GCSE Examiners' Report

Chemistry

GCSE

Summer 2025

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 unit.

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	WJEC 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.wjec.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 WJEC 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 subject, rather than for each unit that contributes towards the overall grade. Grade boundaries are published on results day.	For unitised specifications click here: Results, Grade Boundaries and PRS (wjec.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.***

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Executive Summary

Around 8400 candidates cashed-in GCSE Chemistry with a ratio of around 5:1 in favour of higher tier entries for Unit 2 candidates. A small number of higher tier candidates should have been entered for the foundation tier paper.

The inclusion of more objective style questions on foundation tier papers in particular, has again proved successful with mean marks in a sensible range on all four papers and good marks distributions.

Lack of exam experience was evident for some Unit 1 candidates. Lots of information which can be used in an answer is given in the question but many candidates did not read carefully enough to realise this. Similarly, they did not read and follow instructions, e.g. on how many boxes to tick. Some candidates failed to make use of the table of ions provided at the back of each examination paper.

Recall of knowledge (AO1) continues to be an issue for many candidates. This includes simply not having learnt key facts, e.g. tests for ions, and giving answers lacking detail in longer responses, e.g. in QER questions.

Mathematical skills were generally good but candidates should be encouraged to show their working in all calculations.

Some candidates struggled to express their ideas clearly, with incorrect terminology and vague language often seen. This was often exacerbated by poor spelling and punctuation, along with poor handwriting. Examiners cannot credit work which is illegible. Many noted difficulty in distinguishing between some numbers in numerous candidates' work.

Foundation tier candidates in particular need further practise in writing chemical formulae and balancing equations, but Unit 2 candidates certainly improved on their Unit 1 performance in these areas last year. Regular work on these skills should be built into teaching during year 11. Centres are also reminded that calculations and chemical tests specified in Unit 1 are also assessed in the Unit 2 paper so should be revisited when the opportunity arises.

Performance in the practical unit was good but questions based on practical work in the written papers often suggested a lack of first-hand experience of the relevant apparatus and methods.

Our digital resources website offers blended learning lessons and knowledge organisers, among other materials which you can access here.

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UNIT 1: CHEMICAL SUBSTANCES, REACTIONS AND ESSENTIAL RESOURCES

FOUNDATION TIER

Overview of the Unit

The demand of the questions was comparable to that in previous series and the paper was a suitable and fair test for the candidates at foundation tier level. The degree of difficulty of the questions increased throughout the paper, with questions in the common section providing the most challenge.

The foundation tier only section of the paper was generally well attempted. The objective style questioning used in most of this section was accessible for all candidates. Despite this, many candidates lacked the basic knowledge and understanding of the topics assessed through these questions and therefore made random guesses. There were also a few candidates who, through failing to read the question properly, selected more answers than required.

Questions that required descriptions and/or explanations were poorly answered, particularly when they required direct recall of knowledge. This included questions relating to practical work.

Where candidates did demonstrate some knowledge and understanding, they often gave answers that were either too vague or that did not specifically relate to the question.

Few candidates showed a real understanding of what happens during simple chemical reactions. The ability to write chemical equations is a key part of chemistry and the skills required have a significant number of marks allocated to them in each examination paper. Very few candidates were able to give the chemical formula of a named compound or insert a number into a box to balance a given equation.

Questions that assessed mathematical skills were generally well attempted. However, too many candidates still lack the basic numeracy skills required to successfully access these questions. For example, few candidates were able to calculate the formula mass of a compound from a given formula and very few could calculate a percentage composition.

The PISA-style question was attempted by nearly all candidates. Most candidates gave a lower or middle band answer in the QER question with only a very few accessing the top band marks.

Comments on individual questions/sections

Question 1

Most parts of this question were very well answered. The facility factors for parts (c) and (d)(ii) suggest that the colour of chlorine gas and the flame test colour for sodium were guessed by most candidates.

Question 2

(a) Most candidates knew the gas identified by the limewater test but fewer recognised the test for hydrogen. Many gave this as the test for oxygen.

(b) Most interpreted the table correctly and scored both marks in part (i). In part (ii) many knew that respiration uses oxygen but far fewer also picked combustion. Photosynthesis was often selected.

