Pearson Edexcel

# Examiners' Report
# Principal Examiner Feedback

## November 2021

Pearson Edexcel GCSE Chemistry

(1CH0) Paper 1H

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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)**

The responses to this question seemed to achieve either full marks or nothing in general. Candidates who understood what the question was asking explained very clearly about heating to a constant mass to ensure that the reaction was complete. Others suggested looking for things that they would not be able to see – for example, carbon dioxide being released or looking to see if all of the zinc carbonate had gone.

There was also some misunderstanding in the reading of the question for a number of candidates, in that they interpreted the term 'complete' to mean that the reaction had happened at all rather than that the reaction had finished.

**Question 1(b)**

Most candidates scored 2 marks for this question. Some lost a mark for incorrectly rounding the answer down to 87% rather than up to 88%.

**Question 1(c)**

The majority of candidates managed to convey the idea that the blue flame is the hottest, although some didn't get the mark because they used the word stronger or said that the reaction would be quicker rather than relating the answer to the heat energy required for the reaction.

Fewer candidates scored the second marking point. There was a common misconception that a lid was there either to prevent gases from escaping or to keep the reaction at a higher temperature. It was more common to see these answers than the correct answer.

**Question 2(a)**

This question was very well answered, with the majority of candidates mentioning between four and six of the marking points in their answers by identifying and naming the subatomic particles. Many candidates also discussed the existence of isotopes, and some mentioned the idea of a nucleus within the atom. The responses that did not score simply stated the reverse argument to the points stated within the question – that atoms were made up of smaller particles and that there are differences between them.

**Question 2(c)(i)**

This question had a wide range of scores from 0 – 3, even across the small number of entries and indicates that most candidates can come up with some formulae and state symbols. The most common reason for candidates receiving 2 marks instead of 3 was due to many candidates still not having the correct formula for chlorine as $Cl_2$. There were also a number of responses giving the state symbol for water as (aq).

**Question 3(b)(ii)**

Some candidates lost marks here by not being specific enough about what would be removed by filtration (impurities) or suggesting that filtration removed bacteria. Others did not get the mark for mentioning large items that would be removed in the initial screening of the water, such as twigs, leaves and other large objects.

**Question 3(b)(iii)**

Again, marks were lost here by not being specific enough. Candidates using the idea of cleaning the water or removing impurities were not awarded a mark, although many responses did get the mark.

**Question 3(c)**

Most candidates managed to score some marks for this question, but few scored full marks here. There were some clear misconceptions with candidates interpreting the data as some wrote about how quickly impurities were removed while others discussed the shape of the graph. Many candidates failed to take any data from the graph to state the optimum masses of salt A and salt B required, or to identify the percentage of impurities removed at these points.

**Question 3(d)**

Well answered overall with only a few blank responses. There were a few responses showing the formula of aluminium phosphate with the ion charges.

**Question 4(a)**

There seemed to be some confusion here between the structure of aluminium and alloys compared with bond strength, although many candidates scored 2 or 3 marks for this question.

**Question 4(b)**

This question was well answered overall, and many candidates scored both marks. The most common 1 mark response was calculating the mass of 2% - presumably due to candidates misreading the question.

**Question 4(c)(i)**

This question was very well answered and almost all candidates scored 2 marks here for stating that the as the percentage of magnesium increased, the strength of the alloy also increased.

**Question 4(c)(ii)**

Another well answered question, although again some candidates limited themselves to 1 mark by not reading the question properly and giving the percentage of magnesium from the graph rather than the percentage of aluminium asked for in the question.

**Question 4(d)**

Well answered overall with many candidates identifying improved resistance to corrosion and improved appearance to gain both marks. However, some candidates lost marks simply by stating that gold is unreactive and not linking this to why this property is used in electroplating. A few candidates also incorrectly stated that gold is used for electroplating as it does not conduct electricity.

