OCR
Oxford Cambridge and RSA

Foundation

GCSE

Combined Science Chemistry A Gateway Science

J250/03: Paper 3 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2024

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.

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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.

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. Award No Response (NR) if:

- there is nothing written in the answer space.

Award Zero '0' if:

- anything is written in the answer space and is not worthy of credit (this includes text and symbols).

Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should check this when reviewing scripts.

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 **15**.

11. Annotations available in RM Assessor

Annotation	Meaning
	Correct response
	Incorrect response
	Omission mark
BOD	Benefit of doubt given
CON	Contradiction
RE	Rounding error
SF	Error in number of significant figures
ECF	Error carried forward
L1	Level 1
L2	Level 2
L3	Level 3
NBOD	Benefit of doubt not given
SEEN	Noted but no credit given
I	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
__	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

12. **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**.

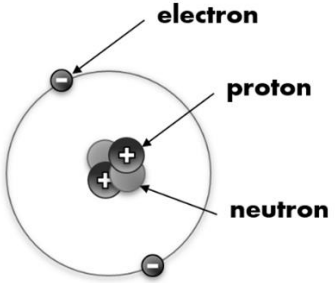
Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

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.

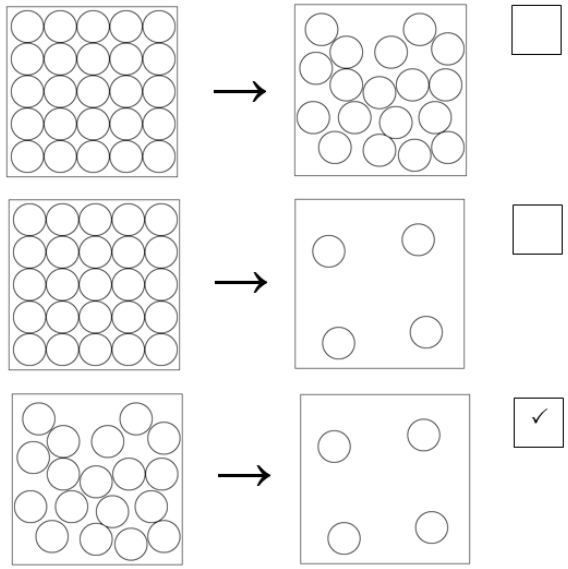
Question	Answer	Marks	AO element	Guidance
1	B	1	2.1	**ALLOW** g
2	D	1	1.1	
3	A	1	1.2	
4	D	1	2.2	
5	D	1	2.2	
6	B	1	1.2	
7	B	1	1.1	
8	B	1	1.1	
9	A	1	1.1	
10	C	1	2.1	

Question			Answer	Marks	AO element	Guidance
11	(a)	(i)	 ✓✓	2	2 x 1.1	All three correct = 2 marks One or two correct = 1 mark
		(ii)	The particle with the lowest relative mass is the **proton / neutron / electron**. ✓	1	1.1	
		(iii)	This particle was the **proton / neutron / electron**. ✓	1	1.1	
	(b)		F ✓	1	1.1	**ALLOW** fluorine **DO NOT ALLOW** F_2
	(c)	(i)	Atomic number ☐ Atomic size ☐ Atomic weight ✓ ✓	1	1.1	
		(ii)	Idea that gaps were left for undiscovered elements / so elements with similar properties were placed in the same group ✓	1	1.1	**ALLOW** column instead of group **ALLOW** same instead of similar

		(iii)	Group 1 ☐ ✓ Group 7 ☐ ✓ Group 0 ☐ ✓	**1**	**3.2b**	Both answers must be ticked to score this mark

Question			Answer	Marks	AO element	Guidance
12	(a)	(i)	Carbon / C ✓	1	1.1	
		(ii)	4 ✓	1	1.1	
		(iii)	1.54×10^{-13} ☐ 1.54×10^{-10} ✓ 1.54×10^{-3} ☐ ✓	1	2.2	
		(iv)	It has many strong covalent bonds High melting point It has no free electrons Does not conduct electricity It is a simple molecule It is made from ions. ✓ ✓	2	2 x 1.1	

	(b)		<table><tr><th>**Properties of graphite**</th><th>**True**</th><th>**False**</th></tr><tr><td>It conducts electricity.</td><td>✓</td><td></td></tr><tr><td>It is as hard as diamond.</td><td></td><td>✓</td></tr><tr><td>It has a high melting point.</td><td>✓</td><td></td></tr></table> ✓✓	**2**	**2 x 1.1**	All three correct = 2 marks One or two correct = 1 mark

Question			Answer	Marks	AO element	Guidance
13	(a)	(i)	Crystallisation ☐ Distillation ✓ Filtration ☐ ✓	1	1.2	
		(ii)	 ☐ ☐ ✓ ✓	1	2.2	
		(iii)	Idea that the glass tube is heated up by the **water vapour/steam** entering it ✓	1	3.1b	**ALLOW** (the glass tube is heated up by) heat from condensation / the idea that steam is condensing and transferring heat
		(iv)	Condenser ✓	1	3.3b	
	(b)	(i)	Bar drawn at 4 g and -8 °C ✓	1	2.2	

