

Foundation

GCSE

Combined Science Chemistry A Gateway Science

J250/04: Paper 4 (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 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. **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.
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 **14**.

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 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	D	1	1.1	
2	D	1	1.1	
3	D	1	1.2	
4	D	1	1.2	
5	C	1	2.1	
6	C	1	2.2	
7	C	1	1.1	
8	C	1	2.2	
9	B	1	2.1	
10	B	1	2.2	

J250/04

Mark Scheme

June 2025

Question			Answer	Marks	AO element	Guidance
11	(a)		Calcium carbonate – CaCO_3 ☐ Hydrogen chloride – HCl ☐ Methane – CH_4 ☒ ✓	1	1.1	
	(b)		Fractional distillation ✓ Cracking ✓	2	2×1.2	ALLOW distillation
	(c)		B ✓ It's a finite resource AND a mixture (of compounds) ✓	2	2×2.1	ALLOW it is non-renewable and a mixture ALLOW a description of finite e.g., limited amount / will run out and a mixture
	(d)		1960 – 2020 ✓ Fossil fuels ✓	2	3.1a 1.1	

J250/04

Mark Scheme

June 2025

Question			Answer	Marks	AO element	Guidance															
	(e)		<table><tr><td></td><td>True</td><td>False</td></tr><tr><td>All animals will adapt to survive.</td><td></td><td>✓</td></tr><tr><td>Droughts and floods will become more likely.</td><td>✓</td><td></td></tr><tr><td>Extreme weather conditions will increase.</td><td>✓</td><td></td></tr><tr><td>It will impact crop growth.</td><td>✓</td><td></td></tr></table> ✓✓		True	False	All animals will adapt to survive.		✓	Droughts and floods will become more likely.	✓		Extreme weather conditions will increase.	✓		It will impact crop growth.	✓		2	2 × 1.1	Four correct = 2 marks Two or three correct = 1 mark
	True	False																			
All animals will adapt to survive.		✓																			
Droughts and floods will become more likely.	✓																				
Extreme weather conditions will increase.	✓																				
It will impact crop growth.	✓																				

Question			Answer	Marks	AO element	Guidance																
12	(a)	(i)	Idea that the reactions become more vigorous/faster ✓	1	2.1	ALLOW answers relating to specific observations e.g. fizzes faster/more / the piece of metals disappear quicker / (sodium) melts ALLOW reaction is more intense																
		(ii)	Melts fast(er) / fizzes more/very vigorously / disappears very/more quickly ✓	1	3.2a	NOTE needs to be more vigorous than sodium e.g., fizzes faster / disappears faster ALLOW sparks/burns/explodes / floats / pops / gives (purple) light																
	(b)		Potassium hydroxide ✓ Hydrogen ✓	2	2 × 2.1	ALLOW answers in either order ALLOW recognisable spellings																
	(c)	(i)	s ✓	1	1.1																	
		(ii)	Fluorine ✓	1	2.1	DO NOT ALLOW fluoride ALLOW recognisable spelling																
	(d)		<table><tr><td></td><td>Potassium chloride solution</td><td>Potassium bromide solution</td><td>Potassium iodide solution</td></tr><tr><td>Chlorine</td><td></td><td>✓</td><td>✓</td></tr><tr><td>Bromine</td><td>X</td><td></td><td>✓</td></tr><tr><td>Iodine</td><td>X</td><td>X</td><td></td></tr></table> ✓✓✓		Potassium chloride solution	Potassium bromide solution	Potassium iodide solution	Chlorine		✓	✓	Bromine	X		✓	Iodine	X	X		2	2 × 2.2	All three correct = 2 marks Any one/two correct = 1 mark
	Potassium chloride solution	Potassium bromide solution	Potassium iodide solution																			
Chlorine		✓	✓																			
Bromine	X		✓																			
Iodine	X	X																				

Question			Answer	Marks	AO element	Guidance
13	(a)		(D) A C E B ✓ ✓	2	2 × 1.1	All four in correct sequence = 2 marks One wrong in sequence = 1 mark e.g. A B C E / A E C B / B A C E etc = 1 mark
	(b)		First check the answer on the answer line If answer = 40 (%) award 3 marks Total sections (= 3 + 4 + 3) = 10 ✓ $(4 \div 10) \times 100$ ✓ = 40% ✓	3	3 × 2.2	ALLOW ECF on M1 ALLOW ECF on M2 ALLOW $100 \div 10 = 10$ 4×10 = 40 % ALLOW $360 \div \underline{10} = 36$ $[(36 \times 4) \div 360] \times 100$ = 40%
	(c)	(i)	They dissolve in rain water making it acidic. ☐ They make a hole in the ozone layer. ☐ They trap heat from the Sun. ☒ ✓	1	1.1	

J250/04

Mark Scheme

June 2025

Question			Answer	Marks	AO element	Guidance
		(ii)	Argon ☐ Methane ☒ Nitrogen ☐ ✓	1	1.1	

Question			Answer	Marks	AO element	Guidance
14*			Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question. Level 3 (5–6 marks) Detailed description of their choice of container States which container they would choose and gives a justified advantage and disadvantage for their choice with a detailed and accurate comparative interpretation of the data. <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 description of their choice of container States which container they would choose and gives a clear advantage or disadvantage for their choice with an accurate use of the data Or a basic advantage and disadvantage <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 description of their choice of container States which container they would choose and gives a reason for their choice using non-comparative information from the table	2	4 × 3.1b 2 × 3.2a	AO3.1b Analyse information and ideas to evaluate i.e. Aluminium can examples Advantages: • recycling saves high/highest/more amount of energy • high number of containers collected for recycling • shortest / less time to decompose (in landfill) • less contribution to global warming Disadvantages: • uses highest amount of energy to produce • contributes to global warming • number of containers collected not 100% / disposed of/remains in landfill Glass bottle examples Advantages: • uses lowest amount of energy to produce • high number of containers collected Disadvantages: • highest contribution to global warming • recycling saves lowest amount of energy • number of containers collected not 100% / disposed of/remains in landfill AO3.2a Analyse information and ideas to make a judgement i.e. States which container they would choose e.g.

Question			Answer	Marks	AO element	Guidance
			<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>			- Aluminium can or Glass bottle <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 - container choice is aluminium Advantages, include a majority of: - Al has less contribution to global warming - Al saves more energy/70% of energy during recycling - Al takes less time to decompose in landfill Disadvantage: - Al uses more energy in production Examples of Level 2 clear explanations - container choice is aluminium Advantages: - Al contribution to global warming is medium, glass is high - Al saves 90% of energy during recycling and glass saves 25% - Al takes 80 years to decompose in landfill and glass takes 1 000 000 years

J250/04

Mark Scheme

June 2025

Question			Answer	Marks	AO element	Guidance
						Disadvantage: - Al uses 300 000 kJ of energy in production and glass uses 2 500 Examples of Level 1 basic explanations - container choice is aluminium Advantage: - Al has medium contribution to global warming Glass container chosen follows the same examples using the information for glass

Question			Answer	Marks	AO element	Guidance
15	(a)		Line drawn at 65°C ✓	1	1.2	ALLOW any line from 64 to 66 either inside or alongside the thermometer A horizontal line must reach the scale; a vertical thread needs to stop at 64 to 66
	(b)	(i)	The more reactive the metal the higher the temperature ✓	1	3.1a	ALLOW the more reactive the metal the hotter ALLOW it/temperature/highest temperature increases NOTE needs to be comparative
		(ii)	Aluminium ✓	1	3.2a	ALLOW Al, but name takes precedence
	(c)	(i)	First check the answer on the answer line If answer = 65 (°C) award 3 marks (65 + 63 + 66) ÷ 3 / 194 ÷ 3 ✓ = 64.67 ✓ = 65 ✓	3	3 × 1.2	ALLOW 194 ÷ 3 ALLOW correct rounding / 64.6 ALLOW clear evidence of correct rounding of an incorrect answer
		(ii)	Mass of magnesium / volume/25cm ³ of dilute hydrochloric acid ✓	1	2.2	ALLOW amount of magnesium/metal / amount of hydrochloric acid ALLOW starting temperature ALLOW room temperature DO NOT ALLOW time

J250/04

Mark Scheme

June 2025

	(d)		Put a lid on the cup / stir the reaction mixture ✓	1	3.3b	ALLOW use a triple walled cup ALLOW use a polystyrene cup ALLOW insulate the cup / stand the cup on an insulator IGNORE repeats
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Question			Answer	Marks	AO element	Guidance
16	(a)		2 (H ₂ O) ✓ (1) O ₂ ✓	2	1.1 2.2	DO NOT ALLOW 2O or O ²
	(b)		Test – glowing splint ✓ Result – (the splint) relights ✓	2	2 × 1.2	Read answer as a whole DO NOT ALLOW splint / burning splint IGNORE blown out splint
	(c)	(i)	Enzyme(s) ✓	1	1.1	
		(ii)	Increases rate of reaction / reaction is faster / reaction speeds up / oxygen is produced quicker ✓ Reduces/lowers activation energy / reduces energy needed for reaction to occur (by providing an alternative route for the reaction) ✓	2	2 × 2.1	ALLOW bubbles faster IGNORE bubbles more NOTE: reaction is fast is insufficient DO NOT ALLOW more energy needed IGNORE collisions NOTE: activation energy is low is insufficient
		(iii)	It is decreased. ☐ It is increased. ☐ It stays the same. ☒ ✓	1	2.1	
	(d)	(i)	First check the answer on the answer line If answer = 24 (cm²) award 2 marks (surface area of 1 face =) $2 \times 2 / 2^2$ ✓ (surface area of cube = 6×4 =) 24 (cm ²) ✓	2	2 × 2.2	IGNORE volume calculations e.g. $2 \times 2 \times 2 / 4 \times 2 / 2^2 \times 2^2$ ALLOW 4 with no other working ECF from incorrect M1 × 6

J250/04

Mark Scheme

June 2025

Question			Answer	Marks	AO element	Guidance
		(ii)	The smaller pieces have a larger mass. ☐ The smaller pieces have a larger surface area. ☒ The smaller pieces have a larger volume. ☐ ✓	1	3.1b	
	(e)		Rate of reaction = $1.5 \text{ cm}^3/\text{s}$ ☐ Rate of reaction > $1.5 \text{ cm}^3/\text{s}$ ☒ Rate of reaction < $1.5 \text{ cm}^3/\text{s}$ ☐ ✓	1	2.1	

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