(c) Most could correctly draw a molecule of carbon dioxide and give the formula of methane.

Question 3

(a) Only just over a half of candidates recalled the name given to Group 1 elements.

(b) No points to highlight.

(c) Fewer than a half of selected the correct formula for potassium oxide in part (i) but many more than that put a 2 in the box to balance the equation in part (ii). Seven of every ten candidates identified fizzing as the observation showing that a gas is formed.

Question 4

(a) Parts (i)-(iii) were well answered although two in five read the scale from the bottom up and gave an incorrect volume of gas in part (ii). In part (iv), most candidates knew that the rate of the reaction depends on temperature but this was not sufficient to gain the mark as the questions asks for a change that will increase the rate. Only about one in four gave an acceptable answer such as 'increasing the temperature'.

(b) Few candidates were able to convert the time from minutes into seconds and then complete the calculations for both marks. Most gained a single mark for dividing volume by a time of 2 minutes.

(c) Many candidates simply added all three given A_r values and gained no credit. About a half of candidates gave the correct answer of 100. When that value was not seen, examiners awarded 1 mark for any clear indication that the formula contains one atom of calcium, one atom of carbon and three atoms of oxygen.

(d) Very few candidates were able to give a correct formula for calcium chloride. Most gave CaCl. Without the correct formula there was no access to the mark for balancing the equation.

(e) Fewer than a half of candidates correctly answered along the lines of noise or dust pollution or habitat destruction.

(f) Most gave the name calcium oxide but only one in five recalled that water is added to convert calcium oxide to calcium hydroxide. Candidates should be encouraged to try to use the given formulae to work out which atoms have been 'added' to go from the reactant to the product in simple reactions such as this one.

Question 5

(a) Only about a half of candidates calculated the missing result in part (i). Part (ii) is a good example of marks lost because of lack of detail. Reference to volume, soap or time alone were not sufficient. Volume of water, type of soap and shaking time were all acceptable answers. Almost all drew the bars correctly in part (iii) but in part (iv) some confused the data with previous questions where the amount of lather produced was measured. In those questions, the hardest water had the lowest bar but here it is the highest bar, i.e. that for Wrexham. Some gained the first mark but again lacked clarity in their explanation. Reference to the 'most soap' was needed. No credit was awarded for 'more soap' or 'lots of soap'. Reference to bar height was not credited.

(b) Simple recall with two in five gaining the mark.

(c) More recall and a facility factor of almost 50% meaning that most selected one correct answer.

Question 6

(a) Atomic structure seems to be fairly well known at a basic level and most candidates gained a mark in part (ii) for giving the mass number of boron. About one in three completed the sentence in part (i) correctly. Very few were able to clearly express why an atom has no overall charge in part (iii) and this was the most poorly answered question on the whole paper.

(b) Most candidates drew the correct electronic structure for aluminium.

Question 7

(a) The QER was not attempted by one in six candidates. There were two clear parts needed for a complete answer – to explain how separation happens during chromatography and why one diagram set-up works and the other does not. Many only addressed one part. The second part was answered better with many candidates able to identify the problem with diagram **B** and adequately explain why it would not work. Explanations of the process itself were weaker with many candidates failing to mention solubility and/or relate solubility to distance travelled. Most answers were awarded a lower or middle band mark with very a few accessing the top band.

(b) The R_f calculation was well done by most. Candidates coped well with having to measure the distance travelled by the dye although some based their calculation on the distance between the spot and the solvent front rather than the distance from the pencil line to the spot.

(c) This was one of the most poorly answered questions on the paper with a facility factor of 23%. The most commonly credited point was that ethanol and water have different boiling points.

Question 8

(a) No points to highlight.

(b) Most candidates identified helium correctly but they were only awarded the mark if they gave an appropriate use. A simple reference to balloons was not sufficient but credit was awarded for ‘party balloons’ or to making balloons float.

(c) Many candidates failed to give a single property of a metal from an extensive list of acceptable answers.

Question 9

(a) A mean mark of less than one out of a total of three shows that recall of this content was not good for foundation tier candidates. The most common mark awarded was for identifying the constructive boundary in part (i).