**Question 5(b)**

Less than half of the candidates scored any marks on this question. Very few seemed to understand the idea that zinc chloride is soluble and zinc carbonate is not, but some scored this mark.

**Question 5(c)(ii)**

Not well answered overall, with some candidates discussing ideas of reactivity to explain why hydrogen forms rather than sodium at the cathode – not answering what had been asked in the question.

**Question 5(d)(i)**

Most candidates scored at least 1 mark on this question, with many of these going on to score the second mark. The quality of the diagrams drawn was very variable – some drawn neatly with a ruler and others showing sketches. It was more difficult to determine whether the freehand sketches were worth both marks. Common reasons for the loss of a mark included: not drawing the solution in the beaker, not adding labels (as asked for in the question), not drawing the power source and wires or showing a chemical cell rather than the set-up of electrolysis.

**Question 5(d)(ii)**

Explaining what happens in electrolysis continues to be a weak area for candidates. Very few marks were awarded here with confusion between electrons and ions, and no apparent understanding of why the concentration of the solution does not change during electrolysis with copper electrodes. There was also a misconception that the loss and gain of electrons at the electrodes are the cause of the changes in mass.

**Question 6(a)(i)**

This question was well answered overall, with most candidates correctly using the term 'excess'.

**Question 6(b)**

Marks were lost in this question by candidates suggesting that all of the water should be evaporated from the solution rather than heating the solution to concentrate it. Very few responses mentioned leaving the solution to cool or putting the solution somewhere warm for a period of time to allow crystals to form slowly (as tends to be seen more commonly in school)

**Question 6(d)**

Some candidates got the correct response for this question and clearly showed their working out. Candidates that had shown some working out usually scored 1 or 2 marks although they may not have obtained the correct final answer. A number of candidates incorrectly calculated the relative formula mass of water to be 26 – multiplying the $H_2$ by 5 but not the O. There were a few completely blank responses, although 1 mark was available just for calculating the relative formula mass of water.

**Question 7(a)**

This was a question about carrying out a practical to determine the order of reactivity of metals. It was very badly answered throughout, with very few candidates mentioning any

practical activity at all. Some attempted to explain the order of reactivity but without any reference to practical work, and some used the metals and their sulfate salts interchangeably. Where marks were awarded, they were usually for identifying the mixing of some of the metals with some of the salts. There were very few marks awarded for any observations. Many candidates gave detailed responses about displacement of less reactive metals but did not relate this to the practical activity at all.

**Question 7(b)**

Many candidates scored a mark for correctly stating that aluminium is higher than carbon on the reactivity series. There were fewer that then went on to state that carbon cannot displace aluminium or that there would be no reaction between the carbon and aluminium oxide. A number of answers stated that aluminium has strong bonds that require a lot of energy to break – and so not answering the question that was asked.

**Question 7(d)(i – ii)**

Many candidates correctly calculated the relative formula mass and then the number of moles of $TiCl_4$ in the reaction for part (i) of the question.

Part (ii) of the question was usually left blank or given an answer relating to the observations that would be made if there were excess magnesium. Candidates did not seem to understand what they were being asked to do for this part of the question. Where attempts were made to show the excess of magnesium, students generally did not mention the 2:1 ratio for the reaction and gave an answer with a 1:1 ratio.

**Question 7(e)**

Most candidates correctly identified filtration as the correct method of separating, but fewer managed to score a second marking point. They did not say either to add the hydrochloric acid to the mixture, or to wash the residue after filtration and could not score a second marking point. Although it was not part of the marks awarded, a significant number of students stated that the titanium would pass through the filter paper in spite of being told that it was insoluble in the question. There were also several responses suggesting distillation as a suitable separation method.

**Question 8(a)**

The most common answer to this question was related to pollution and suggested that candidates were answering the question as to why hydrogen may be a better fuel than hydrocarbons. There was little understanding shown of chemical cells, or hydrogen-oxygen cells.

