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A LEVEL

Examiners' report

CHEMISTRY A

H432

For first teaching in 2015

H432/02 Autumn 2021 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 November 2021 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 exam paper nor examples of candidate responses.

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 exam paper and the mark scheme can be downloaded from OCR.

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Paper 2 series overview

H432/02 is the second of the three examination components for GCE Chemistry A. This component is focused on organic chemistry and brings together topics from modules 4 and 6 of the specification, including relevant practical techniques. There is a synoptic element to all of the three of the A Level examination and as such this paper also contains some content of modules 1 and 2 set in the context of organic chemistry. The paper consists of two sections comprised of multiple choice and a mixture of short and long response questions respectively.

There was no evidence that any time constraints had led to a candidate underperforming and scripts where there was no response to the final question also had large sections of the paper which had not been tackled.

Candidates who did well on this paper generally did the following:	***Candidates who did less well on this paper generally did the following:***
• Solved calculations with clear and logical steps • Demonstrated knowledge of reagents and conditions in organic reactions • Drew clear diagrams in reaction mechanisms. • Knew key definitions • Were able to apply knowledge to unfamiliar contexts • Were able to analyse data to suggest structures.	• Showed unclear setting out of calculations • Wrote equations that were not balanced • Provided unclear presentation of structures and organic mechanisms with curly arrows, lone pairs and dots for radicals ambiguously placed • Were unable to suggest structures in multistep synthesis reactions • Were unable to link observations and NMR data to suggest structures that were consistent with the given molecular formula.

Section overview

Multiple choice questions

Candidates needed to make sure their response is clear to the examiner, particularly when they changed their response. Candidates who performed well, drew structures, wrote equations or calculation steps next to their responses to aid their choice.

	**AfL**	There were occasionally some candidates who had "No response" responses which could easily be overcome through developing examination technique. Candidates should provide a response to every multiple choice question. There is no penalty for giving a wrong response.

Level of response questions

19(b): This question differentiated well. Those that did not achieve a mark often made little progress in the percentage yield calculation. Many candidates incorrectly detailed a two-step mechanism involving substitution to produce an alcohol followed by oxidation to a carboxylic acid, missing the key detail of an extra carbon in the chain. Candidates that answered this question well calculated the mass of (chloromethyl)benzene required and described the steps required to produce compound A, providing balanced equations for each step. Candidates achieving Level 1 or 2, did not provide balanced equations for both steps or had made little progress with the percentage yield calculation.

21: Most candidates could correctly analyse the observations from the test-tube tests but were unable to link this to the NMR data to suggest structures for D, E and F. This limited their response to Level 1. Those that achieved Level 3 had worked through each piece of data in turn before clearly identifying structures for the three compounds.

Other questions

16(a)(i): These definitions were known by few candidates. Many did not mention orbitals in their response.

16(b)(i): This was answered well by students. Many candidates included correct dipoles and charges. Curly arrows were frequently well-positioned. Few candidates attempted to make the minor product.

16(d)(i): Many candidates did not apply their knowledge of curly arrows to this unfamiliar context. Those that scored a mark often did so for the top curly arrow but missed the requirement of the second curly arrow.

16(d)(ii): Many candidates did not correctly answer this question with products being given that had too few carbon atoms.

20(a)(i): Candidates who answered this question well had clear mechanisms. Too often positioning of curly arrows was ambiguous.

20(a)(iii): Candidates who found this question difficult often did not recognise the functional groups present in the reacting molecule. Those that identified an esterification reaction often then did not balance the equation.

Common misconceptions

	Misconception	16(b)(ii) Some candidates explained the formation of the major organic product in terms of the stability of the product, rather than referring to the stability of the intermediate. Many responses also stated Markownikoff's rule – rather than explaining their response.

	Misconception	17(b)(ii) Too often candidates' responses linked more energy being needed to break covalent bonds. Candidates need to be clear that the energy is being used to overcome the intermolecular forces.

Key teaching and learning points – comments on improving performance

	AfL	For level of response questions, candidates need to use the information provided in the question. They should look to include explanation for their choice of steps and show all of their working. They need to make sure equations are balanced and structures are clearly labelled.

	AfL	When candidates draw structures of molecules, these must have the correct connectivity of atoms and they need to be unambiguous.

	AfL	Candidates need to develop their ability to perform calculations that require them to convert between different units, e.g. mg to kg. Each step of a calculation should be shown.

Guidance on using this paper as a mock

	AfL	Candidates will need to be well-prepared on the synthetic routes and reagents from content across the A Level specification. They should be well-versed in linking NMR data and test tube observations to provide logical structures for compounds. Candidates should be advised to count the number of carbon atoms within a reactant and product to reduce mechanism errors.

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Supporting you

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