Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

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Pearson Edexcel International GCSE
In Chemistry (4SD0) Paper 1C

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Question 1

Part (a) was well answered by the majority of candidates. Some lost the mark in (ii) by either giving the name of a metal when the symbol was asked for or by giving a metal from Period 4 such as potassium or a transition metal.

The majority gave the correct answers for part (b) with a small number thinking caesium was the least reactive element in Group 1.

Question 2

Part (a) was high scoring with the majority gaining all three marks.

Part (b) proved more difficult with only the minority scoring all three marks. The use of melting point and boiling point was generally well known. A common response for the mixture was to state that it has a higher or lower melting or boiling point with no mention of a range. Another common response was to state that the pure substance has a melting point of $0^{o}C$ and boiling point of $100^{o}C$. A variety of separation techniques were given by some candidates, such as filtration or fractional distillation, which were not creditworthy responses.

Question 3

In part (a) most identified Q correctly and realised that the reaction of R with dilute acid would be dangerous or explosive. Just saying that the reaction would be very vigorous was not sufficient for the mark as this does not explain why the reaction was not done. A few missed the point completely and thought that R would not react with hydrochloric acid. Most scored the mark in (iii) with the most common error being placing R and S in the wrong order.

In (b)(i) many candidates stated that coating with zinc was known as galvanising or galvanisation. A common incorrect answer here was sacrificial protection, which was an acceptable answer in (ii). The most common correct answer in (ii) was painting. Some did not score as they wrote barrier method, which was not creditworthy, unless they specified one of the acceptable barrier methods.

In (c)(i) many candidates gave the expected response of zinc displaces copper. Some simply stated that zinc reacts with oxygen but made no reference to copper and so did not gain the mark. A few candidates stated that the zinc displaces the oxygen and did not appreciate that this is not the same as the zinc displacing copper. In (ii) only the minority stated that copper(II) oxide was the oxidising agent, with the majority losing the first marking point by stating that copper was the oxidising agent, although they often gained the second mark by stating that copper gave the oxygen to zinc or that copper was reduced. A minority thought that zinc was the oxidising agent and therefore did not score.

Question 4

In part (a) many candidates correctly gave OH^{-} or the hydroxide ion as the answer and knew that 11 was a possible pH for ammonia. Common incorrect answers in (i) included Na^{+} and H^{+}.

Part (b) was generally well answered although some thought sulfuric acid was a proton acceptor and others thought phenolphthalein was colourless in alkali and pink in acid.

In (c)(i) many candidates were able to correctly identify the charges on the ammonium ion and the sulphate ion. Only the minority gained the second marking point. A common response, which was not creditworthy, was to refer to an interchange of the charges but with no mention of balancing or cancelling out the charges or producing a neutral compound.

Most candidates correctly calculated the relative formula mass of ammonium sulfate in (c)(ii) but fewer went on to calculate the mass of nitrogen correctly in (iii). A common error was to multiply the moles by 14 instead of 28, not taking into account that there were two nitrogen atoms in the formula, which lost them one mark.

Question 5

Part (a) was generally well answered with many candidates gaining both marks. There were some good answers which covered all three points from the mark scheme. Some candidates tried to answer this question in general terms mentioning how the periodic table is structured without basing their answer on the elements mentioned in the question, which limited them to a maximum of one mark.

Common incorrect answers in (b)(ii) included not appreciating that chlorine is diatomic and therefore writing 2Cl instead of Cl_2 and writing CH_3 instead of CH_4. There were some good answers to (iii) but many candidates just described formation of a bond by electron sharing, which was insufficient for the first marking point, without the mention of an electron pair. Some lost the second marking point by referring to a single nucleus rather than the two nuclei. Many candidates drew a fully correct dot-and-cross diagram for (iv), but some just scored one mark as they omitted the lone pairs of electrons on the chlorine atom and others added extra electrons to the hydrogen atoms. In (v) the majority of candidates knew there were weak intermolecular forces in CH_3Cl but a significant number lost the second marking point by referring to **less** energy rather than **little** energy. This point has been stressed on previous examiner's reports that the words **less** or **more** should only be used when comparing two substances. Some lost both marks by stating or implying that the covalent bonds were broken on boiling.

