



...day June 20XX – Morning/Afternoon

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

J250/10 Paper 10 (Higher Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 10 minutes

MAXIMUM MARK 60

DRAFT

This document consists of 20 pages

MARKING INSTRUCTIONS**PREPARATION FOR MARKING****SCORIS**

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris 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 scoris and mark the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

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 scoris 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 scoris 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 a tick 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 scoris **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 scoris 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.

11. Annotations

Annotation	Meaning
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.

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SECTION A

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

SECTION B

Question		Answer	Marks	AO element	Guidance
11	(a)	measure temperature of sodium thiosulfate and acid mixture (1) (because) temperature will be different from sodium thiosulfate solution alone (1) OR place flask on cross before adding acid (1) idea that reaction has started before timing begins / idea that moving flask will increase mixing (1)	2	3.3b	ALLOW measure temperature of sodium thiosulfate solution when it has been removed from tripod (1) (because) temperature will continue to rise after flask is removed from tripod (1)
	(b)	(reaction is fastest) at 60°C (1) (because) gradient of graph is steepest (1)	2	2.2	ALLOW (reaction is fastest) between 50 – 60 °C (1) ALLOW rate of reaction has highest value (1)
	(c)	At higher temperatures ion/molecules of sodium thiosulfate and hydrochloric acid have more energy (1) So more frequent and more successful collisions (1)	2	2.2	

Question		Answer	Marks	AO element	Guidance
12	(a)	<p>Order of reactivity (most to least) magnesium iron lead copper</p> <p>magnesium as most reactive and copper as least (1) iron and lead in correct order (1)</p> <p>Explanation Any two from idea that none of the metals displace magnesium (from magnesium oxide) / magnesium displaces all the other metals from their metal oxides so magnesium is most reactive (1) idea that copper is displaced from copper oxide by all three other metals / copper cannot displace any of the other metals so copper is least reactive (1) idea that lead will displace iron or copper so is more reactive than these metals / lead cannot displace magnesium so is less reactive (1)</p>	4	<p>3.1a 3.1a</p> <p>2.2 x 2</p>	<p>ALLOW correct explanation for iron (1)</p>
	(b)	<p>$\text{Cu} + 2\text{AgNO}_3 \rightarrow 2\text{Ag} + \text{Cu}(\text{NO}_3)_2$</p> <p>formulae (1) balancing (1)</p>	2	2.1	<p>balancing mark is conditional on correct formulae ALLOW any correct multiple e.g. $2\text{Cu} + 4\text{AgNO}_3 \rightarrow 4\text{Ag} + 2\text{Cu}(\text{NO}_3)_2$ ALLOW = or \rightleftharpoons for arrow DO NOT ALLOW 'and' or & for + ALLOW one mark for correct balanced equation with incorrect use of upper and lower case formulae e.g. $\text{CU} + 2\text{AgNO}_3 \rightarrow 2\text{Ag} + \text{Cu}(\text{NO}_3)_2$</p>

Question		Answer	Marks	AO element	Guidance
13	(a)	<p>Any two from lowest total energy use (1) lowest CO₂ emissions (1) least amount of solvents used (1)</p>	2	3.1b	
	(b)	<p>Tall column with condensers coming off at different heights (1)</p> <p>Column heated at the bottom so hot at the bottom and cool at the top (1)</p> <p>Because substances in crude oil have different boiling points (1)</p> <p>Substances with high boiling points condense at the bottom and substances with low boiling points condense at the top (1)</p>	4	1.2 1.2 1.1 1.2	

Question		Answer	Marks	AO element	Guidance
14	(a)	<p>closed system (1)</p> <p>rate of forward reaction equals rate of backwards reaction / AW (1)</p>	2	1.1	
	(b)*	<p><i>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</i></p> <p>Level 3 (5–6 marks)</p> <p>Applies understanding of Le Chatelier’s principle to predict how <u>and</u> explain why the position of equilibrium changes with each condition</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)</p> <p>Applies understanding of Le Chatelier’s principle to predict how the position of equilibrium changes with each condition AND explains why the position of equilibrium changes with one condition</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>	6	1.1 x 3 2.1 x 3	<p>AO1.1: Knowledge of Le Chatelier’s principle</p> <ul style="list-style-type: none"> • With increased pressure, equilibrium moves to the right. • With increased temperature, equilibrium moves to the left. • Equilibrium moves to the right with addition of CO₂. <p>AO2.1: Apply knowledge of Le Chatelier’s principle to reaction to predict position of equilibrium</p> <ul style="list-style-type: none"> • Equilibrium moves to the right with increased pressure as less gaseous moles on RHS. • Equilibrium moves to the right with increased pressure as 4 moles of gas on LHS and 2 moles of gas on RHS. • Equilibrium moves to the left with increased temperature favouring the backward endothermic reaction. • Equilibrium moves to the left with increased temperature as forward reaction is exothermic. • Equilibrium moves to the right with addition of CO₂ to reduce that change in concentration.

