

Foundation

GCSE

Combined Science Chemistry A Gateway Science

J250/03: Paper 3 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2023

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

© OCR 2023

MARKING INSTRUCTIONS**PREPARATION FOR MARKING****RM ASSESSOR**

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training*; *OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor.
3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

MARKING

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 50% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the RM Assessor messaging system.

5. Work crossed out:
- where a candidate crosses out an answer and provides an alternative response, the crossed-out response is not marked and gains no marks
 - if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed-out answer and award marks appropriately.
6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there, then add the annotation SEEN to confirm that the work has been read.
7. There is a NR (No Response) option. Award NR (No Response)
- if there is nothing written at all in the answer space
 - OR if there is a comment which does not in any way relate to the question (e.g., 'can't do,' 'don't know')
 - OR if there is a mark (e.g., a dash, a question mark) which isn't an attempt at the question.
- Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).
8. The RM Assessor **comments box** is used by your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
- If you have any questions or comments for your Team Leader, use the phone, the RM Assessor messaging system, or email.
9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:

Read through the whole answer from start to finish, using the Level descriptors to help you decide whether it is a strong or weak answer. The indicative scientific content in the Guidance column indicates the expected parameters for candidates' answers but be prepared to recognise and credit unexpected approaches where they show relevance. Using a 'best-fit' approach based on the skills and science content evidenced within the answer, first decide which set of level descriptors, Level 1, Level 2 or Level 3, best describes the overall quality of the answer.

Once the level is located, award the higher or lower mark:

The higher mark should be awarded where the level descriptor has been evidenced and all aspects of the communication statement (in italics) have been met.

The lower mark should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in italics) are missing.

In summary:

The skills and science content determines the level.

The communication statement determines the mark within a level.

Level of response question on this paper is **13**.

11. Annotations available in RM Assessor

Annotation	Meaning
	Correct response
	Incorrect response
	Omission mark
	Benefit of doubt given
	Contradiction
	Rounding error
	Error in number of significant figures
	Error carried forward
	Level 1
	Level 2
	Level 3
	Benefit of doubt not given
	Noted but no credit given
	Ignore

12. Abbreviations, annotations and conventions used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
✓	Separates marking points
DO NOT ALLOW	Answers which are not worthy of credit
IGNORE	Statements which are irrelevant
ALLOW	Answers that can be accepted
()	Words which are not essential to gain credit
—	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

13. Subject-specific Marking Instructions

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

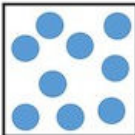
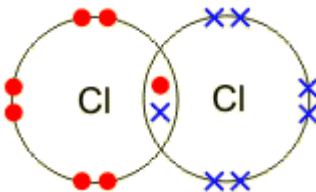
Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

The breakdown of Assessment Objectives for GCSE (9-1) in Chemistry Combined Science A:

	Assessment Objective
AO1	Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.
AO1.1	Demonstrate knowledge and understanding of scientific ideas.
AO1.2	Demonstrate knowledge and understanding of scientific techniques and procedures.
AO2	Apply knowledge and understanding of scientific ideas and scientific enquiry, techniques and procedures.
AO2.1	Apply knowledge and understanding of scientific ideas.
AO2.2	Apply knowledge and understanding of scientific enquiry, techniques and procedures.
AO3	Analyse information and ideas to interpret and evaluate, make judgements and draw conclusions and develop and improve experimental procedures.
AO3.1	Analyse information and ideas to interpret and evaluate.
AO3.1a	Analyse information and ideas to interpret.
AO3.1b	Analyse information and ideas to evaluate.
AO3.2	Analyse information and ideas to make judgements and draw conclusions.
AO3.2a	Analyse information and ideas to make judgements.
AO3.2b	Analyse information and ideas to draw conclusions.
AO3.3	Analyse information and ideas to develop and improve experimental procedures.
AO3.3a	Analyse information and ideas to develop experimental procedures.
AO3.3b	Analyse information and ideas to improve experimental procedures.

For answers to Section A if an answer box is blank ALLOW correct indication of answer e.g., circled or underlined.

Question	Answer	Marks	AO element	Guidance
1	C	1	1.1	
2	C	1	1.1	
3	D	1	1.1	
4	C	1	2.1	
5	B	1	1.1	
6	B	1	1.2	
7	C	1	1.1	
8	C	1	2.1	
9	D	1	2.1	
10	B	1	2.2	

Question			Answer	Marks	AO element	Guidance
11	(a)	(i)	Several particles spread out in an irregular pattern E.g.  ✓	1	1.1	IGNORE any lines indicating that particles are moving
		(ii)	Idea that they (only) <u>vibrate</u> (about a fixed point) ✓	1	1.1	ALLOW vibrate in fixed positions
		(iii)	Condensation / condensing ✓	1	1.1	
	(b)		-101°C ✓	1	3.2a	
	(c)	(i)	Two electrons shown in the overlap ✓ 	1	1.2	ALLOW any combination of crosses and dots
		(ii)	The particles of chlorine are called isotopes / molecules / polymers . ✓ The atoms of chlorine are joined together by a covalent / ionic / metallic bond. ✓	2	2 x 1.1	

