Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

November 2020

Pearson Edexcel GCSE

In Chemistry (1CH0) Paper 2H

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Principal Examiner's report on Chemistry Paper 2H

This paper was the second of two Chemistry papers taken by Chemistry higher tier students in November 2020. Some questions were also part of the foundation tier.

Question 1

Q1bi: Most candidates could name the test reagents by name or formula.

Q1bii: Most candidates understood the issue in the question, and scored both marks referring to bromide and iodide ions. Candidates who did not achieve both marks usually did so, either because they only spoke of only one of iodide or bromide, or because they discussed chloride (or even fluoride) ions.

Q1bii: Many candidates could identify the flame photometer. Note that 'photometer' alone did not score the mark.

Question 2

Q2b: The information that the two elements both had one electron in the outer shell of their atoms was well described. Some candidates referred to the same number of electrons (not outer electrons) and so did not score.

Q2c: Candidates were usually aware that intermolecular forces affect boiling point. There remains a confusion between intermolecular and intramolecular forces, with responses sometimes straying into an implicit or even explicit statement that covalent bonds were responsible for level of boiling point, e.g. 'the intermolecular forces between the atoms are weak'. Some candidates did not go on to explain that weak intermolecular forces only required little energy to overcome.

Q2d: The vast majority of candidates balanced the equation, although not all got the correct state symbols – even though the question stated that potassium fluoride was a solid.

Question 3

Q3a: Almost all candidates identified the pattern in the data, but not all linked this to surface area, as required in the question.

Q3b: This part was well answered; most candidates calculated 300s, with only a few missing the need to convert from minutes to seconds. It was widely known that to find the rate the volume is divided by time.

Q3c: It is pleasing to note that a good number of candidates were able to discuss their response in terms of kinetic energy, some even mentioning the change from thermal to kinetic energy. This was often linked to a higher frequency of collision (although some candidates failed to score by referring to 'more collisions', not 'more

frequent collisions'). The frequency of collision and success rate of collision were confused by some candidates who are advised to refer to these aspects separately.

Question 4

Q4ai: Polymer formation from monomers is generally well understood, although some candidates lack the appropriate literacy skills in explaining the process. Better candidates produced good diagrams.

Q4c: A majority of responses focussed on flexibility, with very few alluding to unreactivity, non-toxicity or impermeability (to air or water). Explanations were, unsurprisingly, weaker than the statement of a property, and sometimes here insufficiently scientific or rigorous language prevented the awarding of a mark.

Q4d: Despite the **bold** statement in the question a few candidates still calculated the mass that did react. The better candidates were able to properly round their answers to two significant figures. This was not understood by all – some not rounding at all, and it was a pity that a response of 17.5 rounded to 18.0 was seen.

Question 5

Q5ai: Most candidates identified that effervescence would occur in this reaction. Many fewer were able to state that the solid would disappear (or the harder point that a colourless solution would be left).

Q5aii and iii: Condensation polymerisation and DNA were well known by candidates, and perhaps slightly less well known the identity of water of the other product.

Q5b: Some candidates missed the point here, and tried to propose completely different (and incorrect) test. (Note the wording in the question: "…changes …to be made to <u>this test</u> for it to work). The word 'dry' was mentioned on four occasions and many picked up the fact that the litmus must be damp. Perhaps surprisingly, slightly fewer identified that the litmus paper was the wring colour.

Q5c: Nomenclature of simple organic compounds not well understood, with very few stating but-1-ene, and few being able to draw its structure. The majority did identify water, but some just missed out the name at the bottom and others gave incorrect structures for water, e.g. H_2-O.

Question 6

Q6ai: Most candidates linked the cloudiness to a precipitate, slightly fewer to sulfur (even though the equation gave it as a solid product). Others identified NaCl as a solid precipitate (even though the equation gave it as aqueous), whilst others thought that the cloudiness was caused by effervescence.

Q6aii: It was clear that the majority of candidates had either carried out this investigation or seen it done. A pleasing majority were able to locate a black cross correctly and knew that it would disappear. However, some were confused into discussing the effect of different concentrations of HCl, but omitted to discuss the process for measuring the rate.

Q6bi: It was surprising that this proved difficult, given that if the mixture “turns brown” it must be a product and therefore even if you knew nothing about halogens there was a 50:50 choice. The majority of incorrect answers identified bromine.

Q6bii: OILRIGS are fast disappearing in this new eco age! Those who use them do remember that reduction is gain (of electrons), so most gained this mark. The problem with a good acronym is that it can hide a lack of understanding, so far too many suggested that iodine/iodide was reduced (or even sodium or sodium iodide).

