Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

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Pearson Edexcel International GCSE
In Chemistry (4CH0) Paper 1C

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Question 1

Part (a) was very well answered with most candidates scoring all three marks. The majority of candidates scored at least two marks for part (b). Rather than stating that the particles were far apart some just said that they were not closely packed. This was not creditworthy as it was just a negative statement of what was in the stem of the question. Most candidates mentioned the free movement of the particles, but only a small minority stated that they moved quickly.

Question 2

In (a) most candidates recognised the filter funnel but some just wrote 'filter', which was not creditworthy. Some wrote 'Bunsen burner' instead of tripod even though the label clearly pointed to the tripod and many candidates did not gain the mark for the evaporating basin, as they just wrote bowl, dish or basin omitting the word evaporating. It is surprising that some candidates do not recognise standard laboratory apparatus. (b)(i) was poorly answered with the majority of candidates scoring zero. A common error was to say that the rock salt dissolved rather than just the salt. Others talked about increasing the rate of reaction, which was ignored. Those who did say that the salt dissolved only rarely scored the second marking point for saying it dissolved more quickly. The majority of candidates stated that the impurities stayed in the filter paper in (c)(i) but only a small minority said that this was because the impurities were insoluble, which limited them to one mark.

Question 3

Overall this question was well answered. The majority gave a correct answer to (a)(i). The most common incorrect answer here was cracking. In (a)(ii) most knew that bitumen was used for road surfacing but some lost a mark for just writing 'aircraft' for kerosene. The majority recognised that eicosane was an alkane in (b)(i) and stated that it fitted the general formula of alkanes, usually quoting the general formula. In (b)(ii) the majority knew the catalyst used for cracking, with silica being the most common answer. Incorrect answers included iron and phosphoric acid. (b)(iii) was well answered by the majority of candidates. A few ignored the 3 in front of the C_4H_8 and hence came up with an answer of $C_{16}H_{34}$.

(c)(i) was well answered with only a small minority losing a mark for omitting 'only' or mention of incorrect particles. The most common error in (c)(ii) was to state that saturated compounds contain single bonds, without specifying that all the bonds are single bonds, consequently only a minority of candidates gained the mark here. In (c)(iii) the majority either scored all three marks or zero here, as

those who knew the bromine water test usually went on to describe the results correctly. A few lost a mark by only saying what happens in the case of unsaturated compounds and a small number confused saturated and unsaturated giving the results the wrong way round, hence losing two of the three marks.

In (d)(i) the most common error was to write 'butene' omitting the '1'. A common error in (d)(ii) was to just draw but-1-ene again with the double bond on the left. A few had the double bond in the correct place but then failed to score the mark by having an incorrect number of bonds attached to the various carbon atoms.

Question 4

(a)(i) was poorly answered with many candidates just stating that covalent bonding is the sharing of electrons between non-metals. Some did pick up one mark for mention of a pair of electrons but very few mentioned the attraction to the nuclei of the atoms. It is surprising that as the definition of a covalent bond is clearly stated in the specification that so few students answer this correctly. Candidates fared better in (a)(ii) with many giving a correct dot-and-cross diagram. Common errors included drawing only one shared pair between the two carbon atoms or giving a dot-and-cross diagram for methane.

In (b)(i) many candidates realised that the boiling points were low due to weak intermolecular forces but often lost the second mark by saying less energy was needed to break the forces. As this question is not a comparison the word 'less' is not appropriate here. A few still think that the covalent bonds are weak but these were in the minority. In (b)(ii) most realised that the forces were stronger in B. Those majority of candidates knew what to do in (b)(iii) and usually scored both marks. A few who did the calculation correctly lost a mark by either failing to write the molecular formula or by writing $2C_2H_5$.

In (c) a fair number of candidates realised that the structure was a giant structure, but some lost the first mark by talking about giant covalent bonds. Many candidates lost the second marking point as they referred to intermolecular forces in their answers.

Question 5

In (a) very few candidates knew that sulfur burnt with a blue flame. A common answer was to say that a yellow gas was seen or sometimes a white precipitate. The majority wrote a correct equation for (b) and only a small number who wrote all the formulae correctly failed to balance it. Common errors included missing

out SO_2 or giving the formula of sodium chloride as $NaCl_2$. Part (c) was poorly answered showing a lack of knowledge of laboratory gas preparations. Common incorrect answers in (i) included thinking silica gel was a catalyst, presumably confusing it with silica in catalytic cracking, or thinking it was there to remove impurities. Downward delivery was not well known and candidates often lost marks in (iii) by saying that sulfur dioxide was heavier than air or just saying it was dense without reference to air. In part (d) the majority wrote sulfuric acid in (i) which was an acceptable answer with fewer writing sulfurous acid and most knew that methyl orange is red in acid and that acids contain H^+ ions. In (iv) some thought methyl orange was green when neutral, presumably confusing it with universal indicator.

Question 6

Just over half the candidates gave correct state symbols in (a). Common errors included thinking HCl was a liquid or $MgCl_2$ was a solid. (b)(i) was poorly answered with very few candidates giving the expected answer of 'to make the reaction faster.' Those who did score the mark here usually said that the oxide layer stopped the magnesium from reacting, which was an acceptable answer. (b)(ii) was generally well answered with most saying it was to stop the gas escaping, although a few lost the mark for saying 'to stop substances entering the flask'. (b)(iii) was not so well answered, with incorrect answers including, 'as soon as the magnesium/acid is put in the flask' or 'as soon as gas starts to fill the gas syringe' or even 'when the reaction has finished'.