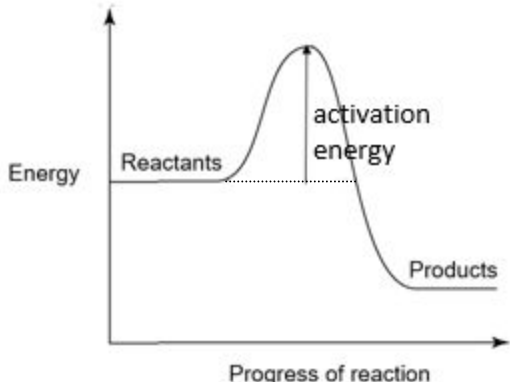
Question			Answer	Marks	AO element	Guidance
	(d)		<p>It goes 'pop when lit. ☐</p> <p>It relights a glowing spill. ☐</p> <p>It turns limewater cloudy white. ☐</p> <p>It turns damp litmus paper white. ☒</p> <p style="text-align: right;">✓</p>	1	1.2	

Question			Answer	Marks	AO element	Guidance
12	(a)		$\text{CuCl}_2(\text{aq})$ ✓	1	2.1	
	(b)		<p>Any two from:</p> <p>Copper formed on electrode X ✓</p> <p>Idea that copper forms positive ions ✓</p> <p>Idea that copper ions are attracted to the negative electrode or cathode ✓</p>	2	2 x 3.2b	<p>ALLOW (positive) metal ions are discharged at the cathode / Metals are formed at the cathode</p> <p>If no other marks awarded, award one mark for either:</p> <p>ALLOW the idea that copper/metal is attracted to the cathode/electrode X</p> <p>OR cathode/electrode X gets bigger</p>
	(c)		<p>Choice of appropriate currents e.g., 2(A) and 4(A) ✓</p> <p>Use of data to show that as current doubles the mass of copper doubles e.g., 0.12(g) is double 0.06(g) ✓</p>	2	2 x 3.1b	<p>ALLOW for 2 marks: e.g., 2(A) is 0.06(g) and 4(A) is 0.12(g)</p>
	(d)	(i)	<p>All points plotted correctly scores 2 marks ✓✓</p> <p>But</p> <p>3 or 4 points plotted correctly scores 1 mark ✓</p>	2	2 x 2.2	ALLOW $\pm \frac{1}{2}$ square
		(ii)	Straight line of best fit through points (ignoring anomalous point at 3 A) ✓	1	1.2	ALLOW a reasonable line of best fit through incorrectly plotted points (ignoring anomalous point at 3 A)
		(iii)	Idea that the result does not fit the pattern / Does not lie on the line of best fit ✓	1	3.1b	ALLOW it is an anomaly / an outlier
		(iv)	Mass of copper at 3 A from their line of best fit e.g., 0.09 g ✓	1	3.2b	<p>ALLOW $\pm \frac{1}{2}$ square</p> <p>Must be from candidates' graph, not calculated from table</p>

Question			Answer	Marks	AO element	Guidance
Question			Answer	Marks	AO element	Guidance
13*			<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5–6 marks) Describes how pure salt can be separated from the mixture, if the method is followed pure salt will be obtained. AND Draws labelled diagrams to show separating the pure salt by filtration and evaporation/crystallisation.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Describes how pure salt can be separated from the mixture, and the method may produce pure salt. AND Attempts to draw labelled diagrams to show separating the pure salt by filtration and evaporation/crystallisation.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks) Attempts to describe how the salt can be separated from the mixture, but the method could not be followed to obtain pure salt. OR Attempts to draw a labelled diagram of either filtration OR evaporation/crystallisation.</p>	6	2.2 x 4 3.3a x 2	<p>AO2.2 Applies knowledge of scientific enquiry, techniques and procedures</p> <ul style="list-style-type: none"> Describes the separation of the sand by filtration <ul style="list-style-type: none"> sand remains on the filter paper salt solution passes through the filter paper Describes the separation of the salt by evaporation <ul style="list-style-type: none"> heating evaporates the water salt left behind / does not evaporate Uses the correct names for the separation techniques: <ul style="list-style-type: none"> filtration evaporation / crystallisation Uses correctly labelled equipment in diagrams: <ul style="list-style-type: none"> e.g., filter funnel / filter paper / conical flask etc. e.g., evaporating dish / tripod / gauze / Bunsen burner etc. <p>AO3.3a Analyse information and ideas to develop experimental procedures</p> <ul style="list-style-type: none"> Describes that sand is removed from the salt solution by filtration Describes that the salt is removed from the salt solution by evaporation

Question			Answer	Marks	AO element	Guidance
			<p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p>0 marks <i>No response or no response worthy of credit.</i></p>			

Question			Answer	Marks	AO element	Guidance
14	(a)		$\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$ ✓	1	2.2	IGNORE state symbols, even if incorrect ALLOW any correct multiple, including fractions ALLOW = OR $\Rightarrow$ instead of $\rightarrow$ DO NOT ALLOW and / & instead of '+'
	(b)		Zinc sulfate ✓	1	2.2	ALLOW zinc sulphate
	(c)		(Universal indicator) is red in the acid (at first) ✓ (Universal indicator) turns green (once all the sulfuric acid reacted) ✓	2	2 x 3.3a	ALLOW orange / yellow If no other mark awarded ALLOW the idea that the indicator changes colour for one mark
	(d)	(i)	161.5 ✓	1	2.2	
		(ii)	First check answer on answer line If answer = 40.5% award 3 marks (65.4 $\div$ 161.5) $\times$ 100 ✓ = 40.495 ✓ = 40.5 (%) ✓	3	2.2 2 x 1.2	ALLOW ECF from incorrect M_r from 14(d)(i) ALLOW 40.495 up to calculator value 40.49535604, correctly rounded ALLOW the decimal place mark from an incorrect calculation which uses the answer to 14d(i)
	(e)	(i)	(Reaction in which) energy is given out / energy is transferred to surroundings ✓	1	1.1	ALLOW idea of a reaction in which the temperature increases

		(ii)	Activation energy correctly labelled between reactants line and highest point of curve and shown as an arrow facing upwards ✓ 	1	1.1	DO NOT ALLOW activation energy with a double headed arrow DO NOT ALLOW activation energy arrow pointing downwards
		(iii)	(Minimum) energy needed for a reaction to occur / AW ✓	1	1.1	
	(f)	C ✓ Temperature (only) increases ✓ (Increases) by a small amount / by 2 °C ✓	3	2.1 2 x 2.1	If A or D award 0 marks ALLOW B and temperature increases for 2 marks	

Question			Answer	Marks	AO element	Guidance
15	(a)		Isotopes ✓	1	1.1	
	(b)		Number of protons = 8 Number of neutrons = 9 Number of electrons = 8 ✓✓	2	2 x 2.1	Three correct = 2 marks One or two correct = 1 mark
	(c)		17 ✓	1	2.1	ALLOW ECF from 15(b) for incorrectly identified number of protons and neutrons
	(d)		Oxygen ✓	1	2.1	ALLOW ECF from an incorrect number of protons in 15(b)
	(e)	(i)	Na = 2.8 ✓ Y = 2.8 ✓	2	2 x 2.2	ALLOW any combination of crosses and dots
		(ii)	NaY ₂ ☐ Na ₂ Y ☒ Na ₂ Y ₂ ☐ ✓	1	2.2	
		(iii)	Atoms of Y and Z have the same number of electrons. ☒ Atoms of Y and Z have the same number of neutrons. ☐ Atoms of Y and Z have the same number of protons. ☐ ✓	1	3.1b	

Question			Answer	Marks	AO element	Guidance
		(iv)	Any 3 from: Electrostatic forces (between ions) ✓ Attraction between oppositely charged ions / between Na^+ and Y^{2-} ✓ Giant structure / lattice ✓ (Electrostatic forces) are strong / require lots of energy to break ✓	3	3 x 1.1	Maximum 2 marks if incorrect bonding or particles are mentioned

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on

01223 553998

Alternatively, you can email us on

support@ocr.org.uk

For more information visit



ocr.org.uk/qualifications/resource-finder



ocr.org.uk



Twitter/ocrextams



/ocrextams



/company/ocr



/ocrextams



CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT

OCR is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored. © OCR 2023 Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA.

Registered company number 3484466. OCR is an exempt charity.

OCR operates academic and vocational qualifications regulated by Ofqual, Qualifications Wales and CCEA as listed in their qualifications registers including A Levels, GCSEs, Cambridge Technicals and Cambridge Nationals.

OCR provides resources to help you deliver our qualifications. These resources do not represent any particular teaching method we expect you to use. We update our resources regularly and aim to make sure content is accurate but please check the OCR website so that you have the most up-to-date version. OCR cannot be held responsible for any errors or omissions in these resources.

Though we make every effort to check our resources, there may be contradictions between published support and the specification, so it is important that you always use information in the latest specification. We indicate any specification changes within the document itself, change the version number and provide a summary of the changes. If you do notice a discrepancy between the specification and a resource, please [contact us](#).

Whether you already offer OCR qualifications, are new to OCR or are thinking about switching, you can request more information using our [Expression of Interest form](#).

Please [get in touch](#) if you want to discuss the accessibility of resources we offer to support you in delivering our qualifications.