Examiners' Report/
Principal Examiner Feedback

Summer 2014

Pearson Edexcel International GCSE
in Chemistry (4CH0) Paper 1CR

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2014
Publications Code UG038364

Principal Examiner's Report June 2014 International GCSE Chemistry – 4CH0 1CR

Question 1

This was a straightforward question about states of matter. Many correct equations were seen in (d)(ii), although some started with hydrogen and oxygen as reactants, some wrote word equations, and there were some that started with a liquid and ended up with a gas. Candidates should be reminded that the letters used for state symbols must be unambiguous - the main problem is the use of a letter that could be read as either s or g.

Question 2

Parts (a) and (b) of this question were well answered by most candidates, but a wide range of marks was seen in part (c). In (c)(i), several candidates misinterpreted the question and wrote about the numbers of food dyes or how to calculate R_f values. Several ways of supporting the paper in a container were seen (suspension from a glass rod or wooden splint, using a paper clip to make a circle from the paper, all of which are acceptable). The mark for the solvent level being below the spots (or the line) was not always scored - statements such as "the solvent should not be above the line" and "the solvent level should only be up to the line" do not have the same meaning as "the solvent level should be below the spots". The mark for what to do next was more difficult to score - the expectation was that the apparatus should be left until the solvent had reached the upper line in the diagram (or to the top of the paper), or until the colourings (or spots) had separated. Common responses that did not score included "leave for several hours" and "leave until all the dyes had reached the top of the paper". The number of food dyes in (iii) was invariably correct, but in (iv) many overlooked the word "known" and repeated the answer from (iii). The R_f calculation in (c)(iv) was generally well done, with few candidates giving distances that bore no relation to the expected values.

Question 3

This question about methods of rust prevention was reasonably well attempted. In (a)(i), most candidates knew that iron oxide was the main compound in rust (the (III) in the name was not essential, but incorrect oxidation states such as (II) were not accepted), although some gave air and water as answers. In (a)(ii) and (iii), there was some confusion about whether water or oxygen was excluded, and some candidates gave both, which was not accepted.

Part (b)(ii) was a somewhat novel question, in which many scored 3 or 4 marks. Some candidates wrote only equations, and some wrote only words, which limited them to 2 marks. The most common errors were unbalanced equations, equations the wrong way round, and referring to the corrosion of zinc as rusting.

Part (c)(ii) proved difficult for candidates to answer fully - some repeated the equations with hardly any accompanying words, while others wrote about copper rather than copper ions (or copper sulfate) being present in solution. A substantial number of answers referred to displacement reactions and equilibria.

Question 4

This question about Group 1 elements was generally well answered. Most answers scored full marks in (b)(i), although a more common answer than in previous sessions - a white precipitate - was not accepted as it is not the same as a white trail. Part (c) asked for a different observation, not the same observation occurring more vigorously - but most candidates scored the mark with a reference to a flame. Answers to part (d) illustrate the importance of using correct language, and there were many examples of answers that candidates presumably thought would score but did not - "similar electron configurations" (correct but not an answer to the question), "same electron configurations" (incorrect but ignored).

Question 5

This question about Group 7 elements was generally well answered. A perennial problem in part (a) is the correct description of the colour of bromine. The specification requires candidates to know the colours of both bromine and bromine water, and teachers are recommended to look at the mark schemes for this and recent question papers for the acceptable answers.

In (b)(i), the reference to the solution formed was to magnesium chloride rather than to hydrochloric acid, but candidates who used the latter interpretation were not penalised. The negative ion is Cl^- - those who wrote $2Cl^-$ also scored, since this coefficient indicates the ratio of ions formed, but common errors that did not score were Cl_2^- and Cl^{2-}. The vast majority of candidates correctly identified hydrogen in (b)(ii), but some descriptions of the familiar test were not precise enough to score the mark - a splint that is not burning will not work, and a reference to a glowing splint suggests a confusion with the test for oxygen. The test for chloride ions in (b)(iii) was generally well known, although relatively few candidates scored full marks. The common errors were not to give the colour of the precipitate formed, to give chlorine or chloride as the substance responsible, and to give an inadequate explanation (removing impurities, getting rid of other ions did not score) - what was expected was some reference to the prevention of other precipitates forming, or to a reaction with carbonate ions. There were many different answers to (b)(iv), a lot of them referring to the different reactivities of magnesium, methylbenzene and hydrogen chloride, but it was good to see that the most common answers were the correct ones, which referred to the lack of dissociation of hydrogen chloride, or the absence of H^+ ions, or similar.

Question 6

This question was about the fractional distillation and cracking of crude oil. In (a)(i), although most candidates knew that crude oil was first heated (changes of state such as boiled and evaporated were also accepted), a disappointing number referred to fractional distillation, cracking and burning. Most answers to (a)(ii) scored both marks, with only a few candidates being penalised for statements such as "atoms containing hydrogen and carbon molecules". Most candidates scored 2 or 3 marks in (a)(iii) - the commonest problem was with viscosity, which was sometimes omitted, but more often F was stated to be more viscous than D.

Part (b) was well answered, with only (b)(i) showing a variety of incorrect answers (such as a stated pressure, or just high temperature and pressure). Answers to (c)(i) were invariably correct, although candidates should be aware that correct spellings are important in questions like this - clearly ethene, propane and polypropene did not score, but answers such as popene, protene and putene were not accepted. In (c)(ii), it was pleasing to see many correct displayed formulae, although the most common error was showing two hydrogen atoms on each carbon atom. Unlike in (c)(i), minor spelling errors were not penalised so long as the word was clear (genarel and empiricle were accepted), but different words (such as genital and imperial) were not. Few candidates scored both marks in (c)(iii) - the commonest error was the lack of CH_3 groups.