Question 7

Q7bi: The calculation of density was well done by many candidates. Inevitably, some tried to change the volume units.

Q7bii: Despite being told that argon is a gas, and that the container was “completely filled” many candidates treated argon as a liquid and talked about the meniscus. Not many recognised that as argon is gas the line on the volumetric flask serves no purpose in this experiment. Some did read and understand the question and knew that the volume of the gas was more than 250cm^3 and most of these candidates made sensible suggestions for alternative apparatus or for measuring the whole volume of the volumetric flask.

Q7d: The ‘2’ was straightforward but the charge on the magnesium ion was much less well done, candidates apparently not knowing that charges must be balanced on both sides of an equation.

Q7e: This part was very pleasingly answered by many who, as intended, to the data in the figure and correctly explained the conclusions that could be drawn. Weaker candidates just asserted the conclusion without explaining how the data led to that conclusion (e.g. that there was a lot of carbon dioxide in Q without saying how that could be deduced). Other candidates used the limewater data but ignores the burning splint.

Question 8

Q8ai: Candidates were able to make sensible predictions about the observations of the reaction of rubidium with water.

Q8aiii: This calculation was quite well answered. Most candidates could calculate the moles of rubidium and they usually went to state, or imply, that this was also the moles of rubidium hydroxide. (Some usefully arranged there answer under an equation to the 1:1 ratio was clear, with 0.1 written under each substance). The next stage was less well understood, with the need to convert moles to grams. The final stage, diving by the volume, was also well done (even when earlier stages had not been).

Q8b: The problem for some candidates lay in the knowing/recalling the formula for ammonia and thus deducing the third product with many suggesting that it was CO_2. Those who correctly identified water as the third product and recalled the formula of ammonia nearly always balanced the equation correctly.

Question 9

Q9a: It was surprising how many candidates failed to tackle this question effectively, with not many securing all three marks. Too many candidates described what was happening, rather than explaining the observations as required. Some did not seem to realise that combustion is an exothermic chemical reaction that would produce oxidation products. There was confusion with cracking and mention of alkenes and alcohols.

Q9b: This part was generally well done, and the examiners were pleased to see answers clearly laid out with the energy to break bonds and the energy released making bonds evaluated with working. The most common cause of loss of a mark being an answer of 730 instead of -730. A few candidates showed that they had no understanding and simply juggled the figures they were given. A similar minority seemed unable to transfer data from their calculator to the exam paper (or vice versa) accurately and so lost marks.

Q9c: Candidates' discursive skills seem to be improving as most were able to write with a fair degree of coherence about the data they were presented with. Stronger candidates not only rehearsed the detail from Figure 9 accurately, but also related it to their pre-existing knowledge about the effect(s) of the various pollutants; they also explained a judgement as to which engine caused the most or least environmental damage. Weaker candidates did not discuss the effect(s) of the pollutants. Very weak candidates did not discuss all three cars. The best answers described the polluting effects, evaluated which of the cars were the most polluting and came ot a conclusion about the most or least polluting car using evidence from the table.

Question 10

Q10ai: While most candidates mentioned yeast, the idea of warming the mixture to a limited extent was less well stated. Answers such as 'heat the mixture' were rejected unless a specified temperature or suitable range was given, whilst 'warm' was accepted.

Q10aii: A majority of candidates realised that fractional distillation was required; very few were able to describe the location of the fractionating column. Weaker candidates suggested all manner of remedies such as pre-boiling the dilute ethanol or putting an ice pack around the condenser or redirecting the end of the condenser, and so on.

Q10b: This calculation was well done; the only significant difficulty experienced by some candidates was the move from 1 mol of carbohydrate to 2 mols of carbon dioxide.

Q10c: This question was pleasingly tackled with better candidates giving excellent responses. Most candidates were able to identify some or all of the significance of the formulae of the acids and their reaction with alcohol and sodium hydroxide solution. Most able candidates mentioned the formation of esters and the production of sodium salts. Weaker ones stated that they 'started with CH_3' (not creditworthy) but a good number recognised the significance some or all of -COOH, carboxylic acid and formula mass increasing by 14 (although not connecting this with the difference of CH_2). Weaker candidates thought that their densities were 'similar' or that only that of ethanoic acid was an outlier; again, whilst rather more recognised the trend in respect of boiling points, many still stated that they were 'similar'. The best candidates identified the common functional group and hence similar chemical reactions, and then identified the patterns in the boiling point and in the density.