Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2021

Pearson Edexcel GCSE Combined Science
(1SC0) Paper 1CH

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November 2021
Publications Code xxxxxxxx*

This examination session was a supplementary one for those candidates who could not be awarded a grade in Summer 2021 or who wished to improve on the grade they were awarded at that time.

For this paper, the entry was extremely small, and it should be borne in mind that comments made reflect what was seen and does not represent what would be normally seen at a complete cohort level.

Question 1(a)

Many candidates scored well on this question by not giving the opposite of the descriptions, as in the question, of how Dalton described atoms, so it was not sufficient to that 'atoms are formed from smaller particles' – answers of this type did not score. The popular points made by candidates were naming the sub-atomic particles and stating that elements are composed of a number of isotopes. Unfortunately, a few thought the question was about Mendeleev's early periodic table.

Question 1(c)(i)

Writing balanced equations is a skill that needs to be practiced by candidates. Here, candidates were required to insert correct formulae of three names substances including their state symbols. Only about half the candidates managed score at least one mark for two correct formulae; just a few scored 2 or 3 marks on this question. State symbols remain a mystery for many candidates with several candidates not attempting them. Some thought the state symbol for water was (aq).

Question 2(b)(ii)

Only a few candidates knew why waste water is filtered in the process of producing drinking water. Many offered the suggestion about removing large items such as 'twigs' or 'branches' but these are removed at the initial screening stage before the process of sedimentation. Probably the most common misconception here was to see that candidates thought water was filtered to 'remove impurities', or similar.

Question 2(b)(iii)

Again, a common misconception see here was that candidates thought that process of chlorination was to 'remove impurities'. Answers such as 'to cleanse the water' or ''make the water pure' did not gain credit, but there were some candidates who knew that chlorination is used to kill bacteria and to prevent the build up of bacteria during storage. Overall, the response to this question was quite disappointing.

Question 2(c)

Candidates found this question quite tough. Only the more able candidates could express themselves clearly enough to evaluate the information about salts A and B to achieve 2 or 3 marks. The weakest students resorted to describing the basic shapes of the lines produced by the data, or they wrote about the percentage of impurities removed either at the start or at the end of the graph. Several candidates offered made no attempt at answering this question.

Question 2(d)

Only the most able candidates could write an ionic equation for the formation of aluminium phosphate, given the information in the question. Many candidates made errors in writing the formula of the aluminium ion – the most common errors seen here were 'Al' or 'Al^{3-}' and the formula of aluminium phosphate was often seen containing a charge – usually 3-. Again, practicing writing ionic equations, like writing balanced equations, is a skill that candidates need to develop.

Question 3(b)

Only a few candidates scored a mark on this question for stating that zinc chloride is soluble and zinc carbonate is insoluble. Unfortunately for some candidates, only describing the solubility for one compound was insufficient for a mark. The idea of ions moving in zinc chloride solution or not moving for zinc carbonate (as it didn't dissolve in water) was only made by one candidate on this paper. Of those that offered an answer, many wrote about zinc chloride solution being electrolysed because of 'delocalised electrons'. Overall, a poor performing question for this small entry of candidates.

Question 3(c)(ii)

For the majority of candidates taking this paper, electrolysis was a topic they knew little about. This was evident from seeing only a tiny number able to make a reasonable attempt at answering this question by just writing about 'positive ions' or 'hydrogen ions' being attracted to the cathode.

Question 3(d)(i)

Drawing diagrams of basic apparatus has appeared on several papers now, and it's another skill that candidates do need to practice. The marks were awarded for drawing two electrodes in a solution in the beaker and for drawing a power pack (or battery / cell) connected by wires to the electrodes. Few could draw a complete circuit showing both the electrodes and the power supply. The common mistakes seen were where candidates had missed out the solution in the beaker or had nothing connected to the electrodes.

Question 3(d)(ii)

A few candidates did score for either the anode losing atoms (so becoming smaller) or the cathode gaining atoms (so becoming larger). Unfortunately none of the candidates could explain why the colour of the electrolyte remained the same throughout the electrolysis.

Question 4(a)(i)

Some candidates could account for the amount of acid used by stating that it was in excess. However, several wrote about the concentration of the acid being too high or that the acid reacted too quickly – so it appeared that many were not understating the idea of a limiting reactant – in this case the amount of copper carbonate in the reaction.

