought that protons or ions were transferred and that oxygen gave electrons to the iron atom, which showed a lack of understanding.

b) (ii) The mark here was gained by a fair number of candidates. Many candidates completed the diagram by drawing 4 or 6 electrons in the outer shell instead of 8. A minority of candidates inserted extra electrons into the inner shell and were penalised.

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