(b) Again not well answered but attempts in part (i) were better than part (ii). As always some candidates referred to ‘countries’ rather than continents and gained no credit.

Question 10

(a) Parts (i) and (iii) were almost always attempted but the facility factors suggest that most candidates simply guessed an answer. About one in three gained the mark in part (ii).

(b) Another recall question where it was surprising to see that most candidates could not state that chlorination kills bacteria in drinking water.

(c) Similarly poor recall and low facility factors in parts (i) and (ii). About one in four did not attempt part (iii) and few scored both marks. The most common error was to not double the A_r of sodium before the percentage calculation.

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UNIT 1: CHEMICAL SUBSTANCES, REACTIONS AND ESSENTIAL RESOURCES

HIGHER TIER

Overview of the Unit

The demand of the questions was comparable to that in previous series and the paper was a suitable and fair test for the candidates at higher tier level. The degree of difficulty increased throughout the paper, with the most challenging questions towards the end.

All parts of the paper were well attempted, including the most demanding questions. Very few candidates left questions not attempted.

Performance on questions that required descriptions and/or explanations was often poor, particularly when direct recall of knowledge was required. Where candidates did demonstrate some knowledge and understanding, many gave answers that were either too vague or that did not specifically relate to the question.

Whilst most candidates could write the formulae of simple compounds fewer were able to successfully complete or write full symbol and ionic equations. Significant teaching time should be invested in these skills as they have a large number of marks allocated to them in each examination paper.

Questions that assessed basic mathematical skills were generally well attempted, although calculations involving moles and/or reacting masses were overall quite poorly answered.

The quality of graph work was good and nearly all candidates were able to successfully plot points onto a given axis and draw a suitable curve.

The QER had a very high attempt rate but a facility factor of 40%. The calculations included were often incorrect due to the diagram being misinterpreted.

Comments on individual questions/sections

Question 1

No points to highlight beyond those mentioned in the foundation tier report.

Question 2

(a) Parts (i) and (ii) were well answered with most candidates showing knowledge of the movement of plates at constructive and destructive boundaries.

(b) No points to highlight beyond those mentioned in the foundation tier report.

Question 3

Higher tier candidates showed much better recall in this question than foundation tier candidates as shown by a mean mark of 5.7 compared with 2.4 out of 9.

Question 4

(a) No points to highlight.

(b) Most candidates gained one or two marks by describing how gas levels change during respiration and photosynthesis. They had to name the processes to be awarded credit. Few gained all three marks as explanations of the balance between the processes were usually vague.

(c) Almost all attempted to describe the correct test but only a half of candidates gained the mark. It is very unlikely that this test can be described without referring to a glowing splint. Those who stated that the flame is 'blown out and then relights' were not awarded the mark.

Question 5

(a) Most candidates gained one mark in part (i) for stating that fizzing will be observed. An implication of floating and moving was needed for the second mark which was less often awarded.

(b) Reasonably well answered although few candidates gained both marks. Attempts at explanation tended to vague rather than incorrect.

(c) Many gave the correct formula for potassium oxide but only the strongest candidates could balance this quite tricky equation.

Question 6

Practically all candidates attempted this QER question. They had to extract data from the diagram in order to calculate R_f values as part of their answer. Most recalled the correct expression for the calculation but did not read the appropriate values from the diagram. The pencil line starting point was 1 cm from the bottom of the paper as would be the case when setting up a chromatogram. Those who recorded that the dyes had travelled 5 and 7 cm (and the solvent 9 cm) were limited to a middle band mark at most. Few candidates accessed the top band and the most common marks awarded were in the range from 2-4.

Question 7

(a) Although ionic bonding is not taught in detail until Unit 2, ion formation should be covered in Unit 1. Few candidates answered this well. Some were awarded one mark for stating that gallium loses electrons whilst oxygen gains electrons but only a small number included the number of electrons lost and gained as needed for both marks.

(b) In part (i) many stated that the isotopes have the same atomic number but different mass numbers which is of course true but does not answer this question. The best answers stated that both have 31 protons with one having 38 neutrons and the other having 40 neutrons. Those who stated that they have the 'same number of protons' and 'different numbers of neutrons' were awarded the first mark only. The calculation in part (ii) was very well done having a facility factor of 91%.

