

Oxford Cambridge and RSA

Tuesday 11 June 2024 – Morning

**GCSE (9–1) Combined Science A
(Gateway Science)**

J250/10 Chemistry (Higher Tier)

Time allowed: 1 hour 10 minutes

You must have:

- a ruler (cm/mm)
- the Data Sheet for GCSE (9–1) Combined Science A (Chemistry) (inside this document)

You can use:

- a scientific or graphical calculator
- an HB pencil

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Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

Candidate number

First name(s)

Last name

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **20** pages.

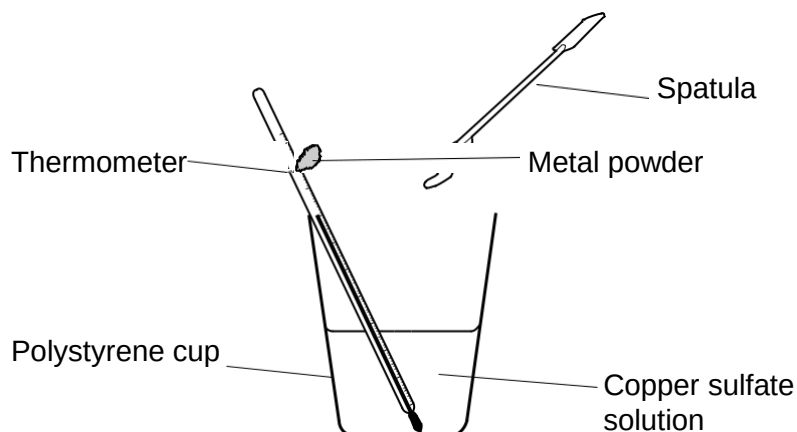
ADVICE

- Read each question carefully before you start your answer.

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- 14 A student investigates the reactivity of four metals.

The diagram shows the equipment they use.



This is their method:

- Measure 25 cm³ of copper sulfate solution into a polystyrene cup.
- Measure and record the initial temperature of the copper sulfate solution.
- Add two spatulas of a powdered metal and stir the mixture.
- Record the highest temperature reached.

The table shows some of the student's results.

Metal	Initial temperature (°C)	Highest Temperature (°C)	Temperature change (°C)
Tin		34.1	17.8
Zinc		43.6	27.5
Iron		29.7	13.6
Magnesium		47.2	31.0

- (a) Calculate the **lowest** initial temperature of the copper sulfate solution.

Lowest initial temperature = °C [1]

(c) It is thought that an increase in carbon dioxide in the atmosphere is causing global warming.

(i) Describe how an increase in carbon dioxide in the atmosphere is causing global warming.

.....

.....

.....

..... [2]

(ii) Describe **one** way that the emissions of carbon dioxide by human activity can be reduced.

.....

..... [1]

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Higher

GCSE

Combined Science Chemistry A Gateway Science

J250/10: Paper 10 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2024

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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

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

Question		Answer	Marks	AO element	Guidance												
(e)	(i)	There was an issue with this question and affected candidates' ability to answer it. To make sure all candidates were treated fairly, we have awarded the mark to all candidates for this question.															
		Aluminium oxide / Al_2O_3 loses oxygen ✓	1	3.1b	ALLOW aluminium ions / Al^{3+} gain electrons IGNORE oxygen has been separated from aluminium DO NOT ALLOW aluminium loses oxygen / gains electrons												
	(ii)	<table border="1"><thead><tr><th></th><th>True</th><th>False</th></tr></thead><tbody><tr><td>Aluminium oxide is melted at a high temperature.</td><td>✓</td><td></td></tr><tr><td>The electrolysis produces impure aluminium.</td><td></td><td>✓</td></tr><tr><td>The electrolysis uses large amounts of electricity.</td><td>✓</td><td></td></tr></tbody></table> ✓✓		True	False	Aluminium oxide is melted at a high temperature.	✓		The electrolysis produces impure aluminium.		✓	The electrolysis uses large amounts of electricity.	✓		2	2 x 1.2	All 3 correct = 2 marks Any 1 or 2 correct = 1 mark
	True	False															
Aluminium oxide is melted at a high temperature.	✓																
The electrolysis produces impure aluminium.		✓															
The electrolysis uses large amounts of electricity.	✓																
	(iii)	<u>Aluminium</u> is more reactive (than carbon) / ORA ✓	1	1.2	ALLOW <u>aluminium</u> is higher in the reactivity series (than carbon) IGNORE unless a comparison of reactivity is given DO NOT ALLOW aluminium oxide/it/oxygen is more reactive than carbon IGNORE aluminium is very reactive												