

Foundation

GCSE

Combined Science Chemistry A Gateway Science

J250/03: Paper 3 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2025

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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.

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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 posted on the RM Cambridge Assessment Support Portal <http://www.rm.com/support/ca>
3. Log-in to RM Assessor and mark the **required number** of practice responses (“scripts”) and the **number of required** 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 40% 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. **Crossed Out Responses**
Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

Rubric Error Responses – Optional Questions

Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM Assessor, which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

Multiple-Choice Question Responses

When a multiple-choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).

When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only one mark per response)

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth two or more marks)

If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space).

Longer Answer Questions (requiring a developed response)

Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

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 seen and mark any responses using the annotations in section 11.
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 is not 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.**
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(e)**.

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

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
<u>—</u>	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

10. 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 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.

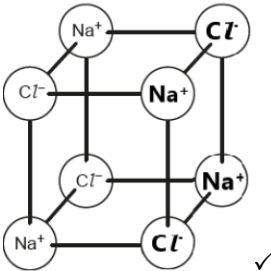
For answers to Section A if an answer box is blank ALLOW correct indication of answer e.g. circled or underlined.

Question	Answer	Marks	AO element	Guidance
1	A	1	1.1	ALLOW g
2	A	1	2.1	ALLOW 20(g)
3	B	1	1.1	
4	A	1	2.2	
5	A	1	2.1	ALLOW CH ₄
6	D	1	1.2	
7	B	1	1.1	ALLOW H ⁺
8	A	1	2.1	
9	C	1	1.1	
10	B	1	1.1	

Question			Answer	Marks	AO element	Guidance
11	(a)		On the left. ☒ On the left and right. ☐ On the right. ☐ ✓	1	1.1	DO NOT ALLOW if more than one box ticked
	(b)		Aluminium ☐ Copper ☐ Magnesium ☒ ✓	1	2.1	DO NOT ALLOW if more than one box ticked
	(c)		C ✓	1	3.2b	
	(d)	(i)	A compound ☐ An alloy ☒ An element ☐ ✓	1	1.1	DO NOT ALLOW if more than one box ticked

Question			Answer	Marks	AO element	Guidance
		(ii)	The strength (of iron) increases as the percentage (of carbon) increases / ORA ✓	1	3.1a	ALLOW AW DO NOT ALLOW just “It increases” Assume “it” refers to the strength of iron

Question			Answer	Marks	AO element	Guidance
12	(a)		16 ✓	1	2.2	
	(b)		Reaction 1 is endothermic because the temperature change is negative / temperature decreases / absorbs heat ✓ Reaction 2 is exothermic because the temperature change is positive / temperature increases / releases heat ✓	2	2 × 3.2b	ALLOW 1 mark for correctly identifying Reaction 1 as endothermic and Reaction 2 as exothermic with either no/incorrect explanations
	(c)	(i)	B ✓	1	1.1	
		(ii)	A ✓	1	1.1	

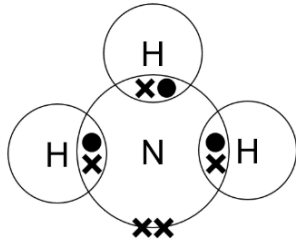
Question			Answer	Marks	AO element	Guidance
13	(a)	(i)		1	2.1	All four ions (shown in bold) must be labelled correctly for the mark
		(ii)	NaCl ✓	1	1.1	ALLOW elements shown in either order e.g., Cl Na ALLOW $\text{Na}^+ + \text{Cl}^- \rightarrow \text{NaCl}$ ALLOW = instead of $\rightarrow$ DO NOT ALLOW NA or CL DO NOT ALLOW formula with charges in e.g. Na^+Cl^-
	(b)		Any temperature in the range 801 to 1464 ✓	1	3.2a	ALLOW 801°C
	(c)	(i)	Power supply / power pack / battery ✓	1	1.2	ALLOW cell, battery pack
		(ii)	Chlorine ✓	1	1.1	ALLOW Cl_2 DO NOT ALLOW Cl^2 / Cl2 / Cl
		(iii)	Graphite is unreactive And It is an electrical conductor ✓	1	3.1b	Both are required for the mark

	(d)	First check the answer on the answer line If answer = 62 (kg) award 3 marks $160 \times \frac{39}{100} \checkmark$ $= 62.4 \checkmark$ $= 62 \text{ (kg)} \checkmark$	3	2 × 2.2 ALLOW 160×0.39 ALLOW 62.4 for 2 marks ALLOW ECF from an incorrect calculation which uses 39 / 0.39 / 39% and 160 1.2 ALLOW ECF if significant figures are correct from an incorrect calculation which uses 39 / 0.39 / 39% or 160	
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Question	Answer	Marks	AO element	Guidance
13(e)*	Level 3 (5–6 marks) Detailed explanation of how the atoms form ions Gives a detailed explanation in terms of both sodium and chlorine atoms and Cl^- and Na^+ <u>ions</u>. <i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i> Level 2 (3–4 marks) Clear explanation of how the atoms form ions Gives a clear explanation in terms of atoms and/or ions of sodium and/or chlorine. <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i> Level 1 (1–2 marks) Basic explanation of how the atoms form ions Gives a basic explanation in terms of either atoms or ions. <i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i> 0 marks <i>No response or no response worthy of credit.</i>	6	6 × 2.1	NB: Any mention of sharing electrons / incorrect bonding limits answers to achieving a maximum of Level 2 AO2.1 Apply knowledge and understanding of scientific ideas e.g., Explains the reaction in terms of sodium: • sodium atoms have 1 electron in their outer shell/are 2.8.1 • sodium atoms lose their outer electron • sodium atoms transfer their outer electron to chlorine atoms • sodium atoms form sodium ions • sodium ions have a full outer shell/have 8 electrons in their outer shell/are 2.8 • sodium ions have a 1+ charge Explains the reaction in terms of chlorine: • chlorine atoms have 7 electrons in their outer shell/is 2.8.7 • chlorine atoms gain an electron • chlorine atoms gain an electron from sodium atoms • chloride ions have a full outer shell/ have 8 electrons in their outer shell/are 2.8.8 • chloride ions have a 1- charge

Question			Answer	Marks	AO element	Guidance
						<i>Please note: indicative content indicates possible points candidates might make, but this is not an exhaustive account. Any valid response should be rewarded.</i> Examples of Level 3 detailed explanations • One electron is transferred from Na to Cl atoms • Na atom has one electron in outer shell (2.8.1), Cl atom has 7 electrons in outer shell (2.8.7) • Ions are Na⁺ and Cl⁻ • Bonding is ionic – charged ions attract • There are complete outer shells on both ions (2.8) and (2.8.8) Examples of Level 2 clear explanations • Sodium loses electrons whereas chlorine gains electrons • Na ions are positive, Cl ions are negative • Na has a single electron and/or Cl shell is not full • Ions have full outer shells • Bonding is ionic Examples of Level 1 basic explanations • Electron loss/gain involving Na and Cl, in terms of atoms or ions • Sodium has a single electron

Question			Answer	Marks	AO element	Guidance
14	(a)		Relative mass = 1 ✓ Relative charge = 0 ✓	2	2 × 1.1	DO NOT ALLOW +1 or -1
	(b)		First check the answer on the answer line If answer = 8.35×10^{-31} (kg) award 2 marks $1.67 \times 10^{-27} \times 0.0005$ ✓ $= 8.35 \times 10^{-31}$ ✓	2	2 × 2.2	ALLOW ECF if answer in standard form is correct from incorrect calculation ALLOW for 1 mark: 3.34×10^{-24} (from $1.67 \times 10^{-27} \div 0.0005$) ALLOW for 1 mark: 2.99×10^{23} (from $0.0005 \div 1.67 \times 10^{-27}$)
	(c)		Number of neutrons = 7 ✓ Number of electrons = 7 ✓	2	2 × 2.1	
	(d)	(i)	2 ☐ 3 ☒ 4 ☐ ✓	1	2.2	ALLOW 3 written in the equation if no box is ticked
		(ii)	(14 + 3 =) 17 ✓	1	2.2	

Question			Answer	Marks	AO element	Guidance												
	(e)		Ammonia contains only two elements. ☐ Ammonia is a compound of nitrogen. ☐ NH₃ gives the simplest ratio of the atoms. ☒ ✓	1	3.1b													
	(f)		<table><thead><tr><th></th><th>True</th><th>False</th></tr></thead><tbody><tr><td>It shows how the atoms are arranged in space.</td><td>✓</td><td></td></tr><tr><td>It shows the exact length of the covalent bonds.</td><td></td><td>✓</td></tr><tr><td>It shows the numbers of atoms of each element.</td><td>✓</td><td></td></tr></tbody></table> ✓✓		True	False	It shows how the atoms are arranged in space.	✓		It shows the exact length of the covalent bonds.		✓	It shows the numbers of atoms of each element.	✓		2	2 × 1.1	All three correct = 2 marks One or two correct = 1 mark
	True	False																
It shows how the atoms are arranged in space.	✓																	
It shows the exact length of the covalent bonds.		✓																
It shows the numbers of atoms of each element.	✓																	
	(g)		 Any one pair of shared electrons ✓ Rest of diagram correct ✓	2	2 × 1.2	ALLOW electrons as all dots, all crosses, or a mix of dots and crosses ALLOW diagrams with inner electron shells, but inner shells must be correct if shown Second marking point is dependent on one shared pair of electrons												

Question			Answer	Marks	AO element	Guidance
15	(a)	(i)	Any value from 1 to 6 ✓	1	1.1	ALLOW below 7 AW ALLOW zero
		(ii)	<u>Universal</u> (indicator) ✓ Red ✓	2	2 × 1.1	ALLOW pink / yellow / orange
		(iii)	pH meter / pH probe ✓	1	3.3b	
	(b)		Magnesium sulfate ✓	1	2.1	ALLOW correct formula
	(c)		Magnesium carbonate/white powder/solid disappears ✓ Fizzing/bubbling/effervescence ✓	2	2 × 2.2	IGNORE dissolves IGNORE gas produced
	(d)		Step 1: Filtration ✓ Step 2: Crystallisation / Evaporation ✓	2	2 × 1.2	ALLOW distillation DO NOT ALLOW fractional distillation
	(e)	(i)	As (the mass of) magnesium carbonate increases (up to 5.0g)(the mass of) the salt increases ✓ Idea that the mass of magnesium carbonate increases from 5.0 g (to 7.0 g) the mass of the salt stays the same / at 7.1 g ✓	2	2 × 3.1a	ALLOW they both go up ALLOW directly proportional ALLOW 6.0g instead of 5.0g as the data used to describe the trend ALLOW towards the end no more salt is produced / AW (if no data is given)
		(ii)	No more product is formed ✓	1	3.1b	

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