Question 8

(a) The graph well very well done by most. As always in this type of example, a good attempt at a smooth curve was required and candidates who joined the points with straight lines were not awarded the third mark.

(b) Some candidates correctly interpreted the data in the results table and used this to calculate the appropriate number of moles. Many unfortunately based their calculation on the mass of the flask and reaction mixture after 120 s instead of calculating the mass of gas released over the two minute period. They were awarded one mark.

(c) This proved to be the most difficult question on the paper with a facility factor of 12%. Very few candidates were able to clearly link the 'steepness' of the curve with the rate of the reaction.

(d) Most candidates were able to state a change that would increase the rate of the reaction and a good number explained this well using particle theory.

Question 9

(a) Only one in four recalled the correct observation in this reaction.

(b) The idea in this question seemed to be poorly understood and very few were able to link the stability of the carbonates to the reactivity of the metal. This is an obvious area to target for improvement.

(c) Reasonably well answered with a facility factor of 69% suggesting that most gave CuO but many failed to give $CaCO_3$. More straightforward marks for those with good skills in writing formulae.

Question 10

Straightforward recall throughout. Part (a) was reasonably well answered but many lost a mark because they did not refer to 'ions'. Part (b) was known by very many candidates.

Question 11

(a) Part (i) required recall of ion test observations which is a common area of weakness. A facility factor of 36% is again disappointing for relatively simple content. This suggests a lack of practical experience of these tests which are of course also assessed in Unit 2. More candidates identified the bromide than the carbonate. Part (ii) was an unusual question but correctly answered by around a half of candidates.

(b) Very few could write a correct ionic equation for this precipitation reaction. Most gained a mark for the formula of silver chloride.

(c) Finding the mass of magnesium oxide produced by the correct subtraction was the most difficult part of this question and it was well done by many. Those who made an incorrect subtraction were awarded the second mark on an 'error carried forward' basis.

Question 12

(a) In part (i) many candidates were able to give a clear explanation of the observations which was good to note. There was much of the usual confusion between iodine and iodide but the ideas were sound in many answers. The equation in part (ii) was better done than the ionic equation in question 11 and the strongest candidates easily gained the three marks.

(b) This reacting mass calculation was another good discriminator with the strongest candidates setting out their method clearly and quickly finding the correct answer. Many of the weaker candidates gained a mark for calculating the M_r of iron(III) chloride.

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UNIT 2: CHEMICAL BONDING, APPLICATION OF CHEMICAL REACTIONS AND ORGANIC CHEMISTRY

FOUNDATION TIER

Overview of the Unit

The demand of the paper was broadly comparable to last year. The paper proved to be of an appropriate level of demand with a pleasing mean mark of 45.4. This is slightly higher than last year's mean of 43.9. A surprisingly large number of questions were not attempted by a significant number of candidates.

Candidates coped well with the foundation only section of the paper mainly due to the number of multiple-choice questions. Performance on the common section question was poor. In general, application and interpretation questions were better answered than recall questions.

Performance in basic numeracy was good. The quality of graph work was very good. Almost all candidates were able to successfully plot points onto the grid and join them with a straight line. However, many candidates substituted numbers incorrectly into a given equation and the weakest appeared to think that 'cm^3' was a value to the power 3 rather than a unit.

The QER question continues to highlight concerns about spelling, punctuation and grammar and illegible handwriting. Almost all candidates would benefit from spending a minute or two planning the basic points they want to include and the sequence in which they should be written.

As reported last year some candidates were unable to write numbers clearly, e.g. number '4' often looked like a '7′ or a '9'.

Some candidates also failed to use the table of common ions at the back of the examination paper to help them construct chemical formulae.

Comments on individual questions/sections

Question 1

(a) Almost all candidates recognised a Bunsen burner in part (i) but the facility factor of 41% in part (ii) suggests that most guessed which box to tick. The idea of an excess of one reactant is not a straightforward one and it is not well understood by foundation tier candidates.

(b) Most candidates identified the filter funnel in stage 2 but did not know that water is the liquid evaporated in stage 3. The most common incorrect answer was sulfuric acid.