The majority scored both marks in (c)(i) although a few lost a mark by failing to show how they had obtained their answer on the graph. A small minority wrote 20.2 instead of 22. (c)(ii) was not so well done with many misreading the value. 5.0 and 5.5 and 8 were common incorrect answers here. In (c)(iii) the majority gained at least one mark for one of the two mark scheme answers. In (c)(iv) many candidates realised that the reaction was quickest at the start but they often lost the first mark and sometimes the second by saying it was fastest during the first two or three minutes. Some commented on the steepness of the graph and others gave answers in terms of more particles present or more gas collected for the second marking point.

Part (d) discriminated well across the whole mark range. For those who answered well the most common error was to talk about more particles but without mention of them being in the same volume. The majority gained at least one mark for saying that the rate of reaction increased. Some of these went on to talk about more frequent collisions but then limited themselves to just one mark by referring to particles gaining energy.

Question 7

Parts (a) and (b) were generally well answered, although some were confused by the negative numbers in (a)(i) and had the correlation the wrong way round. The most common answer in (a)(ii) was to say they have full outer shells. Just under half the candidates gave correct answers to (c)(i) and (ii). Common mistakes in the equation included not making chlorine and/or bromine diatomic, or writing $NaBr_2$ and $NaCl_2$ or failing to balance the equation. The most common allowable answer for (ii) was brown. Most knew that there would be no reaction in (iii) and either gave one or both of the accepted reasons. (c)(iv) was poorly answered. A common mistake for those who understood the concept was to say that iodine was oxidised, rather than iodide ions.

This type of question has been written many times before and the issue of referring to the correct species when answering the question has been highlighted in several examiner reports, but candidates are often still making the same mistake. Many candidates scored zero here as they were confused as to what was oxidised and what reduced and others made generic statements such as 'both oxidation and reduction occur' which was not creditworthy here.

The majority gave a correct equation in (d)(i), with common incorrect answers including failing to make H and Cl diatomic or failing to balance the equation. (d)(ii) discriminated well across the whole mark range. Some candidates said that the litmus would stay blue in methylbenzene but then stated that this was because the solution was alkaline which lost them the first two marking points. Many knew that the litmus would turn red in beaker B but a few of these went on to say that it would be bleached white, presumably confusing chloride ions with chlorine. Many gained two marks by either stating the colours of litmus correctly or for saying that the litmus goes red in beaker B as hydrochloric acid forms. Some very good answers were seen which discussed the lack of ionisation in methylbenzene and the presence of H^+ ions in water.

Question 8

Very few candidates scored both marks in (a)(i). Many just said the conclusion was valid as calcium forms a white precipitate. Those who scored one mark usually said that the other ions also give a white precipitate but rarely went on to say that excess sodium hydroxide would need to be added to confirm the presence of calcium ions. In (a)(ii) it was surprising that only a minority of students knew the flame test for calcium ions. Those who did however normally gave the correct flame colour of brick red. Many just added excess sodium hydroxide here, but this was not creditworthy as a different test was asked for.

(b)(i) was also very poorly answered with only the minority of candidates understanding that this was about heating to constant mass, once again showing a lack of knowledge of practical Chemistry. A common incorrect answer was to say that you could test for the presence of water by adding anhydrous copper sulfate. (b)(ii), (c) and (d) were more or less all or nothing questions. Those who knew how to do the calculation usually scored all four marks whereas those who didn't scored zero, with a few just gaining one mark for finding the mass of water. Similarly, in (c) those who knew the test for chloride ions usually scored all three marks and those who didn't zero. Those who did the calculation correctly in (d)(i) invariably identified barium in (ii).

Question 9

In (a)(i) the majority of candidates knew that haematite was the correct ore, but there were some unusual spellings. Common incorrect answers included iron oxide and bauxite. (a)(ii) was very poorly answered with most candidates thinking that the hot air was there to provide heat for the furnace and totally missed the point of it supplying oxygen to react with the carbon. Most balanced the equation correctly in (a)(iii) with a common error being 2Fe instead of 4Fe. Many candidates scored zero in (a)(iv), but others picked up at least one mark for knowing that slag is formed, but often thought this was due to a direct reaction between limestone and silica. Some very good answers seen however with both a good description and fully correct equations.

Surprisingly only just over a third of candidates gained the mark in (b)(i). Answers were often too vague as they stated that aluminium was too reactive or more reactive but without relating it to carbon, or sometimes they compared aluminium with iron. Many failed to score in (b)(ii), but for those who recognised that electrolysis was needed the marks were spread evenly across the whole mark range. Some just gained one mark for mention of electrolysis. The marking point that was seen most rarely was the reference to the carbon electrodes, but candidates could still gain full marks without this marking point.

Question 10

In (a)(i) very few candidates gained the mark, which makes me think many of them had not done a titration or even seen one demonstrated. Those who had the idea that the solutions needed to be mixed evenly most often said stir rather than swirl the flask which was not a creditworthy response. (a)(ii) was surprisingly poorly answered with many candidates only ticking two of the three concordant results, but these could go on to score in (a)(iii) if they averaged their values correctly, gaining both marks if they gave their answer to two decimal places. Some who

ticked the correct boxes lost a mark in (iii) for not rounding their answer to two decimal places. Others ticked two or three boxes and then went on to average all four values correctly, which could gain them one mark in (iii). With all these possible combinations of answers only a small percentage of candidates gained full marks here.

10(b) was very much like 8(b)(ii) where the majority either scored zero or all five marks. One common error was failing to divide the volume by 1000 in (i) which limited them to one mark for this part, but they could then go on to score the other three marks if they carried their error forward. Some candidates confused this question with gas volumes and tried to incorporate 24,000 into their answer, which often resulted in them scoring zero. Part (c) discriminated well over the whole mark range, although the lower marks were more common than the higher ones, mainly because the candidates often heated the solution to dryness, limiting them to one mark.

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