



GCE AS EXAMINERS' REPORTS

**CHEMISTRY
AS**

SUMMER 2023

Introduction

Our Principal Examiners' reports offer valuable feedback on the recent assessment series. They are written by our Principal Examiners and Principal Moderators after the completion of marking and moderation, and detail how candidates have performed.

This report offers an overall 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 goes on to look in detail at each question/section of each component, pinpointing aspects that proved challenging to some candidates and suggesting some reasons as to why that might be.ⁱ

The information found in this report can provide invaluable 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	Edugas offers an extensive annual 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.edugas.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 6 months after the examination.	www.wjecservices.co.uk or on the Edugas subject page
Grade boundary information	Grade boundaries are the minimum number of marks needed to achieve each grade. For unitised specifications grade boundaries are expressed on a Uniform Mark Scale (UMS). UMS grade boundaries remain the same every year as the range of UMS mark percentages allocated to a particular grade does not change. UMS grade boundaries are published at overall subject and unit level. For linear specifications, a single grade is awarded for the overall subject, rather than for each component/unit that contributes towards the overall grade. Grade boundaries are published on results day.	For unitised specifications click here: Results and Grade Boundaries (edugas.co.uk)

Exam Results Analysis	WJEC Eduqas provides information to examination centres via the WJEC secure website. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.	www.wjecservices.co.uk
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.eduqas.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.	www.wjecservices.co.uk or on the Eduqas subject page.
Become an examiner with Eduqas.	We are always looking to recruit new examiners or moderators. These opportunities can provide you with invaluable insight into the assessment process, enhance your skill set, increase your understanding of your subject and inform your teaching.	Exam Marking jobs Examiner & Moderator Vacancies From Eduqas

Executive summary	Page
Component	
Component 1	5
Component 2	7
Supporting you – useful contacts and links	10

Subject Officer's 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 generally very good.

Some candidates showed a lack of understanding of practical methods, possibly resulting from limited experience during their pre-16 education.

One theme for consideration is the preparation of candidates to answer questions that require comparison of two different things. Language must be specific and precise in order to gain full credit e.g. reference to 'higher boiling temperature' is likely to be a better answer than 'different boiling temperature'.

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

Areas for improvement	Classroom resources	Brief description of resource
Definitions of key terms and ideas	Knowledge Organisers	Summary notes on all specification topics

CHEMISTRY

GCE AS

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

Overview of the Component

The majority of candidates found this paper very accessible and it was rare to see a question not attempted. Candidates showed a high level of secure recall of knowledge and an impressive ability to apply their understanding across all aspects of the specification – covering both theory and practical work equally. The overall performance was very strong.

Comments on individual questions/sections

Section A

This was answered well on the whole. The few errors that did occur were seen mostly with a few candidates struggling to give a correct chemical equation for question 2 and also struggling with the correct meanings of the terms in questions 4 and 6. Question 6 was one of the least well answered questions on the whole paper. The accompanying calculation, however, caused no issue at all.

Section B

- Q.7** This question was well answered and there were many examples of well worded answers for parts (a) and (b). If there was an error in part (b) it was usually because candidates had failed to compare the strengths of intermolecular forces or had failed to state whether the boiling point was higher or lower, rather than just “different”. Part (c) was tackled well although it is worth reminding candidates that the first titration is not automatically excluded from calculations because it is first but only if it is not concordant.
- Q.8** Another well answered question. Part (e)(i) caused the most challenge. Whilst most candidates recognised the importance of water being a polar molecule, only the strongest were able to successfully describe how interactions between the ions and water molecules led to the breaking apart of the lattice.
- Q.9** Whilst many candidates gave a correct equation for the reaction of lithium with water in part (a), there was a significant number who did not. This did not affect them in part (iii) as their mole ratio was carried forward. The calculations were managed well. A few candidates failed to achieve the final mark in (b)(ii) because they omitted the final conversion to kJ mol^{-1} . Parts (a)(ii), (c)(iii) and (d) all saw many excellent written answers. If errors were seen it was usually because candidates were not specific in their answers when the question required reference to a difference.

- Q.10** This question contained the QER question and it was answered extremely well on the whole. The best candidates included a description of Le Chatelier's principle and used it to explain how the ideal conditions were determined – clearly stating the type of ideal conditions. They then elaborated upon this by explaining how and why it was necessary to compromise on both the temperature and pressure. Where candidates lost marks it was generally because they overlooked the adaptations. The majority of candidates were accomplished in expressing how the equilibrium position was affected by changes in temperature and pressure, although a few did refer to changes in number of moles without mentioning moles of gaseous components specifically. The rest of the question posed few problems to most candidates. Just a few found the calculations tricky, failing to apply the 80% conversion correctly in (c)(ii) or failing to convert the number of hydrogen ions to moles in (c)(iii).
- Q.11** Whilst there were many excellent answers to this question there were some candidates who were unclear about the decomposition of carbonates, both the trend and the equation. The calculation was tackled well with only a few candidates failing to apply their correctly calculated M_r to identify the metal. The practical aspects of establishing how the reaction had finished and determining the error in the balance reading were well understood.
- Q.12** Whilst giving the correct meaning of the term relative atomic mass caused a few issues for some candidates, it was impressive to see how competently most applied their knowledge of mass spectrometry to part (b). Again a few candidates just talked about "different" masses or charges rather than being specific. In part (d) candidates showed excellent knowledge although a few needed to focus on penetrating ability rather than ionising ability in part (i).

CHEMISTRY

GCE AS

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AS COMPONENT 2 – ENERGY, RATE AND CHEMISTRY OF CARBON COMPOUNDS

Overview of the Component

There was a slight increase in the number of candidates to 122 and the mean mark was down to 54.4. The vast majority of candidates had prepared thoroughly for this examination and the responses were often well expressed and detailed, with the highest mark being 73 and only three candidates scoring under 30.

Section A proved to be fairly successful for the majority of candidates. In Section B, Q9 was the best answered and Q10 proved to be the most difficult.

It was pleasing to note that once again a significant number of candidates showed excellent recall of organic chemistry information and performed very well in most calculation questions. Some improvement was seen in using NMR spectral data, however, there still needs to be an improvement in application of practical work.

Comments on individual questions/sections

Section A

This was generally well answered, with the average mark being around 6.5 out of 10.

Questions 3, 4 and 6(a) were very well answered.

Question 1 proved to be the most challenging part of Section A with just under a half naming the compound correctly. A number of candidates did not count the longest carbon chain but gave '2-chloro-3-ethylbutane' as the name because there were four carbons in a straight horizontal line.

In question 2 too many included the —OH group in their answer instead of just showing the number of each type of atom present in the molecule.

In question 5 many candidates lost a mark for not clearly showing which atoms are bonded to which rather than a lack of knowledge. As in previous years, candidates were only penalised once in the whole paper for this type of error.

Although almost all knew why the reaction rate was faster at a higher temperature in question 6(b), only a few used the diagram to gain both marks.

Section B

Q.7 (a) Parts (i)-(iii) were very well answered. Part (iv) was generally well answered, the main error being to divide the difference with the experimental value instead of the theoretical value.

However, in part (v) only around half the candidates gave a correct reason for the experimental answer being smaller. Popular incorrect answers were to do with the apparatus e.g. 'specific heat capacity of beaker not accounted for'.

- (b) The calculation on bond enthalpy was extremely well answered but in part (ii) under half gave the reason for not using this method with propene. The main incorrect answer was 'average bond enthalpies are used in the calculation'.
- (c) In part (i) most of the candidates could write an equation to gain the first mark but only around half gave the structure of the ester formed.

Part (ii) was poorly answered with less than a third getting both marks. Marks were lost for not being sufficiently detailed e.g. stating that the ester had a 'different boiling point' rather than a lower one or not stating why the ester had a lower boiling point. Most candidates knew that removing the ester shifted the position of equilibrium to the right, but a significant number did not realise that sulfuric acid removed water and so the position of equilibrium moved further to the right.

- Q.8** (a) Surprisingly only just over half the candidates could give an advantage for the use of fossil fuels in part (i). Many answers were not incorrect but too vague e.g. 'reliable', 'cost effective' and 'variety of fossil fuels'. Parts (ii)-(iv) were well answered, but carbon monoxide and sulfur were common incorrect answers in part (ii).
- (b) Around two-thirds successfully used the quantitative and spectral information to identify compound **X**. Some candidates used only the information from the mass spectrum or the ^{13}C NMR so lost a mark for not using **all** the information. In part (ii) the ^1H NMR spectrum was well drawn, but some lost a mark for failing to give the relative areas of the peaks.

Q.9 This was the most successfully answered question in this section with over a half scoring at least 8 out of 9

- (a) In the QER question, candidates had to describe chemical tests to identify three organic compounds. Over half scored in the higher band.

The three main errors were:

- just stating how to test for the functional group instead of treating it as a practical activity
- omitting the sodium hydroxide from the positive test for 1-chloropropane
- giving incorrect formulae for propanoic acid and sodium carbonate

- (b) The percentage yield calculation was extremely well answered with around 90% gaining full marks.

Q.10 Although this was the least successfully answered question in this section, the mean mark was still around 8.6 out of 16.

- (a) This mole calculation was very well answered.

- (b) The calculation of the overall reaction rate was poorly answered. Only about a third of candidates realised that the curve levelled out at 270 s not at 300 s. Most scored both marks for calculating the initial rate. Some lost a mark for incorrectly reading an axis correctly and a few lost both marks for not drawing a tangent.
- (c) Only a minority gained the mark in part (i). Most candidates thought that the reaction stopped after five minutes. Part (ii) was fairly well answered, but a significant number lost a mark for not referring to concentration of the reactants or not referring to time in the answer.
- (d) Poorly answered. About 40% failed to gain any marks and of those who did, two-thirds only scored 1 out of 3. The answers were not sufficiently detailed and the main mistakes were:
- not showing cotton wool from the top of the flask
 - not making it clear that the acid and the flask were weighed before adding the carbonate
 - not stipulating a time interval
- (e) Almost all candidates knew that the apparatus was a gas syringe.
- (f) Generally well answered but many lost a mark for miscalculating the moles of carbon dioxide since they did not realise that its mass was 0.26 g.
- (g) Poorly answered. Despite the fact that the vast majority calculated that the carbonate was in excess in part (a), most thought that because the moles of carbonate had increased the volume of carbon dioxide would also increase.
- Q.11** (a) Well answered with around three quarters giving at least one correct isomer. The main error was to give *Z*-pent-2-ene.
- (b) Generally very well answered. Around half the candidates scored at least 5 marks out of 6.
The vast majority could use the reaction scheme to identify the functional group in each compound. However, some lost marks for not giving reasons e.g. why compound **B** was a bromoalkene or why compound **D** was not a carboxylic acid. A significant minority thought that compound **E** was an alkane since it did not show *E-Z* isomerism.
- Parts (ii) and (iii) were very well answered. Almost all the candidates knew the colour change that occurred during the oxidation and the vast majority knew the reagent required for the elimination reaction.
- Part (iv) proved to be the hardest part of the whole paper. Some thought that pent-1-ene formed a primary carbocation intermediate during the addition of HBr, but many did not attempt the question. Part II was answered more successfully with around half the candidates knowing that a tertiary carbocation intermediate would form during the addition of HBr or that a tertiary alcohol would be formed during the substitution reaction. The main error was to state that significant quantities of both products were formed during the addition of HBr.

Supporting you

Useful contacts and links

Our friendly subject team are on hand to support you between 8.30am and 5.30pm, Monday to Friday.

Tel: 029 22404252

Email: science@edugas.co.uk

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

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

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ⁱ 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.