(c) This simple subtraction was done correctly by two of every three candidates. Some added the two numbers whilst others multiplied or even divided one by the other.

(d) This is a regular question on most chemistry papers and should be very easy for those who understand a simple chemical formula. Most candidates gained both marks or no marks at all. No credit was awarded for simply adding up the three A_r values.

Question 2

(a) Almost all candidates gained the three marks for parts (i) and (ii). Many candidates chose the 'repeat' option in part (iii) and the facility factor again suggests little understanding of the point being assessed in this question. Most gained the mark for identifying hydrogen in part (iv) whilst carbon dioxide was the most common incorrect answer.

(b) Most candidates gained both marks for this simple calculation but the most surprising error was to see the volume of 50 being raised to the power 3 before multiplication.

(c) Another question where the facility factor suggests mainly guesswork in selecting which answer to tick. There is a clear lack of understanding of displacement reactions at foundation tier level.

Question 3

(a) In part (i) the points were plotted correctly by almost all candidates and most drew a straight line through them with a ruler. Some attempted to draw a straight line without a ruler and may not have been credited the third mark. Just over a half of candidates used the information given and followed the instructions correctly to gain the mark for part (ii). Some candidates misinterpreted the information and drew a line from (0,0) to (2,4).

(b) The relevant ions and four possible answers were provided here but only two in five candidates selected the correct one. Most foundation tier candidates continue to struggle with anything other than the simplest chemical formula. As is repeated each year, this is a skill worth persevering with as all papers include numerous marks for formulae and equations. The most commonly selected incorrect formula was 'Cu_2Cl'. Some candidates showed a limited knowledge of electroplating in part (ii) but this difficult idea was not well understood. A good number recognised the solution as the electrolyte but most appeared to select their answers at random in the second and third sentences.

Question 4

(a) Most candidates recognised the hardness of diamond as the key property in its use in drill bits but few gained the second mark.

(b) Very well answered with a facility factor of 86%.

(c) Almost all candidates identified nano-sized silver as antibacterial and most also gained the second mark.

Question 5

(a) Three in five candidates gained the mark for balancing the equation in part (i) while two in five gave an acceptable statement of the purpose of a catalyst in part (ii). Three in four recognised the symbol used for a reversible reaction in part (iii).

(b) Parts (i) and (ii) were reasonably well answered.

Question 6

(a) Few candidates gained the mark in part (i)I. A direct comparison of the melting point of iron and the furnace temperature was needed. Vague answers such as 'its melting point is 1540°C' were not credited. Part (i)II was very well answered. Most candidates showed a good understanding of reduction in the context of losing oxygen in part (ii).

(b) The QER question was attempted by 90% of candidates. The facility factor was very close to half-marks showing that most were able to make some creditworthy points. The content required was very straightforward but most candidates would have benefited from planning what they wanted to include before they started their response.

As in previous years, the standard of spelling and grammar was sometimes poor and some candidates' handwriting was very difficult to decipher.

(c) This PISA-style question was very well answered.

Question 7

(a) Any reference to a colour change was accepted here but fewer than a half of candidates gained the mark. Many lost the mark as they referred to the solution becoming 'clear' when they meant 'colourless'.

(b) Well answered with a facility factor of 81%.

(c) Surprisingly poorly answered with fewer than one in three gaining the mark. The idea of repeating the titration with no indicator present was clearly not understood.

(d) Again, surprisingly poorly done with only one in four gaining the mark. The idea of slow evaporation leading to larger crystals is one that is very frequently assessed. This is a good example of a question where hands-on practical experience would have benefited candidates.

Question 8

(a) Very well done and almost all candidates gained both marks. Some lost a mark for not including all the bonds in the structure of butane.

(b) Most gave the correct formula for octane in part (i) but only around one in four could write the formula for propene. The most common incorrect answer was the formula for propane suggesting that some may not have read the first two sentences in the question.

(c) Very well answered.

(d) Most candidates showed a good understanding of bond energy calculations in parts (i) and (ii). The most common error in part (ii) was to multiply the bond energies by the number of molecules rather than the number of bonds present, i.e. by 2 in both cases rather than by 4. Just under a half of candidates stated that the description given in part (iii) was of an exothermic reaction.

