Examiners' Report
Principal Examiner Feedback

Summer 2024

Pearson Edexcel GCE
In Chemistry (8CH0)
Paper 01: Core Inorganic and Physical Chemistry

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2024
Publications Code 2406_8CH0_01_ER

General Comments

There were some very strong candidates who have good scientific knowledge and understanding. It was clear that some candidates were not prepared and gave weak answers to several questions. In general, the greatest area for improvement on this paper was calculations and practical skills. There was a concerning number of students getting GCSE level questions incorrect. Lots of marks were lost due to candidates referring to incorrect chemistry.

Question 1

This was the most accessible question on the paper, with 90% of candidates scoring correctly.

Question 2

Only 50% of candidates scored correctly here, with some candidates struggling to recognise the large jump in energy.

Question 3

This question was answered well by candidates, with 80% of candidates scoring correctly.

Question 4a

Overall, question 4a was answered well, with 40% of candidates scoring full marks.

Q4ai) Most candidates got the colours correct. A few candidates got the colours the wrong way around or forgot the word *precipitate*.

Q4aii) This was answered well. Most candidates got the tests and results correct, although were losing marks through not mentioning that AgBr does not dissolve in dilute ammonia. Lots of candidates referend to the halogens, halides or potassium halides, rather than the silver halide precipitate. A few candidates got the tests the wrong way around.

Question 4b

Q4bi) Overall, this question was well answered. Most candidates could identify white precipitate, however some candidates incorrectly referred to *fizzing*.

Q4bii) This question was answered well.

Q4biii) Overall, this question was answered poorly. Candidates struggled to identify an ionic equation and most attempted to use the nitrate ion. Most that did correctly identity H^+ and CO_3^{2-} either had H_2CO_3 as a product, or incorrectly balanced the equation. Many candidates identified the carbonate ion as a solid.

Question 5a

This question was answered well. Most candidates identified the correct precautions, however some mentioned using a gas mask or washing hands and so were not able to achieve the mark. Some candidates struggled to name a fume cupboard correctly.

Question 5b

This question was answered well by candidates. The greatest error was from candidates incorrectly calculating the relative formula mass of the compounds or missing the 5:4 ratio. #

Question 5c

Q5ci) Overall, this question was answered poorly. Many candidates did not calculate volume correctly. Those that did, struggled to calculate increase in volume or did not convert into cm^3.

Q5cii) Candidates answered this question relatively well, however there were many mistakes seen in responses to this question. M1 was lost through candidates not converting the volume into dm^3 so the calculation for moles was to the incorrect factor. M2 was lost through candidates not referring to the equation at the top of the page and using the molar ratio. M3 was lost through candidates not giving their answer to 2 or 3 significant figures. Most candidates achieved at least 1 mark in this calculation.

Question 5d

This question was answered poorly, with many candidates either not reading the question and giving covalent bonding as an answer or thinking that hydrogen bonding was present in chlorine dioxide.

Question 5e

Q5ei) Candidates answered this question relatively well. Many candidates lost marks for either putting the extra electron as a bonding electron or having the incorrect number of x's or o'x for each chlorine or oxygen. Some candidates left unpaired electrons.

Q5eii) Similarly to question 5ei, candidates answered this question relatively well. A variety of angles were stated. Many candidates stated that lone pair repulsion was greater than bonding pair repulsion but failed to mention the number of lone pair and bonding pairs of electrons around the chlorine atoms.

Question 5f

Candidates responded to this question well. Most candidates were able to identify it as -2.

Question 6a

Q6ai) This question was answered well. Some candidates lost marks for answering part ii in part i, therefore not showing an understanding of the term empirical formula. Most candidates achieved at least 1 mark for calculating the percentage of oxygen.

Q6aii) Overall, question 6aii was answered well, especially for students that achieved full marks on part i.

Question 6b

Candidates answered this question well, with 80% of candidates scoring full marks. Most marks were lost for incorrect number of decimal places, incorrect rounding, calculator error or stating an incorrect unit.

Question 6c

Candidates responded well to this question, with 85% of candidates answering correctly.

Question 6d

This question was answered relatively well. Overall, 50% of candidates answered question 6d correctly. This was mainly due to candidates stating the highest intensity peak at 43 as a molecular mass or the M+1 peak at 115.

Question 7a

Candidates answered this question relatively well. The average mark achieved on this question was 2. Most candidates were able to state the equation between potassium chloride and sulfuric acid and identify the misty fumes of hydrochloric acid given off. Some candidates identified no change in oxidation number of sulfur for the reaction with potassium chloride, but the sulfur is reduced from +6 to +4 when reacted with potassium bromide. Very few could state the balanced equation for the further reaction of hydrogen bromide with sulfuric acid or identify orange fumes as bromine.

