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Examiners' Report/ Principal Examiner Feedback

January 2016

Pearson Edexcel International GCSE In Chemistry (4CH0) Paper 2C

Or

Pearson Edexcel Certificate in Chemistry (4CH0) Paper 2C

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Question 1

This was a fairly straightforward question about common laboratory apparatus and the measurements made using them. Not surprisingly, most candidates scored most or all of the marks, although there were several common errors. The quantity measured by a stop clock was sometimes given as rate, even though the time unit was given for this. Other unacceptable answers included 'measurements' and 'amounts'. Some candidates chose inappropriate units for laboratory apparatus, such as t for mass and m^3 for volume; imperial units such as lb and oz were rarely seen, but were also not accepted.

Question 2

Part (a) tested knowledge of types of substance and their bonding. The types were often correct, with the commonest error being to describe ammonia as an element. Errors in the bonding types were more frequent, with the commonest errors being to give 'ionic' for hydrogen chloride and 'metallic' for magnesium oxide. Most chose the correct formula for magnesium oxide in (b), but in (c) there were many who chose either aq or l for hydrogen chloride at room temperature.

Question 3

This question was about different aspects of some common elements. In part (a), the explanation for argon's lack of reactivity was often correct, but many candidates described argon as inert or noble, which, although correct, was not accepted as a reason. Those who came closer to scoring the mark referred to 'full electron shells' or '8 electrons in the shell', which were not accepted without a reference to 'outer' or similar - all four elements in the supplied table showed 8 electrons in one or more shells. In part (c))(i), it was pleasing to see many candidates being able to correctly describe the process of electron transfer in the formation of calcium chloride; there were many fewer scores of 2 than 3, reflecting the small number who did not manage to clarify that one electron transferred to each of two chlorine atoms. A minor cause of lost marks was the use of 'chloride atom' instead of 'chlorine atom'. There are unfortunately still too many candidates spoiling their answers by referring to the sharing of electrons, and who were not put off from doing this by the reference to 'ionic' in the question. Many candidates ensured high scores by using diagrams which, if clear, could score full marks. The formula of the calcium ion in (c)(ii) was usually correct, with Ca^+ the commonest error. Most did not score the mark in (c)(iii), perhaps through reluctance to choose calcium twice. It was disappointing to see more candidates scoring 0 than 2 marks in part (d) - in step 1, many corrected 'concentrated' to 'dilute' instead of changing the solution to hydrochloric acid, while in step 3, some deleted 'luminous' without replacing it or indicated that the sample, and not the wire, should be placed in the flame.

Question 4

This question was about ethene and ethanol and their interconversion. In part (b), the commonest score was 1 mark (for the displayed formula of ethene), with many not showing the bond in the OH group of ethanol (or sometimes showing the bonding as –C–H–O). In part (c), the commonest score was also 1 mark - the two commonest errors were to describe ethanol as containing single bonds (rather than only single bonds, or not having a double bond), and correctly describing what a hydrocarbon was, but not stating why ethanol was not one. Answers to part (d) were generally disappointing, with 0 the commonest score, although a quarter did manage to score full marks. Although the mark scheme rewarded relevant statements not given in the

question, many candidates failed to refer to either process, or wrote that ethanol was obtained directly from crude oil; quite a few wrote extensively about global warming or climate change.

Question 5

This question was about potassium chloride and the electrolysis of its aqueous solution. Most scored both marks in part (a), by being able to apply their knowledge of the structure of sodium chloride. Errors included the front face shown as containing only positive ions and showing the rear face identical to the front face. In (b)(i), most correctly described the test for chlorine, although some confused this with the silver nitrate test for chloride ions. The half-equation for the formation of hydrogen gas at the negative electrode was poorly done, with many showing H^- ions or the loss of electrons. Even more disappointing was part (b)(iii), with half of the answers scoring zero, including many references to acidity and H^+ ions. Around half of the candidates scored 2 or 3 marks in part (c); the commonest reason for losing a mark was multiplication by 2 (instead of division by 2) in (i). Most of those who scored 0 used the relative atomic mass of chlorine in their calculations.

Question 6

This question was about a titration used in the preparation of lithium sulfate. Questions very similar to part (a) have regularly appeared in previous question papers, so it was disappointing to see only a quarter of candidates scoring full marks in this paper. By far the commonest error was failing to record the final burette reading to the second decimal place (26.3 instead of 26.30), with much smaller numbers of candidates misreading the scales (24.4 and 3.75). However, more than half scored full marks in the also familiar part (b) - those who chose the wrong results were still able to score in (b)(ii) through consequential marking. It was pleasing to see that the commonest score in the three-part calculation in (c) was 5 marks, slightly more than those who scored 0. The commonest errors were failing to use 1000 in (i) or (iii), and failing to multiply by 2 in (ii). Answers to part (d) were disappointing, with less than half giving the correct result of the barium chloride test (white precipitate), and even less correctly naming barium sulfate as the substance responsible.

Question 7

This question was about an experiment involving the combustion of pentane. It was pleasing to see full marks as the commonest score in part (a), although far fewer candidates scored full marks in (b), for calculating the enthalpy change of combustion. Here, there were many errors seen, including failing to calculate the amount of pentane used (72 ÷ 1.88 and 72 × 1.88 frequently appeared), and failing to convert from J to kJ (or multiplying instead of dividing by 1000).

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