Question 9

(a) Only the more able foundation tier candidates gained both marks in part (i) but most gained one mark for the correct electronic structures. Those who lacked the understanding to give the correct charges could of course have found them in the ion table at the back of the examination paper. Barely any candidates gave even one correct property for ionic compounds in part (ii) exemplifying poor recall of simple facts.

(b) Most drew the electrons correctly to show the bonding in hydrogen chloride. For both marks to be awarded, candidates had to use a dot and seven crosses as in the first diagram.

Question 10

(a) Electrolysis is a difficult concept for foundation tier candidates and responses in parts (i) and (iii) showed a clear lack of understanding of the process. Barely any candidates gained the mark in part (i). Some identified it as being an oxide ion but again did not use the table of ions to find the correct formula. Many simply picked an answer at random in part (iii). Part (ii) was well answered but recall was again poor in part (iv) where a property relevant to the use was required.

(b) Reasonably well answered with most getting one of the two marks.

(c) One in three gained the mark for balancing this slightly more difficult equation. This is pleasing and suggests that centres are investing time in developing the skills needed to write chemical equations as we have encouraged for many years. All papers include a significant number of marks awarded for these skills so this is certainly worthwhile.

Question 11

The contact process is a regular topic assessed on this paper but unfortunately foundation tier candidates were unable to recall the key details and struggled on most parts of this question.

(a) Stronger candidates picked up a mark in part (i) but barely anyone could name the catalyst in part (ii). Many used their understanding of formulae and equations in part (iii) and this was well done. Most struggled on part (iv) with $H_4S_2O_8$ selected more often that the correct answer.

(b) Most were unable to identify the meaning of dehydration from the list of alternatives.

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UNIT 2: CHEMICAL BONDING, APPLICATION OF CHEMICAL REACTIONS AND ORGANIC CHEMISTRY

HIGHER TIER

Overview of the Unit

Last year's paper proved to be less difficult than any set in previous years so it was pleasing to see that the mean mark this time dropped significantly to a more sensible 45.0, indicating that it is of an appropriate level of demand. Most questions were attempted by almost all candidates. The QER question and the solution calculations differentiated well at the higher end of the ability range.

As in previous years there were some candidates who would have benefitted from entering the foundation tier paper.

Numeracy skills were usually better than literacy skills although candidates should be encouraged to set out their working in a clear and logical way wherever possible. Questions requiring application and interpretation were better answered than those involving recall only, although many candidates were unable to express themselves clearly using scientific terminology. Unlike previous years, the QER question was attempted by almost all candidates although the mean mark for the question remained a little less than half of the available six marks.

As in previous years, only the most able candidates confidently wrote chemical equations but many showed a good degree of understanding in writing formulae and completing partially written equations. Some candidates lost marks by not using the table of ions provided in the examination paper.

Many topics in chemistry are best assessed through questions set in practical context as in Q4(b), Q6, Q7, Q10 and Q11(b). Those candidates who have experience of similar practical exercises will always be at an advantage in answering these questions.

Comments on individual questions/sections

Question 1

(a) Part (i) was very well answered but few candidates were able to recall two properties of ionic compounds.

(b) Correctly answered by almost all candidates.

Question 2

(a) Only two in five candidates gave O^{2-} in part (i) but parts (ii) and (iii) were well answered. As seen on the foundation tier paper, relatively few were able to give a property of aluminium relevant to its use in over-head power cables in part (iv).

(b) Very well answered.

(c) Very well answered.

Question 3

(a) The recall elements in parts (i) and (ii) were less well done than parts (iii) and (iv) where candidates could get the marks by applying their understanding of chemical formulae and equations. Only one in three recalled that vanadium(V) oxide is the catalyst for the contact process.

(b) Two in three candidates identified the meaning of dehydration.

Question 4

(a) In part (i) most candidates identified the decomposition reaction and the reaction that is used to heat up the furnace. The reduction reaction was least well known. In part (ii) many gained a mark for stating that oxygen is lost during reduction. Fewer gained the second mark where clarity was essential in explaining that it is iron oxide, rather than iron, that loses oxygen. Some more able candidates explained the reaction in terms of electron gain which of course was acceptable.