Question 7

Many good answers were seen to this question about rates of reaction, although some parts proved more challenging than others. In (a), many answers referred only to the rate of reaction, but a pleasing number realised that the required method should show no change in mass. Statements such as "weigh the solid before and after the experiment" scored 1 mark but not the mark for a statement such as "the mass will be the same".

Part (b)(i) was well attempted, but many answers illustrated candidates' problems in answering questions of this type. The commonest correct answers were "volume" and "mass", although alternatives were accepted. Candidates should be aware of when to use the term "amount", and answers to this question illustrate their problems. The term "amount" should only be used as a reference to the amount of substance (in moles), although it may be acceptable as an alternative in some cases. For example, for the hydrogen peroxide solution the word "amount" is not acceptable as an alternative to "volume" as the concentrations vary (and therefore the amounts of hydrogen peroxide also vary). However, "amount" is acceptable as an alternative to "mass" for manganese (IV) oxide as the two terms are directly proportional to each other.

Many candidates were able to demonstrate their knowledge of experimental procedures in their answers to (b)(ii), but those who did not often referred to allowing the oxygen out (which would happen without the cotton wool) or preventing something from entering the flask (which is unlikely). The reason for the loss of mass in (c)(i) was generally known, although the mark required some reference to the oxygen leaving the flask (such as escaping or being given off), rather than just being identified as a product. There were many correct answers to 7(d)(ii), and most of them included a correct explanation in terms of mass loss. There were few plotting errors in the graph in (e), although several candidates plotted only six points, and it was pleasing to see that almost all candidates used a ruler to draw the line.

Part (f) was generally well answered, although some answers did not refer to particles (or molecules) and even more failed to mention the frequency (or equivalent wording) of collisions.

Question 8

Most attempts at balancing the equation in (b)(i) were successful; some candidates (unnecessarily) wrote coefficients of 1 for hydrogen peroxide and hydrazine (which were not penalised), but some wrote coefficients of zero (which were penalised) which were perhaps attempts to indicate that no coefficients were needed. The dot and cross diagram for hydrazine was often correct, with the most common error being to show a double bond between the two nitrogen atoms – this is understandable, but the question did state that only single bonds were present. It was expected that candidates would follow the example of ammonia, but many did not show the electrons as paired, while others used triangles. There were many examples where open circles and dots both appeared, and it was not clear whether either of both of these symbols should be considered. The expected answer to (c)(i) was a reference to the ΔH value being negative, which most candidates stated; statements about heat being given out did not score, as this could be stated from the "exothermic" given in the question and did not need any reference to the information in the table. Many candidates scored the mark in (c)(ii) with answers such as "it does not react with oxygen" or "no combustion" - the commonest wrong answer was to state that the ΔH value was lower.

In (d), most candidates were familiar with empirical and molecular formula calculations, and there were few examples of atomic numbers used instead of relative atomic masses or of division the wrong way round. The most common cause of lost marks was inappropriate rounding - in this case, rounding to 2:4:13 or 1:2:7. An unusual problem for some candidates in this example was the use of M and H instead of C, N and H in the formula.

Question 9

The commonest wrong answer to the equation in (a)(ii) was $SO_2 + O_2 \rightarrow H_2SO_4$ and a minority of candidates wrote the product as H_2SO_3 (two other alternative answers were also accepted). In (b)(i) most candidates stated covalent, although several included the word "simple" as well. Thankfully the use of "molecule" in the question meant fewer answers of "ionic". There were few fully correct answers to (b)(ii), and finding the right words in this type of question is a perennial problem for very many candidates. The simplest successful answer was "weak intermolecular forces", but many candidates stated that covalent bonds were weak. The biggest problem occurred when both covalent bonds and intermolecular forces were mentioned and the wording did not make it clear which was weak or easily broken, such as "it has covalent bonds and intermolecular forces and these are weak" - here, "weak" could refer to covalent bonds, or to intermolecular forces, or to both.

Part (c) asked very familiar questions about an unfamiliar metal, and application questions of this type require candidates to apply their expected knowledge of metals in general to a specific metal. Unfortunately, candidates are notoriously bad at answering questions of this type. For example, in (c)(i), there were references to molecules and negative ions, while in (c)(iii) there were many references to layers of electrons or protons or molecules sliding over each other. Some candidates obviously misread the question and thought it was about molybdenum oxide rather than molybdenum, which greatly reduced their chances of scoring marks.

Question 10

This question was about the use of hydrogen in the reduction of metal oxides. The expected answer in (a)(ii) was some reference to the risk of an explosion or fire. Some answers did not come close enough ("hydrogen is flammable" was not accepted, as it is shown burning in the diagram). Most incorrect answers referred to ensuring that the hydrogen would still flow through the apparatus to make sure that the reaction continued, or to prevent the formation of carbon monoxide. In part (b), the required further practical steps were to heat the sample again (in the stream of hydrogen) then weigh it again to check that the mass had not changed. Most answers focused on the idea of repeating and taking an average, or using a more accurate balance.

The two calculations in (c) were well attempted with many all-correct answers seen. Very few candidates are unable to handle mole calculations, and examples of dividing atomic mass by mass in grams were rare. In (c)(i) some marks were lost by dividing by 8 or 32 instead of by 16, while in (c)(ii) the mass of metal oxide was sometimes used in place of the mass of metal.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE