Examiners' Report
Principal Examiner Feedback

January 2018

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

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January 2018
Publications Code 4CH0_2C_1801_ER

Examiner’s Report International GCSE Chemistry 4CH0 2C January 2018

Question 1
As expected this question was generally well answered, although some candidates just named Q as ‘filter’ rather than (filter) funnel, which was not worthy of credit. Others just wrote ‘flask’ for R which was insufficient and some thought P was a measuring cylinder or S was a burette. Colours of litmus in acid and alkali were usually well known.

Question 2
This was a high scoring question with many candidates gaining full marks. In (d)(ii) common errors included drawing two electrons in the outer shell or confusing atomic number and mass number and drawing a lithium atom with seven electrons. Some candidates lost a mark in (e) by either rounding their answer up to 7 or incorrectly rounding 6.925 down to 6.92. Others lost both marks by failing to divide by 100 or dividing by 13. A few misread the question and multiplied 92.5 by 6 and 7.5 by 7. Candidates need to use common sense in questions of this nature. If mass numbers of two isotopes are given the answer is going to be between those two numbers and nearer to the one with the higher percentage.

Question 3
This question proved more difficult than expected for many candidates. In (b)(i), although questions of this nature have been asked many times before, candidates still often fail to give their answers to two decimal places. Many candidates gave the final burette reading as 26.3 rather than 26.30, which lost them a mark. Others recorded their readings the wrong way round, which also lost them a mark. Others were clearly unfamiliar with using a burette for titrations and gave readings of 27.7 and 2.25, although they often gained one mark for a correct subtraction. Answers to (b)(ii) were even more disappointing and again showed that many candidates are not familiar with doing titrations. Although there have been many questions where candidates had to pick out concordant results only a very small number of candidates mentioned concordance in their answer. A larger number discussed taking an average or identifying anomalies, but these were still in the minority and the majority failed to score any marks on this question. Common incorrect answers focussed on repeating the titration without an indicator, confusing the question with a salt preparation. Others just gave vague answers about possible errors or mistakes and others referred to accuracy, validity or reliability, but these were not creditworthy answers.

Question 4
The majority of candidates did not understand what a molecular formula was and the most common answer to (a)(i) was C_3H_7OH. Some candidates did not give a formula at all and just wrote the name of the alcohol, propanol. In (a)(ii) many candidates did not realise they had to explain whether the compound was saturated **and** whether it was a hydrocarbon. Many just stated that it was saturated as it had no double bonds or only single bonds. This limited them to just one mark. Others thought having only single bonds meant it was unsaturated and some just said it has single bonds, without stating that there were only single bonds present and so failed to score the first marking point. A smaller number of candidates explained why it was not a hydrocarbon, either by saying it contained oxygen or contained hydrogen and carbon only or both, but then failed to say why it was saturated, limiting themselves to one or two marks. Only a small minority scored all three marks for this question.

Part (b) was answered correctly by the majority of candidates with the most common answer being 'same general formula'. Common incorrect answers included 'same molecular formula', and 'same or similar physical properties' rather than stating that there was a trend in physical properties. Some stated that they had 'similar chemical properties' which is the same as 'similar chemical reactions', which was in the stem of the question so was not creditworthy.

In part (c) the majority knew that the aluminium oxide was a catalyst, but a few said it was there to dehydrate or react with the alcohol. Only a minority knew that the gas was collected over water because it was insoluble in water, with the most common incorrect answer being 'it is less dense than water'. Even fewer knew that the first sample of gas contained air from the apparatus. Common incorrect answers included 'it contains aluminium oxide' or 'it contains impurities'. Once again these answers indicate that many candidates have not done this type of practical or seen it demonstrated. In (c)(iv) many candidates who realised the product was propene were unable to draw a correct displayed formula, giving the wrong number of bonds to each carbon atom. Candidates should be taught to check that there are four bonds to each carbon atom when drawing a displayed formula. The majority of candidates knew that the other product was water, but many of them drew a displayed formula of water, even though the question asked for a molecular formula. On this occasion this was allowed as molecular formulae had already been tested in 4(a)(i), but candidates need to be aware that this may not be the case in future examinations, so they need to read the question more carefully and do what is asked. Some candidates did not realise the other product was water and hydrogen, oxygen and carbon dioxide were often see, often meaning one of these gases was named as the answer to (c)(v).

