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Summer 2013

International GCSE
Chemistry (4CH0) Paper 2C

Edexcel Level 1/Level 2 Certificate
Chemistry (KCH0) Paper 2C

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4CH0 2C June 2013 Report

Question 1
This question about separation techniques produced mixed responses, with even some of the more able students thinking that using paper chromatography would extract the red dye from a sample of rose petals. Simple distillation was often given as a method of separating ethanol and water. Although this method would produce a separation, it is not as good as fractional distillation, and the question called for the **best** method of separation to be given.

Question 2
This question proved to be slightly more challenging than was expected, with some students thinking that dissolving ammonia gas in water would produce no change in pH, while others thought that adding sodium chloride to water would make it alkaline. Dissolving carbon dioxide in water and neutralising sodium hydroxide with hydrochloric acid proved less problematic.

Question 3
Almost all students scored both marks in (a), with the occasional misreading of the first temperature as 27 ºC.

The graph was very straight forward to plot and there were few errors. When a mark was lost in part (i) it was invariably for failing to use a ruler to draw the straight lines. The most common incorrect answer in part (ii) was 0.55, presumably thinking that the next point on the scale was 0.6 and not 1.0.

In (c), the students that were awarded the mark generally stated that the copper sulfate had all reacted, with a small number identifying that all of the copper had been displaced. Some answers, such as 'there was not enough copper sulfate' or 'the magnesium was in excess' lacked sufficient detail to be worthy of credit.

Quite a number of the students mistakenly thought that using zinc would produce larger temperature rises with supporting explanations such as 'zinc has a larger atomic mass' and 'zinc has larger atoms'. Of the students who correctly identified that the temperature rises would be lower, very few went on to state that this was because fewer moles were reacting. Disappointingly, some students still argued along the lines of the difference in reactivity between the two metals despite the directive in the question.

Question 4
Most students identified the polymer as poly (ethene), but it was sometimes difficult to tell if the letter after the 'h' was an 'e' or an 'a'. Students should take care with their handwriting and appreciate that, in circumstances such as these, the benefit of the doubt is not given. Cracking was given as the correct answer to part (ii) by most students.

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In (b), some students failed to recognise that there was an instruction to complete the bar chart and of those that did, some lost a mark for not labelling the bar on the horizontal axis. The relationship between the boiling point of the alkane and the number of carbon atoms was easily identifiable, but some went on to mistakenly state that the relationship was proportional.

Part (c) was, in general, well answered with many gaining both marks in one sentence by stating that burning produced carbon dioxide that added to the greenhouse effect. Some students mentioned that the gases given off during burning are harmful or will cause pollution, but such answers were not specific enough to be given credit. Those that chose option A as their answer scored better since many answers for option B considered the effect on wildlife and their habitats rather than the shortage of landfill sites or the fact that the energy generated on burning can be used to provide heat and/or electricity.

Question 5
In (a), most recognised that unsaturated fats contain a carbon-to-carbon double bond, but a number of students still used ‘clear’ to describe a colourless solution, seemingly failing to appreciate that all solutions, regardless of colour, are clear. Although bromine water was described in the question as being orange, yellow and brown were not penalised. The number of students who knew that the reaction is an addition was lower than expected.

Most students correctly identified the food colourings in (b)(i) and (ii), but confusion between colourings and dyes in part (ii) made some answers difficult to interpret. There was no need to analyse the differences between named colourings. Comments on height and/or solubility of the dyes were also not required as the overall patterns should have been compared.

Question 6
Most students realised that sodium chloride has a giant ionic structure although some referred to it as being giant covalent or even molecular.

In (b), most students scored the last mark for correctly identifying that the forces of attraction between the particles in sodium chloride are greater than those in sodium, but this was often the only mark they scored. The particles in both sodium and sodium chloride were often incorrectly identified, with positive nuclei rather than positive ions common in the description of sodium, and molecules was disappointingly common when describing sodium chloride. Even when positive and negative ions were correctly identified in sodium chloride, the force of attraction between them was often described as being intermolecular rather that electrostatic. Careless swapping between ionic and covalent, ions and molecules caused a considerable number of students to lose marks.

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Part (c) produced many good answers. The most common mistakes were the use of 46 for the relative atomic mass of sodium and incorrect use of the stoichiometry of the equation, typically doubling the amount of sodium to obtain the amount of hydrogen.

The test for chloride ions, in (d)(i), should have been straightforward but some described the test for chlorine gas. Cream or yellow was sometimes used to describe the colour of the precipitate and some stated that a white solution would be formed.

The questions in (d)(ii) were based on the context of a student's choice of method for preparing sodium chloride. The majority of students realised that X could not be sodium hydroxide since the reaction mixture fizzed, and then went on to correctly identify X as sodium carbonate. Responses such as 'sodium hydroxide is not a solid' and 'sodium hydroxide is a solution' showed that some students may have never seen solid sodium hydroxide. As the question was based on an imperfect method suggested by a student, a few answers focused on the suitability of the student's method. These answers overlooked the mention of excess, simply stating that sodium hydroxide is soluble and could not be removed by filtration. Answers such as 'sodium hydroxide is soluble' were given credit.

Many students appear not to be able to answer the type of question in part (e) without showing the starting atoms. These were ignored, but those who simply drew an arrow to indicate that an electron was transferred from a sodium atom to a chlorine atom did not score the marks for the correct electronic configurations of the ions formed. Once again, there were some students who thought that sodium and chlorine combined to form a molecule and drew a shared pair of electrons between the two atoms.

Part (f) was very well answered overall. A common mistake was to state that the reactivities of sodium and potassium would be similar because both are in Group 1 and the reactivities of chlorine and bromine would be similar because both are in Group 7.

Question 7

There were many fully correct answers to part (a), with the most common mistake being nitric acid in place of potassium nitrate.

In (b)(i), graphite was accepted as inert electrodes, even though carbon will react with the oxygen produced at the positive electrode to form carbon dioxide. Platinum is the best material to use in this electrolysis.

Very few students appreciated, in (b)(ii), that the acid was added to increase the conductivity of water. Most thought it was to remove impurities, presumably confusing this with its use in the test for halide and sulfate ions. Some thought it would increase the degree of ionisation of water.

In (c)(i), there were many good answers focusing of the relative number of moles or number of molecules of hydrogen and oxygen, but some referred

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solely to the number of atoms of hydrogen and oxygen in water, thus failing to use the information in the equation, as directed in the question.

Surprisingly, some students who had listed graphite as an inert electrode in (b)(i) went on to state, in (c)(ii), that it reacted with the oxygen to form carbon dioxide, suggesting that they did not appreciate what is meant by the term 'inert' in relation to electrodes. Many appreciated that some of the oxygen evolved would dissolve on the water. Others did not carefully read the information supplied in the stem of the question and stated that some oxygen would escape into the atmosphere.

There were many fully correct answers to the calculation in part (d). Some only managed to calculate the number of faradays passed, whilst others failed to correctly use the stoichiometry of the equation and hence did not divide the number of faradays by two in order to calculate the number of moles of hydrogen.

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