Question 7b

Q7bi) Overall, this question was answered poorly, with less than 20% of candidates answering correctly. Many candidates suggested that the role of the acid was to clean/ sterilise the wire or to help the powder stick to it.

Q7bii) Candidates answered this question well, with 90% of candidates answering correctly.

Question 7c

Q7ci) This question was answered poorly. Diagrams were often rushed. The greatest error in M1 was candidates either not heating the carbonate using a Bunsen burner, adding acid to the boiling tube or heating in a conical flask / beaker. The greatest error for M2 was from candidates not drawing a delivery tube clearly where the gas could travel through. Some candidates lost M2 for the delivery tube not being in the limewater or having a bung on the limewater test tube.

Q7cii) Similarly to question 7ci, question 7cii was answered poorly. Candidates achieved marks for 'same distance from heat source' and 'same Bunsen burner temperature / setting / heat'. However, many candidates only mentioned 'same temperature / heat' and therefore were not able to achieve the mark. Most candidates said 'same mass of carbonate' rather than 'same moles of carbonate' so did not achieve the mark.

Q7ciii) Candidates answered this question relatively well, with most candidates losing the mark for not mentioning time or not mentioning 'volume' of carbon dioxide.

Q7civ) Again, this question was answered relatively well, with 60% of candidates getting the correct answer.

Question 7d

This was generally answered well by candidates. The greatest error was from candidates referring to delocalised electrons in potassium chloride. Lots of candidates referred to hydrogen bonding in water as the reason to why it could not conduct.

Question 8a

Q8ai) Overall, this question was answered poorly, with only 40% of candidates achieving any marks. 20% of candidates achieved 3 marks for the diagram. Most candidates lost marks for not drawing enough water molecules or the correct dipoles and not separating the ions from their lattice. Less than 5% of candidates could explain the energy to achieve M4.

Q8aii) This question was answered relatively well. Most candidates could identify hydrogen bonding; however, some candidates did not achieve M1 as they did not identify the hydrogen bonding as between water and methanol molecules. The diagram was answered poorly, with most candidates either not labelling the hydrogen bond, not drawing the lone pair of electrons on the oxygen or not drawing the OHO bond at 180°. Some candidates drew methanol incorrectly or drew the hydrogen bond with the C-H instead of the O-H.

Question 8b

Q8bi) This question was answered well. Most candidates identified 2,2-dimethylpropane as being branched and therefore had weaker London forces. Many candidates lost M2 for either not mentioning surface area or saying that the molecules will be packed closer together. M3 was lost on occasion due to candidates stating that propane had more electrons which is why the London forces were stronger.

Q8bii) Question 8bii was answered relatively well. Many candidates compared the Si=O double covalent bond strength with the Si-Cl single covalent bond strength. When candidates did correctly identify the structures of the two silicon compounds, they normally achieved full marks.

Question 9a

Candidates answered this question relatively well, with 55% of candidates answering correctly. Most marks were lost for incorrect balancing or missing charges. Some candidates included electrons in the overall equation.

Question 9b

Q9bi) Overall, this question was answered poorly, with only 25% candidates answering correctly. The definition was not well explained and the use of 'single species' was rarely seen, with many using a 'single atom' or 'an element' instead.

Q9bii) Candidates answered this question relatively well, with 40% of candidates achieving the mark. Many candidates stated chlorine or chlorate as the reducing agent, rather than the chloride ion.

Q9biii) Again, candidates answered this question relatively well, with 60% of candidates getting correct.

Question 9c

Candidates generally approached this question well. The average mark on this question was 4. Most candidates correctly converted temperature into Kelvin and could rearrange the equation to calculate volume. The greatest error was from candidates not using the molar ratio to calculate number of moles of oxygen and not converting into cm^3 correctly.

Summary

Based on their performance on this paper candidate are offered the following advice:

- Read the question carefully and ensure you are answering the question that is being asked.
- Take time at the end of the examination to check answers.
- Make sure all diagrams are labelled. If the question asks for a labelled diagram, marks can only be achieved with the labels.
- State the obvious. Some of the early marks in a question are for easier content e.g. state the type of bonding in silicon dioxide.
- Revise core practicals. Some questions will be asking practicals which are similar to the core practicals stated.
- Make sure you can draw a diagram of practical apparatus which works e.g. if gas in being collected there is a clear path for it to flow through the apparatus.
- Never leave a multiple-choice question blank.
- Type calculations in your calculator more than once to avoid calculation error.
- Check additional information asked for in a calculation e.g. number of decimal places.
- Highlight final answers in calculations to show you know what the question is asking for.
- Revise basic chemistry. Lots of marks were lost in this paper for GCSE content.

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE