



GCE AS Examiners' Report

Chemistry

AS

Summer 2024

Introduction

Our Principal Examiners' report provides valuable feedback on the recent assessment series. It has been written by our Principal Examiners and Principal Moderators after the completion of marking and moderation, and details how candidates have performed in each component.

This report opens with a summary of candidates' performance, including the assessment objectives/skills/topics/themes being tested, and highlights the characteristics of successful performance and where performance could be improved. It then looks in detail at each unit, pinpointing aspects that proved challenging to some candidates and suggesting some reasons as to why that might be.¹

The information found in this report provides valuable insight for practitioners to support their teaching and learning activity. We would also encourage practitioners to share this document – in its entirety or in part – with their learners to help with exam preparation, to understand how to avoid pitfalls and to add to their revision toolbox.

Further support

Document	Description	Link
Professional Learning / CPD	Eduqas offers an extensive programme of online and face-to-face Professional Learning events. Access interactive feedback, review example candidate responses, gain practical ideas for the classroom and put questions to our dedicated team by registering for one of our events here.	https://www.eduqas.co.uk/home/professional-learning/
Past papers	Access the bank of past papers for this qualification, including the most recent assessments. Please note that we do not make past papers available on the public website until 12 months after the examination.	Portal by WJEC or on the Eduqas subject page
Grade boundary information	Grade boundaries are the minimum number of marks needed to achieve each grade. For linear specifications, a single grade is awarded for the subject, rather than for each component that contributes towards the overall grade. Grade boundaries are published on results day.	For unitised specifications click here: Results and Grade Boundaries and PRS (eduqas.co.uk)

¹ Please note that where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

Exam Results Analysis	Eduqas provides information to examination centres via the WJEC Portal. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.	Portal by WJEC
Classroom Resources	Access our extensive range of FREE classroom resources, including blended learning materials, exam walk-throughs and knowledge organisers to support teaching and learning.	https://resources.edugas.co.uk/
Bank of Professional Learning materials	Access our bank of Professional Learning materials from previous events from our secure website and additional pre-recorded materials available in the public domain.	Portal by WJEC or on the Eduqas subject page.
Become an examiner with WJEC.	We are always looking to recruit new examiners or moderators. These opportunities can provide you with valuable insight into the assessment process, enhance your skill set, increase your understanding of your subject and inform your teaching.	Become an Examiner Eduqas

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Executive Summary

As has been the case in recent years only a small number of candidates entered this qualification. Their performance on both components was excellent. Mathematical skills demonstrated were again very good.

Perhaps the greatest area for improvement is in the understanding of practical methods. Candidates should be encouraged to think about the purpose of each step in a given method to improve their understanding of more complex tasks such as a back titration. Improvement in this area will lead to better performance in the analysis that follows volumetric, thermometric and rate exercises.

Some candidates would also benefit from learning simple definitions which often need to be given and applied in examination questions.

One final theme is the importance of simply reading the questions carefully. Consider command words such as 'describe' and 'explain' and take note of the number of marks available. These both give an indication of the level of detail needed in the answers. Problem solving questions such as those where organic compounds are identified based on a range of given data will always require candidates to give their reasoning and they should always refer to each information source to ensure full credit.

Areas for improvement	Classroom resources	Brief description of resource
Understanding of practical methods	Experiments on Film Chemistry Experiments on Film (science.cymru)	Short video presentations demonstrating key practical methods
Definitions of key terms and ideas	Knowledge Organisers	Summary notes on all specification topics

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COMPONENT 1 – THE LANGUAGE OF CHEMISTRY, STRUCTURE OF MATTER AND SIMPLE REACTIONS

Overview of the Component

All parts of this paper were accessible to most candidates and all parts of all questions were attempted. Candidates showed themselves to have strong maths skills and good recall of theoretical aspects aligned with the ability to apply their knowledge to unfamiliar situations. In the past, attention has been drawn to the need for some candidates to improve their engagement with the practical aspects of this course, and it was good to see examples of improvement in this area. Overall performance was very strong.

Comments on individual questions/sections

Section A

Few mistakes were seen in this section. The main errors were incorrect determination of the M_r of calcium hydroxide and incorrect units for K_c – perhaps some candidates were uncomfortable with there being no units. Some candidates struggled with the meaning of the term ‘orbital’.

Section B

Question 6

A wide spread of marks was seen for this question. In part (a) candidates were familiar with why noble gases were stable but did not explain their answer sufficiently for two marks. Considering the number of marks for the question is a useful guide to the amount of detail required in an answer. The question clearly stated the monatomic nature of these gases and so candidates lost marks in part (b) by using inaccurate/contradictory language such as references to intermolecular forces. Part (c) was well done except when candidates forgot to use Avogadro’s constant – resulting in a mark of 2 out of 3. The meaning of the term ‘relative isotopic mass’ proved troublesome for some candidates as they used ‘average mass’ instead of recognising that isotopic mass relates to a specific isotope. In part (d)(ii) it was acceptable to use the symbol for a helium nucleus to represent an alpha particle but candidates need to remember to include the 2+ charge – He^{2+} .

Question 7

The first part of the question was well answered with candidates having few issues with the concept of covalent bonding and proposing many sensible answers for the more unfamiliar part (a)(iii). The QER question was managed well on the whole. Many candidates described the two structures in detail, being careful to use phrases like ‘molecular structure’ rather than just ‘simple structure’ for trichloromethane; and accessed the top band by describing the types of bonds that had to be broken during melting rather than just commenting on how much energy was needed. Part (b) was also managed well with many gaining full marks by answering fully e.g. in part (i), not just referring to the number of bond pairs and lone pairs but also explaining why minimising repulsion led to an angle of 120° .

Question 8

This was a short question with many candidates gaining high marks. Where marks were lost, the common errors were found in the conversion to cm^3 in part (i) and failing to use the ratio in part (ii), but marks were still gained for correct steps in the method. This shows the importance of attempting all questions even if candidates struggle with some aspects.

Question 9

This question was linked to a practical activity covered in the course. It was good to see an improvement in responses to questions such as (b)(ii). A few candidates misunderstood (b)(i), mainly because they did not focus on the fact that 'the reaction did not go to completion', however this did not prevent them gaining full marks for the next part. The gas calculation was managed well although a few candidates forgot to convert pressure to Pascals or struggled to convert m^3 to cm^3 .

Question 10

This question also covered practical aspects of the course. There were many very good answers describing how to prepare a standard solution. Some candidates, however, described how to make magnesium sulfate itself instead of simply preparing a solution. The back titration parts proved more challenging. Many candidates got most of the marks but some clearly struggled. Practising examples of such questions will help them to be more familiar with the steps involved and will help make the calculations more routine. Again there were instances where candidates did not read the questions carefully e.g. part (b)(ii) asked for the percentage purity but some answers gave the 'percentage impurity' and part (b)(iii) asked for information to show that the impurity was not calcium hydroxide so answers needed to say that the flame colour for calcium was not seen.

Question 11

This was a discriminating question with part (a) surprisingly often answered incorrectly. Candidates forgot the electrons being lost or put the wrong species on the wrong side of the half-equation. Many candidates gave excellent answers to part (e), which covered standard content presented in an unfamiliar context. It was pleasing to see many good descriptions of why covalent substances are more soluble in non-polar, covalent solvents than in polar solvents. The common errors tended to be forgetting to explain the brown colour in part (i) and discussing iodine reacting with cyclohexane rather than focussing on dissolving in part (ii).

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COMPONENT 2 – ENERGY, RATE AND CHEMISTRY OF CARBON COMPOUNDS

Overview of the Component

There was a slight increase in the number of candidates to 135 and the mean mark was of 56.4 was 2 marks higher than last year. The vast majority had prepared thoroughly for this examination and responses were often well expressed and detailed. The highest mark was 77 and only two candidates scored below 30 marks.

Section A proved to be very successful for most candidates. In Section B, Q8 was the best answered and Q9 proved to be the most difficult. The most accessible parts on the paper were Q7(c), Q11(d) and Q10(a)(ii), with the least accessible being Q9(c)(ii), Q10(e) and Q10(d)(ii) in that order.

It was pleasing to note that once again a significant number of candidates showed excellent recall of organic chemistry knowledge and performed very well in all calculation questions. However, there still needs to be an improvement in application of practical work and greater explanation is needed when analysing spectral data.

Comments on individual questions/sections

Section A

This was very well answered with the mean mark being around 8 out of 10.

Questions 1, 3, 4, 5(b) and 6 were very well answered. Q2(a) and Q5(a) were generally well answered but Q2(b) was answered poorly.

It was good to see in Q3 that only a few candidates lost the mark by carelessly showing the bond going from the carbon chain to the hydrogen atom of the —OH group.

In Q2(a) the commonest errors were 'poly pent-2-ene' or 'pentene'. In Q5(a) some lost a mark for writing $C_9H_{15}COOH$ while others forgot to count the methyl side chains.

Q2(b) proved to be the most challenging part of Section A with under a half giving an adequate advantage. Most candidates gave answers which were too general. Typical answers that were considered too vague to gain the mark included 'won't harm the environment', 'form less pollution' and 'renewable'.

Section B

Question 7

(a) Equations were well written in parts (i) and (iv) and most named the isomer in part (ii). The commonest incorrect answer was 2,2-dimethyl,3-methylbutane. In part (iii) fewer than half the candidates scored all three marks. Many thought that triptane was the largest compound although its formula was given in the question. Some also lost a mark for failing to give a reason why a branched chain isomer has a lower boiling temperature than a straight chained one.

(b) The mechanism in part (i) was well known. Marks were mainly lost for starting the curly arrow from the H in the H—Br molecule rather than from the bond and for omitting the lone pair from the Br⁻ ion. Part (ii) was poorly answered. Only one in five gained both marks and about two in five gained no marks. Some lost marks for failing to refer to carbocation formation. However, many failed to mention but-1-ene or but-2-ene and so did not gain a mark.

(c) This proved to be the most accessible part of the whole paper. Almost all the candidates scored full marks.

Question 8

This was the best answered question in this section with (b) being the only tricky part.

(a) In part (ii) some candidates lost the mark for omitting the acid and in part (v) I sulfuric acid was a common incorrect answer.

(b) Almost everyone gained the mark for identifying an alcohol and the alkene, C₅H₁₀. However, to get the next two marks candidates had to explain why the alkene was pent-2-ene and the alcohol pentan-3-ol. Many gained the mark for pent-2-ene, but only a few knew that the alcohol was pent-2-ene because it was the **only** product of the dehydration reaction.

Question 9

This was by some distance the least well answered question in this section.

(a) In the QER question, candidates had to describe a suitable method to investigate the rate of the reaction between thiosulfate and acid. Just over a quarter scored in the higher band but around one in five gained no marks. Those who chose to use the 'disappearing cross' method tended to do very well, although some lost marks for not keeping the total volume constant or not changing time into rate. If candidates chose an unsuitable method they could not access the higher band marks.

Despite it stating in the stem that 'the rate of the reaction can be measured by finding the time taken for a fixed amount of sulfur to be produced', many thought that the rate could be followed by measuring the volume of the gas given off or measuring the loss in mass due to a gas being formed. A significant minority incorrectly thought that there would be an increase in mass during the reaction and they could simply weigh the sulfur that formed after the reaction had finished.

(b) Surprisingly, under half the candidates could adequately explain why a change in concentration affects rate. Marks were lost for lack of detail e.g. stating 'more particles' instead of 'more particles in a given volume' or 'more successful collisions' instead of 'more successful collisions per second'.

(c) Part (i) was very well answered but part (ii) proved to be the least well answered question on the paper. The vast majority confused rate with yield and a typical incorrect answer was 'rate will increase due to backward reaction being endothermic and equilibrium shifting to the left'.

Question 10

(a) Part (i) was poorly answered. Although a significant minority did not know that water was formed, the main error was not to balance the equation. Part (ii) about reflux was well answered with the vast majority scoring at least 2 out of 4 for the changes required and just under a half gaining all 4 marks.

(b) The calculation on percentage yield was well answered with just under three quarters gaining full marks.

(c) The equation for the reaction between ethanoic acid and sodium hydroxide was well known.

(d) Generally poorly answered. The answers were not sufficiently detailed. In part (i), the main mistakes were omitting 'the enthalpy change' or 'in their standard states'. In part (ii) only about a third gave a correct answer. Most focused on the physical states of the reactants and products instead of simply stating other products could form.

(e) Less than half could identify the isomer 2-methylpropan-1-ol and fewer could explain their reasoning.

Question 11

Parts (a), (b) and (d) were well answered.

(c) Only about a third could give an adequate reason. 'To ensure the reaction is complete' was a common incorrect answer.

(e) Most candidates drew a line of best fit, but only a minority correctly extrapolated it to the point at which zinc was added. Many lost a mark for giving the temperature at the beginning of the reaction as 22°C instead of 22.2°C.

(f) Poorly answered. More than half failed to score a mark. Many thought that the line could not be extrapolated with confidence because the point at 4 minutes was an anomaly. Others said that it could be extrapolated because 'the points were close together' instead of stating that they were 'close to the line'.

(g) This calculation was very well answered.

(h) The enthalpy change calculation was well answered but marks were lost for giving an incorrect sign and for using the mass of the zinc rather than that of the copper(II) sulfate solution.

Supporting you

Useful contacts and links

Our friendly subject team is on hand to support you between 8.30am and 5.00pm, Monday to Friday.

Tel: 029 2240 4252

Email: science@edugas.co.uk

Qualification webpage: [AS and A Level Chemistry | Edugas](#)

See other useful contacts here: [Useful Contacts | Edugas](#)

CPD Training / Professional Learning

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