



General Certificate of Secondary Education

**Additional Science 4408 /
Chemistry 4402**

CH2FP Unit Chemistry 2

Report on the Examination

2012 examination – June series

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Set and published by the Assessment and Qualifications Alliance.

Additional Science / Chemistry Foundation Tier CH2FP

General

The majority of students were able to make a good attempt at almost all the questions.

It is important that students follow the instructions in each question carefully, for example by ticking or ringing the number of answers indicated in the question.

Question 1 (Low Demand)

- (a) Hydrogen and hydroxide were common incorrect answers.
- (b) (i) Many students showed they understand the meaning of the term 'line of best fit'. Unfortunately a significant number of students drew random straight lines, some missing points out and others including the anomaly.
- (b) (ii) A few students circled the wrong point or did not attempt the question.
- (b) (iii) Reading the scale on the y axis was a problem for many students with incorrect answers such as 5, 5.5, 7 and 8 common. The majority of students realised that the volume of oxygen increased in (iv).

Parts (c), (d) and (e) were generally well answered.

Question 2 (Low Demand)

- (a) A minority of students scored full credit. Many students did not appear to know these basic chemistry principles. 197 and 79, sometimes reversed, were the most common answers.
- (b) & (c) Wild guesses were evident.
- (d) The function of a catalyst is well known by many students.
- (e) Responses showed that students did not understand the structure of a thermosetting polymer. Vague answers were prevalent referring to chains overlapping, strong bonds between the atoms and intermolecular forces and atoms in chains. Reference to cross links was rare.

Question 3 (Low Demand)

- (a) A minority of students were unable to correctly complete the table.
- (b) (i) A few incorrect responses such as endothermic or thermal.
- (b) (ii) Generally well answered showing an awareness of greater temperature change rather than just referring to starting and final temperatures. Some students thought that the answer was B because you would not want the hand warmer to be too hot in case it burnt the hands.

- (c) Generally well answered apart from part (iv). Despite the use of the term ‘anhydrous’ earlier in the stem of the question most students failed to recognise and identify anhydrous copper sulfate. Copper sulfate, copper sulfate crystals and copper were answers showing a lack of knowledge and understanding.

Question 4 (Low Demand)

- (a) Wild guesses were abundant in both parts of this question.
- (b) (i) The principle of ‘opposite charges attracting’ was well known. Some confusion was evident with oppositely charged ions and oppositely charged electrodes attracting each other.
- (b) (ii) Generally well answered though carbon dioxide was often an incorrect answer.
- (b) (iii) A good discriminating question. Despite the information given in the question many answers failed to mention the reaction of carbon with oxygen or the formation of carbon dioxide.
- (c) The layers of atoms in aluminium and consequent sliding were well described by students. Many students scored credit for the idea of different sized atoms in the alloy disrupting the structure. Some were then able to explain the outcome of this ie lack of sliding. Vague answers referring to strong bonds were prevalent.

Question 5 (Low Demand)

- (a) Most students scored full marks for these three parts.
- (b) Generally well answered with a large number of students fully understanding the idea of layers in graphite that could slide or move over each other. Only a minority were able to explain that the layers were joined by weak bonds. Vague references to the layers having weak bonds, weak bonds in the layers, atoms not being close together and particles rubbing or slipping received no credit.

Question 6 (Standard Demand)

This question involving chromatography was generally not well answered. It appeared that many students had not had practical experience of carrying out paper chromatography.

- (a) (i) The vast majority of answers were incorrect. Many responses referred to the function of the lid as to preventing substances such as gases, oxygen and bacteria getting into the container. Vague references to contamination and preventing the escape of toxins/poisons and the colours were prevalent. The idea of preventing the loss/evaporation of solvent was rarely seen.
- (a) (ii) Generally well answered. A lack of knowledge and understanding was evident when some students discussed the problems of removing the ink compared to rubbing out a pencil mark if a mistake were made.
- (b) (i) A surprising number of students were unable to deduce that four different colours were present in the cake icing. Seven, three and two were common incorrect answers.

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- (b) (ii) Many students thought that the cake icing was safe because they identified the two safe colours and ignored the others. Answers that detailed that all the cake colours were safe showed a lack of understanding.
- (c) Only the more able students had any knowledge and understanding of gas chromatography.
- (c) (i) This was the best attempted part of the question. Confusion between accuracy and reliability and precision was evident. Vague references to better results, the cost and 'easier to do' were common.
- (c) (ii) The idea of separating the mixture was the correct answer. Poor responses referred to evaporation and the mixing of solvents.
- (c) (iii) Very few students scored credit here. Those who did implied that the identity of the solvents could be realised. Many vague answers such as 'something to do with weight/mass' showed no knowledge of molecular mass.

Question 7 (*Standard Demand*)

- (a) Many students simply answered the question using sentences/phrases from the stem of the question e.g. 'add the correct amount of hydrochloric acid to the potassium hydroxide' in a suitable container so that it was neutralised and then evaporating the solution.
Confusion existed between acid/alkali neutralisation and acid/base methods of salt preparation with many students describing removal by filtration of excess base. Many students referred to a colour change at the end point but had not mentioned that they had added an indicator. Poor answers started with potassium chloride solution instead of the reactants. A lack of care in the correct use of scientific terms was evident.
- (b) Generally well answered. Nitrate and nitrogen were incorrect answers and hydrochloric acid was seen.
- (c) (i) A good discriminating question. The more able students referred to plant growth or fertilisers. Many other answers wrongly concluded that the ammonium nitrate killed bugs, pests, insects, weeds or animals to protect the farmland or neutralised the soil.
- (c) (ii) Partial credit was often gained by ticking the correct box. Irrelevant points made concerned government and legal involvement. The washing off of ammonium nitrate was also discussed at length, which could not be a reason why the question 'should farmers stop using ammonium nitrate on their farmland?' cannot be answered by science alone.

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