		(ii)	Increasing the amount of salt decreases the melting point / **ORA** ✓	**1**	**3.1a**	Answer must be a comparison e.g., just melting point decreases scores no mark **DO NOT ALLOW** the idea of just changing the amount of salt
		(iii)	Idea that pure ice contains no salt / idea that increasing salt by 1 g decreases melting point by 2 °C ✓	**1**	**3.1b**	

Question			Answer	Marks	AO element	Guidance
14	(a)		C ✓	1	3.2b	
	(b)		A and C ✓	1	3.2b	
	(c)		Two ovals / dots / circles drawn at the same levels as those for B and D ✓	1	3.2b	**IGNORE** any dots drawn on the baseline
	(d)		**First check answer on the answer line** **If answer = 0.76 award 3 marks** 37 ÷ 49 ✓ = 0.7551 / 0.755 ✓ = 0.76 (to 2 significant figures) ✓	3	**2 x 2.2** **1.2**	**ALLOW** an answer from 0.755 up to calculator value 0.755102040…. If no working shown this answer scores 2 marks **ALLOW ECF** for 2 sig fig mark

Question			Answer	Marks	AO element	Guidance
15*			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 explanation and use of information** Describes and explains properties of material C. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** **Clear explanation and use of information** Describes and explains a property of material C **or** Describes and partially explains more than one property of material C *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** **Basic explanation and use of information** Describes properties of material C **or** Attempts to describe a property of material C **and** attempts an explanation not linked to any properties *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant***.** **0 marks** *No response or no response worthy of credit.*	**6**	**4 x 2.1** **2 x 3.1a**	**AO2.1 Apply knowledge and understanding of scientific ideas e.g.,** Explains properties • (is solid (at room temperature))... as in solid/lattice ions are in a fixed position • (has a high melting point)… as strong attraction between ions / strong bonds between ions / large amount of energy needed to break bonds or forces between ions • (dissolves in water)… as the ions become free to move (**ALLOW** as ionic compounds dissolve in water) • (does not conduct heat)… as no delocalised/free electrons • (conducts electricity (only) when melted into a liquid)… as the ions become free to move • (does not conduct electricity when solid)… as the ions are fixed in position (**ALLOW** as it has no delocalised electrons because it is not a metal) **AO3.1a Analyse information and ideas to evaluate** Describes properties of C • is (white) solid (at room temperature) • has a high melting point • dissolves in water • does not conduct heat • conducts electricity when melted into a liquid

Question			Answer	Marks	AO element	Guidance
16	(a)		**First check answer on the answer line** **If answer = 17.0 / 17 award 1 mark** 16.0 + 1.0 = 17.0 / 17 ✓	1	2.2	
	(b)		**First check answer on the answer line** **If answer = 40.1 award 2 marks** OH^- x 2 = 17.0 x 2 = 34.0 / 34 ✓ 74.1 – 34.0 = 40.1 ✓	2	2 x 2.2	**ALLOW ECF** from **(a)** **ALLOW** if 17 is subtracted twice
	(c)		Calcium / Ca ✓	1	2.1	**ALLOW ECF** from (b) only if element is in Group 2

Question			Answer	Marks	AO element	Guidance
17	(a)		Idea that lithium is on the left (of the Periodic Table) / metals are on the left **and** oxygen is on the right (of the Periodic Table) / non-metals are on the right ✓ **Or** Lithium is in Group 1 (which are metals) **and** oxygen is in Group 6 (which are non-metals) ✓	**1**	**1.1**	**IGNORE** lithium forms positive ions and oxygen forms negative ions **ALLOW** oxygen is in group 16 instead of group 6
	(b)		**4**Li + O_2 → **2**Li_2O 4(Li) ✓ 2(Li_2O) ✓	**2**	 **1.1** **2.2**	**ALLOW** any correct multiples
	(c)		2, 1 ✓	**1**	**2.1**	**ALLOW** diagram **ALLOW** sentences describing the electron arrangement
	(d)		It loses (electrons) ✓ (It loses) 1 / an electron ✓	**2**	**2 x 2.1**	**DO NOT ALLOW** shares for this marking point (CON) **ALLOW** the idea that lithium 'gives **its** electron to oxygen' for 2 marks
	(e)		Idea that both are in Group 1 / both are in the same group / both have 1 electron in their outer energy level / both lose 1 electron / both form 1+ ions ✓	**1**	**3.1b**	
	(f)		Atoms with the same atomic number ✓ but different mass numbers ✓ **Or** Atoms with the same number of protons ✓ but different numbers of neutrons ✓	**2**	**2 x 1.1**	**ALLOW** answers based upon lithium e.g., both isotopes have 3 protons but ^{6}Li has 3 neutrons and ^{7}Li has 4 neutrons **ALLOW** atoms of the same element as **AW** to same atomic number **IGNORE** electrons

	(g)	**(i)**	**First check answer on the answer line** **If answer = 28.57 / 28.6 / 29 (%) award 2 marks** 4 ÷ 14 (x 100) ✓ = 28.57 / 28.6 / 29 (%) ✓	**2**	**2 x 2.2**	**ALLOW** any correct rounding of calculator answer of 28.571428
		(ii)	Idea that the diagram contains too many atoms of lithium / too few aluminium atoms ✓	**1**	**3.1b**	**ECF** from an incorrectly calculated percentage relating to the diagram e.g. value is below 2% lithium **IGNORE** any reference to percentage values

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