**Question 8(b)**

It was obvious that candidates struggled to produce ionic and half equations and many responses here were either left blank or filled with words or state symbols. Very few candidates scored both marking points although some responses were awarded a mark for including electrons on the left-hand side of the equation.

**Question 8(c)**

Candidates made good attempts at this question, and more than half scored 1 of the two available marks. Many would have scored both marks, however it was more common to see the formula mass of oxygen used as 16 rather than the 32 that it is, and then incorrectly calculated the number of moles of oxygen to be 3 rather than the correct value of 1.5.

Other mistakes were with getting calculations mixed up and dividing numbers that should have been multiplied. There were a number of responses of 768, calculated by multiplying the mass by the relative formula mass and therefore using the incorrect formula.

**Question 8(d)**

This 6-mark question was not as well answered as the other one on the paper. Some candidates gave an explanation relating to the equilibrium associated with the Haber Process rather than the one asked about in the question and gave incorrect information about the effect of temperature on equilibrium position because it was learned from the Haber Process rather than applied to this reaction. Level 1 answers correctly determined that a higher temperature would increase the rate of reaction, although this was not usually related to the rate of attaining equilibrium. Most marks scored here related to describing how temperature and catalysts affected the rate of reaction, and there were far fewer answers that discussed the equilibrium.

**Question 9(a)**

Approximately a third of responses scored both marks here, with many of the remaining answers scoring one mark. The most common mistake was not to realise that the information given was about an ion rather than an atom, and so candidates completed the calculation assuming that the element contained 54 protons. A few candidates realised that they had been given information about an ion, but then added two protons to the electron number rather than subtracting it.

**Question 9(b)(i)**

Overall, this question was well answered, although the majority of answers stated 'same number of protons and electrons' rather than just protons. Where candidates were wrong it was because they stated that isotopes have the same number of protons and neutrons.

**Question 9(b)(ii)**

Most candidates who attempted this question scored both marks, although there were a number of blank responses for this question. Sometimes a mark was lost because the candidate rounded the correct answer to 28. A few responses looked as though they may be attempting to carry out empirical formula calculations and scored zero.

**Question 9(c)**

This question was well answered overall with many candidates achieving at least a level 2 response – either by explaining the properties ionic, covalent and metallic compounds without identifying the bonding as asked in the question, or by identifying metallic bonding and explaining the properties of metals. Some candidates did not correctly identify ionic and simple covalent compounds and had the properties of these mixed up. Some candidates that achieved a level 2 response did not achieve level 3 only because they did not identify the bonding in the different substances.

**Question 10(a)(i)**

This question was poorly answered overall, with candidates offering generic suggestions or improvements to carrying out the titration overall rather than relating to the mass of potassium hydroxide as was asked for in the question. Many answers indicated that the candidates did not understand what the question was asking them to do, and there were also a lot of blank responses. The most common mark awarded was to use a pipette to

measure the volume of potassium hydroxide solution more accurately than a measuring cylinder. Common incorrect responses included reading equipment at eye level, repeating (but not to concordant results) and rinsing equipment out with water before use.

**Question 10(b)**

The majority of responses to this question scored either 4 marks or 0 marks and there were a significant number of blank responses here. Where candidates attempted the calculation incorrectly there were issues with getting equations the wrong way round (concentration = moles x volume) or putting values for volume where moles should be and attempting to calculate concentration using the two volume values given in the question.

**Question 10(c)**

This was the lowest scoring question on the paper, with more than half of the responses left blank. Whilst the last question on the paper should be one of the most challenging, some marks could have been awarded with some straightforward calculations. In this case there was one mark available for converting molar concentration into mass concentration and the relative formula mass was given.

**General Comments**

Candidates often make the mistake of answering what they think that the question is asking rather than what is actually being asked.

Questions relating to practical work are often poorly answered.

Calculation questions suggest that recall of formula triangles is poor.