In part (c) most candidates referred to electrons but did not always use the word delocalised and sometimes referred to free electrons. Some lost the second marking point by not stating that the electrons could move. Some went into detail about the layers sliding, which was not relevant here, and others thought that electricity could move through the gaps between the layers.

Question 6

In part (a)(i) most candidates realised that B was an alkane and that it followed the general formula C_nH_{2n+2}. A few just stated that it contained single bonds, which was insufficient for the second marking point. A small minority thought it was an alkene. In (iii) most knew the definition of an isomer but some of these failed to draw any structures even though these were asked for in the question. The majority drew the structure of butane correctly but some thought that just moving the final CH_3 group through 90^0 created a different compound, which showed a lack of understanding. A small minority gave the definition of an isotope but sometimes went on to draw the correct structures.

In part (b) most candidates had a good idea of how fractional distillation works but few actually related this to compound D's position in the column, limiting them to a maximum of three marks. There was occasional reference to melting points and a few descriptions of lab processes. Some referred to heating compound D rather than crude oil.

In part (c) many candidates knew that propene formed an addition polymer and gave the correct name for the polymer. Some candidates just wrote propane or propene and poly(propane) was quite often seen. Some named other typical polymers such as polythene or

PVC and a few just wrote plastic. Only a small minority of candidates drew a correct repeat unit for poly(propene) and most of these went on to gain the second marking point. The most common error was to just draw a chain of three carbons with two hydrogens on each carbon. Others just drew the structure of propene.

Question 7

In part (a) a common incorrect answer was sodium chloride even though the state symbols were present in the equation showing that sulfur was a solid.

In part (b) most scoring answers seemed to be related to the cross and the distance of viewing with some referring to the concentrations of the solutions. Many also referred to time as well as temperature even though these are the variables and some mentioned volume which was given in the stem of the question, showing that candidates do not always read the questions carefully enough.

Part (c) was poorly answered. Those who did score usually did so for the idea of times being too short to record accurately. Very few mentioned the thiosulfate solution cooling down. The most common incorrect answer was to say that the solution would start to evaporate. A few confused a chemical reaction with a biological reaction and said the enzymes would be denatured.

The graph in part (d) was accurately plotted by the majority of candidates and most drew an acceptable curve of best fit. A few plotted the first two points incorrectly.

In (e)(i) most candidates drew a line at 45^{o}C and read from their graph correctly. A common error in (ii) was to ignore the rate equation given at the beginning of the question and to take the mean of 44 and 84, giving a value of 64 seconds, which is not an acceptable method for a non-linear graph. In (iii) many candidates understood the relationship but some of these lost the mark by stating it was a linear relationship or directly proportional. A few thought it was an indirectly proportional relationship.

In part (f) most knew that the particles gained kinetic energy or moved faster. The second marking point was sometimes missed by candidates not mentioning successful collisions or not relating the collisions to greater frequency. Some candidates gave a good explanation of collision theory but then failed to gain the third marking point by not actually stating that the rate increases.

Question 8

In part (a)(i) most scored the mark here, often for the allowable answers of pipette or burette. In (ii) many candidates struggled to give the expected answer here. Common responses referred to spreading the particles or solution evenly or increasing the rate of reaction or speed of dissolving which was already stated in the stem of the question. Those who did score a mark here usually stated that stirring spread the heat evenly throughout the solution. In (iii) the colour of copper(II) sulfate was generally well known.

Many candidates scored all three marks for part (b). Some however were trying to be overly accurate giving a value of 27.25 rather than 27.3. The subtraction mark was almost always awarded as most students could do the subtraction even when they could not read the scales.