Question 4(b)

Obtaining salt crystals from a salt solution is a question that has appeared on occasions, and in this case some candidates were able to give a good enough description to achieve both marks. However, several spoilt their answers by 'evaporating the copper sulfate solution until all the water had gone', which of course would not produce crystals of copper sulfate. Describing experimental work is an important aspect of this subject.

Question 4(d)

This proved to be a very challenging calculation for the candidates. Many had no idea how to go about dealing with this problem. Calculating the formula mass of water was disappointing for several candidates where they had gone with $5H_2O$ as being 5x1x2 + 16 = 26. Some did manage to work out the number of moles of water but slipped up by thinking that the number of moles of water = number of moles of $CuSO_4.5H_2O$. For several candidates, however, it seemed that their

knowledge of moles was somewhat limiting. Many candidates made no attempt at answering this question.

Question 5(a)

Candidates sitting this paper found describing practical work to be particularly challenging, and it was no different in this question. Few candidates made a positive description that could be awarded any marks. The major misconceptions involved reacting the metals with water or with an acid, or just describing the order of reactivity of the three metals. A few candidates had the idea of placing each metal into each solution, but even fewer managed something from that point onwards.

Question 5(b)

Most candidates did not score here. Several candidates were answering their own question about why copper or iron could be extracted by heating its ore with carbon, and so did not score. Several candidates put it down to strong bonds in the ore or that it has a high boiling point and other reasons which all did not score. A few suggested that it was because aluminium was more reactive than carbon and fewer scored the second mark after that.

Question 5(d)(i)_(ii)

In light of the poor marks given for answers to Q04(d), it was surprising to see how many candidates managed to correctly calculate the number of moles of titanium chloride in (i). However, most did not understand what part (ii) was after, with a couple of candidates able to show that that 500 moles of magnesium was an excess by showing that 236.8 moles $TiCl_4$ would react with 2x236.8 (= 473.6) moles Mg, as shown by the balanced that was given, which is less than 500.

Question 5(e)

Some candidates managed to make a sensible suggestion as to how titanium could be obtained from the mixture of metals, but some erroneously thought that distillation would be a suitable way to isolate the titanium having added dilute hydrochloric acid to react with the magnesium. Again, many candidates made no attempt at offering a positive answer.

Question 6(a)

Many candidates scored 1 mark for correctly giving the number of neutrons based on their number of protons in the ion. Only a few candidates spotted that given 54 electron in the ion, so as the ion has a 2- charge so the number of protons present in the nucleus would be 52 and it was these candidates who scored both marks.

Question 6(b)(i)

Many candidates scored here with an answer of the isotopes containing the same number of protons. Some spoilt their answer by adding 'and the same number of neutrons'. Some spotted 'isotopes' and trotted out an answer based on atomic number and mass number, but did not answer the question which specifically about subatomic particles present in the atoms.

Question 6(b)(ii)

Those that had practiced this type of calculation found it quite straightforward and were able to succinctly show a suitable calculation of the relative atomic mass. Of the errors seen, some forgot to divide the total by the number of atoms (100), and a few just tried to give an average of the percentage abundance.

Question 6(c)

Answer at all three levels were seen and for both marks that are present at each level. There were some really good answers that made a good start by identifying substance A as being ionic, based on the ability to conduct electricity in the molten and solid states, and substance B as being metal. Generally the explanation of the properties of melting temperatures and conductivity were quite well explained to a varying degree and these accounted for that answers that obtained a level 2 or a level 3. Level 1 answers generally made some comment about high melting points and strong bonds or that B could conduct because of delocalised electrons.

General comments

At this level, candidates do seem to take a calculator with them when sitting this H tier papers. However, as in previous reports, it has to be reiterated that calculations should be set out in a clear and logical way and where more than one calculation is used, we ignore any calculation method that does not lead to the answer on the answer line.

Similarly as in previous reports, it has to be reiterated that in preparation for future examinations, candidates benefit from using the past examination papers as practice as it gives them experience of different types of questions and the detail that is needed to obtain the marks, especially so for items involving balanced equations, calculations and practical work.