Question 5
This question was answered well by the majority of candidates. In (b)(i) most gave the correct formula for aluminium oxide, but many of these failed to balance the equation correctly. A surprising number gave an incorrect formula for chromium oxide, even though this had been given in the question. Candidates need to make sure they use any helpful information that is in the question. Displacement reactions were familiar to most candidates and well understood, so the majority scored both marks in (b)(ii), although a few thought chromium was more reactive than aluminium or that aluminium displaced oxygen. Some went on to discuss redox reactions, which was not required here as this was asked in (b)(iii). The majority of candidates scored at least one mark in (b)(iii) for one of the mark scheme answers. Those that went down the route of discussing loss and gain of electrons usually failed to say that it was the chromium ions that gained electrons so did not score the third marking point.

It was pleasing to see that the majority of candidates completed the calculation in (c)(i)correctly showing clear working. A few limited themselves to two marks as they either multiplied or divided the moles of chromium by 2, but then went on to multiply their answer by 24 so still scored the third marking point. Some found the moles correctly, but then went on to divide by 24 instead of multiplying so only scored the first marking point. A common error was to multiply the mass of chromium by 24, which showed a lack of understanding and so no marks were awarded for this approach. Part (c)(ii) was less well answered with many candidates failing to score, despite there being five possible alternatives to chose from. The most popular correct answer was reference to gas leaks from the apparatus. Common incorrect answers included suggesting changes in pressure and temperature, even though the question stated that the experiment was done at rtp and stating that not all of the chromium reacted, rather than the fact that the reaction was not allowed to go to completion. Others referred to errors made by the student when reading the volume on the gas syringe, which was not creditworthy.

Question 6
Part (a) was answered well by the majority of candidates. The few that did not score in (a)(i) usually used atomic numbers instead of relative atomic masses. Common errors in (a)(ii) included reversing the charges or just giving the symbols of the atoms. The majority of candidates scored at least two marks for part (b) as they knew that an ionic bond was a strong force of attraction between oppositely charged ions and many also referred to a large amount of energy being needed to break the bonds. The second part of the question was less well answered, as many just referred to electron transfer between magnesium and oxygen but did not specify the charges on the ions or compare them with the charges on lithium and fluorideions. Some of these however still went on to score the fifth marking point for one of the alternative answers. The reason many candidates limited themselves

to two marks was because they mentioned intermolecular forces or covalent bonding, even though they were told in the question that both substances are ionic compounds. Teachers need to stress to students that intermolecular forces are only present in simple molecular substances and if they refer to them in questions relating to ionic, metallic or giant covalent substances they will be penalised.
In part (c), even though questions of this nature have been asked many times before, around half the answers seen failed to score any marks, as they referred to conduction being due to electrons or in a few cases atoms moving rather than ions. Others mentioned 'free ions' but did not give any indication that they were mobile. Some stated that ions were mobile when the compounds were molten or in aqueous solution, but failed to state that they were not able to move in the solid, so limited themselves to one mark.

Question 7
Overall this question proved difficult for the majority of candidates. Around half the candidates failed to score any marks in (a)(i) as they seemed to be unclear as to what the question was asking. Some referred to oxygen being produced or the positive electrode losing electrons or oxidation being gain of electrons. Others did score one mark for knowing that oxidation was loss of electrons, but often failed to score the second mark as they referred to chlorine or chlorine ions losing electrons. Similar questions to this have been asked many times before and the same mistakes are made over and over again. Students need to be specific about which species are being oxidised and reduced when they are answering questions about redox reactions in terms of electron loss and gain. The majority of candidates failed to score any marks in (a)(ii) with the most common errors being writing H or H^+ or sometimes O_2 in place of H_2 or failing to put a charge on the OH^- ion. Those who had the formulae of all the species correct often either failed to balance the equation or balanced it incorrectly by putting a 4 in front of the e^-, presumably as they were familiar with a similar equation which involves 4 electrons. The equation in (b) also proved challenging for many candidates. The most common errors here included not recognising that chlorine is diatomic and writing 2Cl, even though the formula Cl_2 was given in the half equation on the same page, or failing to balance the equation.

In (c)(i) the majority of candidates scored at least one mark, usually either for saying monomers join together or that the double bond in the polymer breaks. Some of these then went on to say that a long chain molecule was formed, but many just said a polymer was formed which was not creditworthy as it was in the stem of the question. It was pleasing to see that the majority of candidates were able to complete the equation correctly in (c)(ii). Those who lost a mark usually did so as they missed off the 'n' or put it before the bracket. Others drew more than one complete unit so lost a mark. A few candidates drew a structure with a double bond in it which showed a lack of understanding and lost them both marks.