Examiners' Report
Principal Examiner Feedback

November 2023

Pearson Edexcel International GCSE
In Chemistry (4CH1) Paper 2C

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

November 2023
Publications Code 4CH1_2C_ER_2311

Examiner's Report International GCSE Chemistry 4CH1 2C November 2023

Question 1

Many candidates often scored two or three marks for (d) as they knew the correct order and used the table to explain which reactions occur. However, a significant number of candidates lost a mark as they often referred to an incorrect use of -ine or -ide. For example, stating that chlorine displaces bromi**d**e and iodi**d**e is incorrect rather than displaces bromi**n**e and iodi**n**e. Teachers need to encourage them to use the correct terminology when describing these reactions. Some candidates discussed the electronic structure rather than interpreting the experimental data, which was not relevant here.

Question 2

In (a)(i) many lost the mark as they referred to the colour, but not solid or vice versa. Both colour and solid or powder or ash was needed for the mark. A few described the bright white flame, but the question asked for the appearance of the magnesium oxide not the reaction that occurred. A few candidates lost the mark for stating that there was a white precipitate. A precipitate would only occur if it formed a precipitate at the bottom of a solution, not in the basin. Around half the candidates scored (a)(ii). Common mistakes included failing to balance the equation, the formulae being MgO_2, Mg_2 or O as a single atom rather than O_2. Question (a)(iii) was poorly answered. There was a lot of confusion about stating that the water reacted with the magnesium or the magnesium oxide. Some thought the pressure increased in the bell jar rather than a decrease in pressure or volume.

Only around a quarter of candidates scored all three marks in (b) with the majority scoring zero or leaving it blank. Those who recognised that the oxygen was 21% of the air that reacted, usually scored all three marks. A common error was to divide the 2000 by 24000 which showed a lack of understanding. Question (c) was very poorly answered. Many stated that the oxygen reacted, but this was in the stem of the question. In order to gain the mark they also had to specify that the other gases in the air apart from nitrogen and oxygen had very small amounts, which very few failed to mention this.

Question 3

In (a) most knew that aluminium was more reactive than carbon. Those who failed to score did not compare the two elements. Question (b) was a good discriminator with a range of marks. Some good answers were seen but some lost marks not being specific enough, for instance just mentioning cars rather than car bodies. A few lost a mark by giving an incorrect property. A small minority gained no marks as they discussed the properties but gave no uses, so they did not answer the question. Question (c) has been asked before on recent papers so it was disappointing that candidates are not well drilled in mentioning layers sliding in pure aluminium. Many answers identified the different sized atoms or ions in the alloy, but many missed linking this to the disruption of the overall structure. Some just discussed the alloy but not the pure metal. Others decided the reason for additional hardness was due to stronger forces of attraction between the metal ions in the alloy, which was incorrect. A few lost a mark for mentioning molecules or intermolecular forces.

Question 4

Question (a) was very poorly answered with the majority gaining no marks. It appears that the candidates either did not read the method or did not understand the idea of keeping the variables constant. As the acid was added initially there could not be a change in the volume, concentration or initial temperature. It was important to keep the concentration and temperature of the sodium hydroxide solution and the rate of stirring constant. Just writing concentration and temperature was too vague, as it was not clear that it was referring to. Around half of the candidates in (b) scored two marks for stating that polystyrene is an insulator and reduced heat loss. Only a few mentioned the temperature change being more accurate. Those who did not score either thought it was a good conductor of heat or discussed the fact that polystyrene would not react with the reagents or the glass beaker might break. The majority gave a correct value for (c)(i), with a common mistake to give a value of 36 where the line finished and not where the lines crossed. Question (c)(ii) proved difficult with the majority gaining at least one mark for stating that as more volume was added the temperature increased. However only a few gained a second marking point and the third marking point was rarely seen. Candidates **described** the shape of the graph, which was not creditworthy, rather than **explaining** the shape. Question (d) discriminated well with the majority gaining four or three marks. A common error was to not use a mass of 47 and 1, 22, 25 and 3 were common errors. However, they often went on to gain error carried forward marks. Some lost a mark for not converting Joules to kilojoules.

Question 5

Around half the candidates scored one mark in (a)(i) for knowing that H_2 forms. Fewer however could not complete the rest of the equation correctly. A common incorrect answer was to think the other product was H_2O. A common answer was to state there was fizzing or bubbles in (a)(ii) but only a few stated that magnesium disappeared or became smaller. A common incorrect answer was to state there was a sweet smell, which implied that they thought an ester was one of the products. Around half the candidates named a suitable acid in (b)(i). Other incorrect answers included silica or potassium dichromate. In (c)(i) and (c)(ii) over half the candidates gave the correct answers. Around half the candidates drew a correct ester linkage in (c)(iii), but fewer completed the structure correctly. A common error was to add OH at one or both ends. Around half the candidates in (d) knew that a biopolyester was biodegradable.

Question 6

A large majority of candidates named the pipette and burette correctly in (a) and the majority gave methyl orange or phenolphthalein in (b) although there were a variety of different spellings. An incorrect answer was seen most often was universal indicator or sometimes litmus **paper** rather than just litmus, which would have been acceptable. Questions (c)(i) and (c)(ii) differentiated well, with around a quarter of the candidates achieving all five marks. Common mistakes included, failing to multiply by 2 or dividing by 2, but error could be carried forward. Question (c)(ii) proved more difficult as they did not always use the moles from the first marking point in (c)(i) and a few used 25 instead of the moles and others divided by 24000 instead of multiplying. Considering that (d) was a simple test for a carbonate a surprising number often lost the first two points by not adding the hydrochloric acid to the sodium carbonate solution. A number of candidates described a flame test to identify the sodium ions, which was not asked for. Silver nitrate or some other reagent was a common addition,

which lost them the first two marks. The acid was not always named, with candidates simply stating to add dilute acid, which lost them the first marking point. Ambiguity over the addition of limewater to a gas evolved rather than to the solution was also evident in some answers. Allowing the third marking point if they mentioned limewater turning cloudy helped many candidates to gain one mark.

Question 7

Many candidates lost both marks as they talked about electrons moving in (a). Those who realised that ions were responsible for conducting electricity often scored both marks or just one mark if they did not mention the ions unable to move in the solid. It was surprising that all they had to do in (b)(i) was to balance the half equation, less than half the candidates failed to score. A common mistake was to give $2e^-$ instead of $4e^-$. Candidates need to realise that they have to balance the charges as well as balancing all other species. Although (b)(ii) has been asked many times before many candidates lost the mark for stating that chlori**n**e loses electrons. A few mentioned gaining oxygen but this is not the case here. The majority gave a correct answer in (c)(i), but a surprising number mentioned a glowing splint and lost the mark. Candidates need to realise that 'burns with a squeaky pop' is not sufficient for the mark. They must mention a lighted splint **and** the squeaky pop to gain the mark. Question (c)(ii) discriminated well with only a small number gaining all three marks. Those who scored two marks usually scored by stating that hydrogen ions were attracted to the negative electrode and gained electrons. A few gave a correct half equation and gained the last two marking points. Note that it is not sufficient to state that hydrogen is attracted to the negative electrode and just stating that hydrogen forms does not score as it is in the stem of the question. Questions (d)(i) and (d)(ii) discriminated well and gave a range of marks. About a quarter of the candidates scored all six marks. A common error was to calculate the bond energies on the right-hand side incorrectly, but error could be carried forward. A few lost a mark for not giving the sign. Many lost marks due to sloppy diagrams unnecessarily. Candidates should use a ruler when drawing the energy level diagram and make sure the ΔH line was the correct length. Some lost a mark by the line or arrow being too short. Many candidates also lost a mark for just writing reactants and products rather than giving the correct formulae of reactants and products or incorrectly balancing them.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom