



General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Report on the Examination

2011 examination – January series

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Science B / Chemistry
Foundation Tier CHY1F**General**

There were seven questions on this paper. The first five were targeted at grades G to E. The last two were common to Foundation and Higher Tiers. They were targeted at grades D and C.

The mark scheme was designed to allow students to gain marks for showing knowledge, understanding and application of chemistry. The extended response questions caused problems for some students who could not organise their answers. However, students are becoming better at fully answering questions and therefore gained more than one mark on the questions that were worth more than one mark.

The majority of students appeared to have sufficient time to complete the paper. A few students used up a lot of space by repeating the question, which really is not needed in an examination and just wastes their time. There seemed to be a large number of students whose scripts were difficult to read, either due to poor handwriting or use of pens other than black, or both.

Students were far better at fitting their answers into the space available; there were far fewer additional pages, but a few students used additional pages to write very few words, which would have fitted on to the original paper.

Basic knowledge and understanding of how science works in everyday situations, including in the laboratory, are tested throughout this paper. This means that it is essential that students read and analyse the information provided, then read and understand the question before writing their response.

Students should then read through their answers, especially those that are descriptions or explanations. Many students use 'it' or 'they' without any clear indication of what the student is referring to.

As in previous papers, this paper produced a good degree of differentiation amongst students with a fair spread of marks.

Question 1 (Low Demand)

- (a) The majority of students achieved full marks for identifying that nitrogen is an element and carbon dioxide is a compound.
- (b) Most students achieved full marks for correctly labelling the electron and the nucleus in a hydrogen atom.
- (c) Most students managed to gain a mark by giving oxygen as the reactant and a majority of these students seemed to appreciate that water was formed, many calling it hydrogen oxide. There were some who just used the formula given to them or thought that the reaction produced hydroxide.

Question 2 (Low Demand)

- (a) (i) The majority of students gained credit for knowing that chromatography is the method used to detect and identify colours in food.
- (a) (ii) Most students understood that the food contained three different colours.

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- (a) (iii) Many students had difficulty describing the positions of the colours on the chromatogram. A comparison of levels is the probably the clearest way. There were still far too many vague descriptions of what was happening or comparisons of the number of colours on each columns.
- (b) (i) Surprisingly, less than half of the students could give the correct reason that colours, such as quinoline yellow (E104), are added to improve the appearance of the food. Many students thought that the colouring was added to improve the taste of the food or to make food sweeter or to provide an energy boost or even to preserve the food. Several students also thought that it was a good idea to add E104 because it would make people hyperactive
- (b) (ii) Most of the students managed to get the idea that further or different tests were needed. There were a few students who incorrectly wanted to use chromatography again, use a different colouring or simply ban E104.

Question 3 (*Low Demand*)

- (a) (i) Students should use a ruler to draw straight lines. Far too many students lost the mark because their lines were drawn free-hand and touched 84% or 86%. However, most students did manage to get the mark. The most common mistake was to draw a line at 90% instead of 85%.
- (a) (ii) Nearly all students knew that sulfur dioxide causes acid rain. Many students incorrectly thought that carbon particles cause global warming.
- (b) (i) This question was poorly answered. The most common mark awarded was for plants or trees absorbing carbon dioxide. A few students incorrectly stated that coal absorbed carbon dioxide or that there was less carbon dioxide because burning coal was not done then or that coal is not used now. Very few students mentioned that carbon dioxide was locked up in coal.
- (b) (ii) Many students stated that carbon dioxide was released but failed to mention that burning coal increases the amount of carbon dioxide in the Earth's atmosphere. Only a few students managed to gain the second mark for carbon being coal or for coal reacting with oxygen. Students must read and answer the question asked. Many read the question as 'How does burning coal affect the Earth's atmosphere?' and answered in terms of global warming.

Question 4 (*Low Demand*)

- (a) Many students realised that the most important property of the iron (steel) when used for pylons is strength. Most students gave incorrect answers such as iron does not conduct electricity or iron does not rust.
- (b) Most students managed to gain at least one mark here for stating either aluminium was less dense or more abundant. Several students were convinced that copper is too good a conductor of electricity and so could cause explosions and electric shocks. Some students used several or all the properties in the table in support of their answer. Simply quoting figures from the table does not constitute an answer. Students should be encouraged to use comparisons in their answers to this type of question.
- (c) (i) Most students gained credit for correctly identifying that C_2H_4 was the chemical formula of the displayed alkene structure.

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- (c) (ii) Again most students gained credit for identifying that the two lines between the carbon atoms in the displayed alkene structure was a double bond.
- (c) (iii) A majority of students gained the mark for knowing that the name of the polymer formed when many of the alkene molecules join together was poly(ethene).

Question 5 (Low Demand)

- (a) (i) A majority of students successfully scored a mark here by calculating that the mean value was 2.5kg.
- (a) (ii) It was very pleasing to see so many selecting the correct result and also knowing that it was an anomalous result. Many students were careless in giving their answer as 40% and Test 2 instead of Test 3.
- (a) (iii) More than half of the students managed to state the correct relationship. A few students just quoted the figures and did not go on to give the relationship.
- (a) (iv) There were not many correct answers. The question was attempted by most students but few stated the variable that should have been recorded was 'volume of water' or 'temperature'. Many students incorrectly suggested 'time taken to break', 'length or weight of the sleeper', 'amount of crushed rock added' or even 'total mass used'.
- (b) This question was poorly answered. Most students did not give answers that referred to 'information about the three materials' that is cement, sand and crushed rock. The main correct answers were 'cost of the materials' and 'availability of the materials'.

Question 6 (Standard Demand)

- (a) (i) This question was poorly answered. The stem informed students that carbon neutral means that there is no increase in the amount of carbon dioxide in the atmosphere. Students were then expected to link the concept of carbon neutral to the idea that the crops absorbed carbon dioxide, which was then released when the biodiesel was used as a fuel. It is surprising how many students think that biodiesel emits no carbon dioxide on burning. Some students were incorrectly influenced by the word 'advertises' and thought that because biodiesel is 'carbon neutral' and 'natural' then more biodiesel will be sold (marketing ploy).
- (a) (ii) About half of the students scored one or two marks. Here the idea was either that clearing forests by burning trees added to the carbon dioxide in the atmosphere or that the removal of these trees meant that there was less photosynthesis to remove carbon dioxide from the air. Many students answered in terms of destroying habitats and reducing biodiversity which did not answer the question.
- (b) Surprisingly, very few of the students could give a correct answer as to why there is an increasing demand for biodiesel. The increasing demand for biodiesel was most commonly linked to the fact that fossil fuels are running out or to the fact that biodiesel is renewable. Too many students gave vague answers that there is an increasing demand for biodiesel because it is 'environmentally friendly'.
- (c) (i) The ethical issue caused by the use of crops for biodiesel instead of for food was not well known. The few students that got the mark did so for 'destroying habitats' or for the suggestion that 'there would be less food or starvation'.

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- (c) (ii) This part was poorly answered. The economic impact of increasing food costs was even less well known. A lot of students did not understand the distinction between ethical and economic factors.

Question 7 (Standard Demand)

- (a) (i) Most students managed to get the mark for stating that the plates were moving or it was a plate boundary.
- (a) (ii) Surprisingly, few students could give a correct suggestion as to why scientists cannot predict when earthquakes will happen. The main correct suggestions were that scientists do not know what happens below the Earth's crust or that there is no pattern as to when earthquakes occur. The most common incorrect answers to the inability of scientists to predict when an earthquake will happen simply repeated the stem.
- (b) (i) Wegener's lack of evidence or that he could not explain how continents could move was known by many students.
- (b) (ii) Most students scored one or two marks. The majority of these students only got one mark mainly because they repeated the same idea twice. This was the idea that the coastlines had shapes that fit or that there were matching sedimentary rocks on both continents. The similarity of the sedimentary rocks or the similarity of the fossils in them was often not mentioned.
- (c) The explanation of what is causing the continents of South America and Africa to move further apart was poorly answered. Most students made incorrect statements such as the continents moved apart because of earthquakes, the oceans pushing them, sea levels rising, tsunamis or global warming. Of those students who understood what actually happens most gained marks for mentioning that convection currents happened in the mantle. Only a very few students knew that these convection currents were caused by radioactivity.

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