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A LEVEL

Examiners' report

CHEMISTRY B

H433

For first teaching in 2015

H433/03 Autumn 2020 series

Version 1

ocr.org.uk/science

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

Reports for the Autumn 2020 series will provide a broad commentary about candidate performance, with the aim for them to be useful future teaching tools. As an exception for this series they will not contain any questions from the question paper nor examples of candidate answers.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

Paper 3 series overview

The H433/03 component assesses content from across all teaching modules of A Level Chemistry B but places particular emphasis on practical skills.

Candidates are required to use knowledge and understanding of principles and concepts in the planning of experimental and investigative work and in the analysis and evaluation of data.

Chemical literacy is assessed through extended response questions as well as the comprehension of, and use of, data from a Practical Insert

Question styles include short answer (structured questions, problem solving, calculations, practical) and extended response questions.

Candidates who did well on this paper generally did the following:	***Candidates who did less well on this paper generally did the following:***
• Wrote clearly and logically taking points in the question in sequence, (either using full sentences or bullet points). • Laid out calculations carefully, explaining what each step represented e.g. moles of a reactant or mass of a product.	• Did not take the care needed with laying out calculations. • Did not use diagrams where they would clearly have helped • Did not read the question stem (including the Insert) carefully enough and produced responses which were not addressing the questions asked.

Themes in candidate responses

Many candidates showed they knew, in broad terms, some of the underlying chemistry needed to answer the questions set, but a common theme was the lack of detail or specificity in their responses.

Comments on responses by question type

Level of response questions

The responses to this question type highlighted some of the issues raised above. Those responses which scored higher marks tended to be logical and structured.

A significant number of candidates did not read the stem of the question, or the material/data provided in the Practical Insert, carefully enough, and went off track with their responses.

1(b) was a good example of this: many candidates produced a procedure suitable for assessing the ease of thermal decomposition of a Group 2 carbonate. This was not the investigation asked for in the stem of the question and although examiners gave some credit for a suitable method for collecting the carbon dioxide, candidates could not access the higher mark levels. Those candidates who did address the acid carbonate reaction asked for in the stem, in the main, produced good responses.

In common with similar practical procedures featured other components in this series 4(a) found candidates less secure on the multiple steps needed to carry out this complex procedure. Examiners were expecting to see:

- a method to sample the reaction mixture at appropriate time intervals
- an appropriate method to quench the reaction
- a titration method, including the choice and colour change of an appropriate indicator
- a suitable calculation, using the titre results to calculate the concentration of hydroxide ion at the different time intervals

Mathematical questions

	AfL	Many candidates set out their calculations with clear steps. This is important because it allows examiners to award credit for error carried forward calculation.

	AfL	In agreement with other components, it is certainly worthwhile for candidates to highlight or underline in the question stem where there is a requirement for a certain number of significant figures. e.g. 2(c) as a reminder for when they arrive at an answer.

In question 1(c)(ii) there were several different routes possible to answer the question. These included a stepwise mole calculation and an algebraic version; the latter proving more difficult. Nevertheless a pleasing number of candidates were successful in their response.

3(a) also produced many correctly calculated values, however, as with most enthalpy calculations, examiners required a sign, in this case negative, to gain the final mark.

4(b)(i) and (ii): The plotting of the graph and its use in calculating half-lives was pleasingly well done.

Other

1(d) The description of the $\Delta_y H$ from the energy level diagram was often recognised as the enthalpy of hydration, but very few described it as for both cation and anion together.

In 1(e) the factors involved in determining the magnitude of enthalpy changes of solution (the formation of ions, charge density, etc.) challenged some candidates. Several candidates realised that barium is indeed more reactive than calcium but did not establish that this was not relative to the hydration of the group 2 metal cations.

4(b)(iii)(iv) This part of the rate of reaction question was found to be difficult; the problem in many cases came from the candidates not distinguishing between the primary and tertiary haloalkanes and the information given in Method 1 and Method 2 in the Insert. Many seemed to blur the two compounds into one substance and as a result found the questions difficult.

Common misconceptions

?	**Misconception**	A number of candidates have the misconception that the only pre-requisite for hydrogen bonding to occur between molecules is simply that hydrogen atoms feature in the structure.

?	**Misconception**	Bond making and breaking processes. A whole raft of misconceptions were seen in responses to this topic, including: • that more bonds are made than broken in an exothermic reaction involving molecular reactants and products, and that is why energy is given out • bond making and breaking both require energy • there are more, rather than stronger, intermolecular bonds formed between well-packed molecular structures compared to ‘looser’ packed molecules.

Guidance on using this paper as a mock

A key analysis, looking at candidate responses, might be to go through student answers after use as a mock, and tick off whether their answer has addressed accurately all the chemical points made in the stem of the question.

Supporting you

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Supporting you through 2020-2021

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