Most candidates scored both marks for (c)(i), with very few just scoring one mark. A few used 1g as the mass and some used the temperature rise from 8b, both of which showed the importance of reading the question properly. Part (ii) discriminated well giving a range of marks. There were four common causes of loss of marks here. One was not putting in the

minus sign and another was not converting Joules to kilojoules. The other two were either rounding incorrectly or giving answers to only 1 significant figure in the intermediate stages, both of which showed a lack of understanding of mathematical skills.
Part (d) was answered well by the better candidates although there seemed to be a lot of confusion apparent in some of the answers given. Many candidates stated that it was an exothermic reaction, their reasoning being that as the temperature had decreased this was an indication that energy was lost or given out, showing a lack of understanding.

Question 9

Part (a) was generally answered well with most knowing that it was a decomposition reaction and that carbon dioxide was produced, which made the cakes rise. Those that did not score here referred to the wrong gas, usually oxygen, or stated that the heat made the cake expand. Those candidates who scored in (b)(i) often stated that it was to ensure that all the sodium hydrogencarbonate had reacted. Only a small minority mentioned heating to obtain a constant mass. In (ii) very few scored the advantage mark. Most common incorrect answers included trapping the heat, increasing the temperature or increasing the rate of reaction. Many thought that preventing gases from escaping was an advantage. More candidates scored the second marking point for saying that the gases were not able to escape or that there would be build-up of pressure. Common errors included stating that no oxygen could get in or water vapour would condense. Some thought that a disadvantage was that the student couldn't observe the reaction.
In part (c) a large majority of candidates gave the correct answer to (i). Many candidates scored all three marks in (ii) but some lost marks for failing to divide the moles by two or by giving answers to only 1 significant figure in the intermediate stages.
Part (d)(i) was well answered by most candidates with a large majority gaining both marks. The few that scored one mark was usually for subtracting 4.2 from 4.8 and then dividing by 4.8 and multiplying by 100 to give an answer of 12.5%. Incorrect answers involved doing something with the numbers without really knowing what they were supposed to do. A few divided 4.8 by 4.2 giving an answer of 114%, which did not score and showed poor understanding of what a percentage means. Those candidates who gained the mark in (ii) usually stated that not all the sodium hydrogencarbonate reacted, with only a small number referring to impurities in the sodium hydrogencarbonate. Incorrect answers included, the zero on balance was not set correctly, the calculation was incorrect, some was left in the crucible, even though the sodium carbonate was being weighed in the crucible, and some sodium hydrogencarbonate escaped, which did not score as spillage was mentioned in the stem of the question.

Question 10

In part (a) most scored at least one mark for oxygen. A common mistake was to write lead instead of lead(II) oxide or just to write lead oxide without specifying which one. Some failed to read the question and gave formulae instead of names, limiting them to one mark for O_2.
Many candidates gained all three marks for part (b), with a few of these using acceptable alternative methods. Those who lost marks usually gave answers to only 1 significant figure or rounded the numbers incorrectly in the intermediate stages. Those candidates who failed to score either did an upside-down calculation or attempted to use the numbers to do a relative

atomic mass calculation assuming the percentages had something to do with isotopes, which surprisingly was seen quite often.
A fair number of candidates scored both marks in (c)(i) with common mistakes including thinking that the state symbol for dilute nitric acid was (l) or for putting a 3 instead of a 2 in front of the lead(II) nitrate. In (ii) quite a few candidates scored five or six marks showing that they had a good knowledge of this type of preparation. Many lost the first marking point for failing to heat the nitric acid and some also lost the third marking point for not filtering before proceeding to partially evaporate the solution. As there were five possible marks for the crystallisation process, most candidates managed to pick up the three marks that were required for this section. A few limited themselves to a maximum of one mark for this section by stating that they would heat to evaporate all of the water.

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