(b) Many candidates were unable to use the pattern of observations to predict those missing from the table in part (i). In part (ii) the correct formula had to be given for any credit to be awarded and just less than a half of candidates managed this. The most common incorrect formula seen was $CuNO_3$. Again, some may have come up with the correct formula had they used the ion table at the back of the examination paper.

Question 5

(a) Candidates performed very well in this PISA-style question.

(b) In part (i) just under a half of candidates recalled the brown colour of the iron(III) hydroxide precipitate but only one in five gave the correct formula $Fe(OH)_2$ in part (ii). Given that most candidates showed good skills in writing formulae this suggests that the majority did not know that the product of the reaction shown is iron(II) hydroxide.

Question 6

Electrolysis of aqueous solutions is one of the most challenging areas of the specification and an element of multiple-choice was included in this question in order to increase accessibility.

(a) Most candidates gained one of the two marks available for this question. The most common correct answer was that 'the mass of **both** cathodes increases'. The most common incorrect answer was 'the blue colour of copper(II) sulfate solution turns paler in **both** beakers as Cu^{2+} ions are removed'.

(b) Most candidates recognised that two electrons are required to balance the electrode equation in part (i). The facility factor of part (ii) was lower than other parts of question 6 as it required a free response explanation. Reference to loss of electrons gained a mark for many but only the strongest candidates stated that it is chloride ions that lose electrons. In part (iii) almost all candidates recognised that the presence of hydroxide ions results in an alkaline solution.

Question 7

(a) About a half of candidates gain the mark in part (i) but many missed out after including an additional + symbol in the formula, e.g. C_nH_{2n+1} + OH

The graph in part (ii) was a tricky one to plot with an unfamiliar scale on the energy axis. Most coped well with this but some struggled to draw a reasonable curve and lost that mark. A small number drew straight lines from point to point. Almost all candidates extrapolated their curve appropriately and gained the mark in part II.

(b) This practical set-up is very familiar from previous questions and most identified a sensible improvement. Few candidates gained the second mark for explaining that the improvement would result in less heat loss to the environment. Weaker candidates were unclear about the difference between heat and temperature, e.g. referring to 'temperature being lost to the air'.

(c) Most identified the correct structure in part (i). The most common incorrect answer was understandably **A**. Only just over two in five correctly named the isomer in part (ii). Many gave propanol but this was not credited.

Question 8

This question was aimed at the most able and differentiated well.

(a) Two in three candidates selected the correct name for the salt formed.

(b) Only the most able candidates completed the equation correctly.

(c) Although most candidates recognised that compound **X** contains copper(II) ions only one in five identified it as copper(II) carbonate. The diagram had to be studied carefully to realise that a gas is also formed in the reaction, meaning that neither copper(II) oxide nor copper(II) hydroxide are correct answers.

(d) Most candidates recalled that hydrochloric acid is a stronger acid than ethanoic acid.

Many failed to get the second mark by not stating that universal indicator turns red in hydrochloric acid.

Question 9

(a) Surprisingly many candidates could not draw the repeating unit for polypropene in part (i). Explanations of addition polymerisation were not well written in part (ii) leading to a mean mark of around 1.5 out of 4 for both parts. These are fairly simple ideas but could not be recalled by the majority of candidates.

(b) Parts (i) and (ii) were very well done although some silly errors were seen, particularly when calculations were not set out clearly and logically. Part (iii) was a less familiar question and weaker candidates failed to get this mark.

Question 10

(a) Not requiring candidates to recall the moles/volume/concentration equation meant that the biggest challenge was rearranging it to find the number of moles. Most managed to do so but not all remembered to express the volume in dm^3.

(b) The relationship between moles and mass was not given in this part so fewer candidates scored marks here as expected. Errors made in part (a) were carried forward here allowing full marks to be awarded for following the correct method.

(c) This part required candidates to fully understand the context of the whole question and only the most able candidates did so. The one in six who gained the mark should be congratulated!

Question 11

(a) This QER question was attempted by almost all candidates and it was pleasing to see that most appreciated the difference between yield and rate. The more able candidates usually structured their response logically and this helped them gain higher marks.

In weaker answers there was no reference to higher temperature increasing the rate but decreasing the yield and the compromise in selecting optimum conditions.

(b) As in previous years, many candidates demonstrated poor recall in respect of chemical tests. Just under a half of candidates gained the mark in part (i) with many giving ‘ammonium’ rather than ammonia. A facility factor of 30% in part (ii) showed that most did not identify either of the compounds. As previously mentioned, practical experience would benefit all candidates in interpreting observations such as these.

It was very pleasing to see that more than 70% of candidates correctly balanced the wholly unfamiliar equation in part (iii).

CHEMISTRY

GCSE

Summer 2025

UNIT 3 – PRACTICAL ASSESSMENT

Overview of the Unit

In this unit candidates are assessed on their practical skills including, forming hypotheses, recognising and preventing hazards and risks, recording and presenting data, understanding the variables that are involved in experiments, evaluating the success of the experiment and planning improvements. There was evidence that candidates are familiar with practical work and the analysis of practical results, although in some areas candidates' skills were not as well-developed as in previous series. This was particularly evident in graph plotting.

The nature of experimental work means that, on occasions, centres may feel the need to provide candidates with unformatted results to use for graph plotting in Section B. This happens in a small number of cases each year. This year it was notable that many centres who gave their candidates results did not explain that they had done so and did not include a copy with the scripts. It is imperative that in such circumstances centres provide a copy of the original results to ensure that examiners can accurately evaluate and award credit for correct data plotting.

Both tasks proved to be accessible for most candidates who usually attempted all sections. As in previous series, candidates were largely successful in making hypotheses and in identifying variables. Notable areas that candidates found challenging were scaling graphs and plotting points accurately. Lines of best fit were often very poor.

Comments on individual questions/sections

Section A – Hypotheses and risk assessments

Most candidates were able to make a sensible hypothesis which linked the independent and dependent variables. In producing risk assessments, the most successful candidates linked the risk with a particular action in the method and were able to suggest a sensible control measure for that risk. Less successful candidates often did not link the risk to an action.

Section A – Tables of results

Most candidates produced well-structured tables with all the data recorded. Whilst most candidates only include units in the table headings it was more common than in previous series to see units in the body of the table. Incorrect abbreviations of units (e.g. secs for s / seconds) were commonly seen. Candidates should be reminded that they should always calculate a mean from their repeats as they will not be prompted to do this.

Section B – Variables

Both tasks included a section on variables. Candidates were usually able to identify the independent and dependent variables, and most were able to state the range of these variables when required. Both the tasks explored how certain variables were controlled, and in common with previous series this was not well answered, with no clear indication of the apparatus used or the required measurement of that variable.

Section B – Graphs

The most successful candidates obtained all the available marks in this section. However, a significant number displayed very weak graph plotting skills. This was more common than in previous series.

Even where suitable scales were chosen, many candidates struggled with the accuracy of their plotting. Inappropriate scales were also commonly seen. Multiples of 3 are not accepted. In tasks where the data range was narrow, candidates often did not truncate the scale. This made plotting the data and drawing the line of best fit difficult. Lines of best fit continued to be problematic as many candidates simply joined the first and last point with no consideration of the spread of data above and below the line. Joining point-to-point is only usually acceptable in biology tasks but this was seen commonly in both tasks.

Candidates were asked to identify the relationship between the plotted variables and this was usually done well.

Section B – Evaluation of results

Candidates were asked to evaluate the repeatability of their results (and the reproducibility of some secondary data in one of the tasks). Whilst it is evident that the terminology is familiar and broadly understood, the clarity of candidates' responses often limited the marks attained. When considering repeatability candidates should make clear reference to the closeness of repeat readings. It was common to see vague responses referring to all the results being close which gained no credit. Of the candidates correctly referring to repeats, few went on to use the data to support their judgment.

Section B – Improvements

Identifying inaccuracies and corresponding improvements was poorly done by many this year. Candidates should be encouraged to consider what they found difficult in carrying out an experiment and base their responses around this.

Section B – Plans

Where tasks included a plan at the end, these were generally better answered than in previous years. In the electrolysis task most candidates attained marks for stating that the current would be measured and describing how the solution would be heated. In common with other plans, candidates did not always state at least four values of the independent variable or list at least two controlled variables.

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