



General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Report on the Examination

2009 examination – June 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, F and 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 candidates to gain marks for showing knowledge, understanding and application of chemistry. The majority of candidates appeared to have sufficient time to complete the paper and very few questions were not attempted.

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 candidates read and analyse the information provided, then read the question before writing their response.

Question 1

- (a) The majority of candidates knew that copper conducts electricity. Other acceptable answers were 'conducts/conductor' or that copper is 'flexible'. The most common incorrect responses were 'conducts heat' or 'insulator'.
- (b) Most candidates were able to identify that the particle was an electron.
- (c) (i) A large number of candidates used the information provided to write a correct reactivity series for the metals. The majority of candidates gained at least one mark for writing one metal in its correct position in the reactivity series.
- (c) (ii) A good percentage of candidates suggested correctly that tungsten is suitable for the filament wire in the light bulb because it has the highest melting point. Most incorrect responses were in terms of tungsten's low reactivity.
- (d) Most candidates knew that argon is used in the light bulb because it is unreactive.

Question 2

- (a) (i) Candidates usually could use the bar chart to identify wood as the fuel that releases least energy from 1g.
- (a) (ii) The majority of candidates were able to read correctly from the bar chart that burning 1g of coal releases 30kJ.
- (a) (iii) There were a surprising number of candidates who could not name an element in coal, given the names and formulae of the products of combustion of coal. Most candidates named one of the compounds given in the table.
- (a) (iv) Most candidates could not use the bar chart to calculate that 3g of petrol would release the same amount of energy as 1g of hydrogen.

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- (b) (i) Candidates were instructed to use the information from the bar chart and the diagram. There were several who made vague statements such as it's a clean fuel, it's eco-friendly or it's harmless to the environment. Most gained one mark usually for stating that water/steam was formed or that there would be no carbon dioxide/global warming. Several candidates thought that hydrogen is a major constituent of the atmosphere and as such is an unlimited source of energy and therefore cheap.
- (b) (ii) Many candidates obtained the mark by using the information provided that hydrogen is made from fossil fuels. Common incorrect responses were that hydrogen is flammable or hydrogen would produce too much water.

Question 3

- (a) (i) There was evidence that several candidates did not understand the figures in the table and also experienced difficulty in expressing themselves. Many candidates thought incorrectly that it was a low fat food, instead of indicating that the food was low in saturated fat or high in unsaturated fat. Candidates did not gain credit for comparing the two types of fat by using expressions such as more unsaturated fat or less saturated fat.
- (a) (ii) The test using bromine to detect unsaturated fats was well known.
- (b) (i) Most candidates knew that an emulsifier prevents a mixture of oil and water from separating.
- (b) (ii) Most candidates did not know that an emulsion has a better texture than the mixture of oil and water from which it was made.
- (c) (i) Despite the fact that the Specification includes detection and identification of artificial colours by chromatography, most candidates showed little or no understanding of the test results. These candidates often expressed their answers in terms of low = safe and high = unsafe. Candidates who gained one mark usually did so by stating that A has more colours than B.
- (c) (ii) The majority of candidates did recognise that the result shown was produced by chromatography.

Question 4

- (a) (i) A large number of candidates used the information provided to correctly identify nitrogen as the main gas in the Earth's atmosphere.
- (a) (ii) The majority of candidates realised from the data that carbon dioxide used to be the main gas in the Earth's atmosphere.
- (b) (i) Most responses were incorrect because they were based on the idea that there was a lack of valid evidence which was caused by inadequate technology or the composition of the atmosphere changing.
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- (b) (ii) Many candidates recognised that liquid water would not exist on the surface of Venus because it was too hot or any liquid water would boil/evaporate. Simply to state that the temperature on Venus is 460°C is an incomplete explanation and did not receive credit.
- (c) The diagram was given to cue candidates into how carbon dioxide was removed from the Earth's early atmosphere. Many candidates gained two marks for stating that trees absorb carbon dioxide and give out oxygen. Several of these candidates also appreciated that carbon dioxide was dissolved into the oceans. There was evidence that the majority of candidates do not understand that a large proportion of this carbon dioxide gradually became locked up in sedimentary rocks as carbonates and fossil fuels.

Question 5

- (a) (i) The majority of candidates recognised the molecular formula of ethene from its structural formula.
- (a) (ii) It was surprising how many candidates did not understand or know that when many ethene molecules join together they form poly(ethene).
- (b) (i) Most candidates knew that the majority of plastic waste is not biodegradable.
- (b) (ii) Many candidates understand that because most plastics do not break down for many years this causes landfill sites to become full and so more land is required for new landfill sites.
- (b) (iii) Few gained this mark. This was because most candidates did not answer in terms of the resources saved by recycling. Often candidates just restated recycle or reuse the plastics.

Question 6

- (a) (i) Most candidates could work out the number of different elements in the formula of calcium carbonate.
- (a) (ii) Most candidates did not understand how to work out the number of atoms in the formula of calcium carbonate.
- (b) The new cement works in the quarry, rather than 100 km away, produced a reasonable number of correct responses, mostly using the smaller distance idea that less transport meant less carbon dioxide emissions. Many candidates thought incorrectly that the quarry itself would retain the carbon dioxide or that the cement/limestone would absorb the carbon dioxide.
- (c) (i) There were good answers from many candidates. The most common misconceptions were that water vapour and nitrogen were emissions that might cause atmospheric pollution or that carbon dioxide would destroy the ozone layer.
- (c) (ii) Many candidates did not attempt to answer this part. Most of the correct suggestions were to use filters, scrubbers or sprays as ways of removing the atmospheric pollutant from the emissions.

Question 7

- (a) (i) The first part was not well answered, with a large majority of candidates incorrectly identifying the product for example as calcium hydroxide, slaked lime, plaster, limestone or carbon dioxide.
- (a) (ii) The hardening of plaster with age also caused problems. Few candidates had any idea what was happening in these reactions. Most did not focus on Reaction 3, although the question clearly stated that this was where the plaster became even harder with age. Very few candidates were able to identify reaction 3 and then go on to explain how the plaster hardened with age by reacting with carbon dioxide to produce the hard material calcium carbonate. The loss of water from the plaster by evaporation was often stated and creditworthy.
- (b) (i) This part was well answered with many candidates correctly describing the connection between the volume of sand and the strength of the mortar. The most common error made by candidates was to describe a relationship between the strength of the mortar and the height from which the ball had been dropped without referring to the strength of the mortar.
- (b) (ii) Many candidates recognised that there was an anomalous value in the table. This was usually done by reference to the small gap between the 36cm (500g) and 37cm (400g) or by mentioning the large difference between the 37cm (400g) and 48cm (300g) values. Some candidates could see that the difference between the 200 and 300 values was 6cm, but didn't appreciate that this was also the case with the values at the top of the table, missing the idea of a trend. However, a few candidates correctly identified the normal increment between heights was approximately 6 to 7cm or indicated that only one set of results had been obtained.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA Website.