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Question	Answer	Marks	AO element	Guidance
	<p>Level 1(1–2 marks)</p> <p>Applies understanding of Le Chatelier’s principle to predict how the position of equilibrium changes with each condition</p> <p>OR</p> <p>Applies understanding of Le Chatelier’s principle to predict how <u>and</u> explain why the position of equilibrium changes with one condition</p> <p><i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p>0 marks</p> <p><i>No response or no response worthy of credit.</i></p>			

Question		Answer	Marks	AO element	Guidance
15	(a)	filter off excess magnesium before heating and evaporate to dryness (1) OR filter off excess magnesium before heating, allow to crystallise, filter and dry (1)	1	3.3b	
	(b)	(in barium) outer shell electrons are further from the nucleus/(in barium) nuclear attraction for outer shell electrons is less (1) so are lost more easily (1)	2	2.2 1.2	ALLOW ora for magnesium IGNORE electrons are lost faster
	(c)	$2.8 \div 84.3 = 0.033$ moles used so 0.033 moles MgCl_2 made (1) $0.033 \times 95.3 = 3.2$ (1) but mass is 3.2 (g) (2)	2	2.1	ALLOW idea that 84.3g of magnesium carbonate makes 95.3g of magnesium chloride for one mark unit not needed ALLOW 3.17 (g) for 1 mark if no other mark awarded DO NOT ALLOW 3.16 (g) Award 2 marks if answer on answer line = 3.2 (g)

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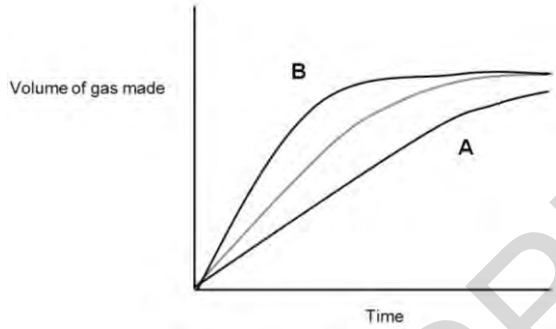
Question		Answer	Marks	AO element	Guidance
16	(a)	carbon is more reactive than copper / ora (1)	1	2.2	
	(b)	$\text{Cu}^{2+} + 2\text{e}^{-} \rightarrow \text{Cu}$ formulae (1) balancing (1)	2	2.2	balancing mark is conditional on correct formulae ALLOW any correct multiple e.g. $2\text{Cu}^{2+} + 4\text{e}^{-} \rightarrow 2\text{Cu}$ ALLOW = or \rightleftharpoons for arrow DO NOT ALLOW 'and' or & for + ALLOW one mark for correct balanced equation with incorrect use of upper and lower case formulae e.g. $\text{Cu}^{2+} + 2\text{e}^{-} \rightarrow \text{CU}$
	(c)	(use) bioleaching (1) because bioleaching uses energy of Cu-S bond (1) phytomining releases CO_2 from burning of plants (1)	3	3.1a 3.2a x 2	

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Question		Answer	Marks	AO element	Guidance
17	(a)	idea that global temperatures have increased significantly (since about 1975) as anthropogenic factors have increased (1) idea that natural factors, and hence global temperatures, have not increased significantly (1)	2	3.1b	
	(b)	Any three from reduce energy consumption/reduce burning of fossil fuels (1) use renewable energy sources (1) switch to hybrid vehicles/hydrogen fuel cell vehicles (1) buy energy efficient appliances (1) switch to energy efficient lighting (1) drive less / walk / use bus (1) choose foods with less air miles (1)	3	1.1	

Question		Answer	Marks	AO element	Guidance
18	(a)	surface area = $(5 \times 5) \times 6 = 150$ (1) volume = $5 \times 5 \times 5 = 125$ (1) surface area: volume = $150: 125 = 1.2$ (1)	3	1.2	
	(b)	idea of increased collision frequency / more collisions per second (1)	1	1.2	IGNORE faster collisions / quicker collisions
	(c)	$6/1.2 = \text{rate of reaction (1cm)} / 1.6$ (1) $6/1.2 \times 1.6 = 8$ (cm ³ per second) (1)	2	2.1	
	(d) (i) & (ii)		2	1.2	Curve A should be drawn completely under the original, it should not quite reach the plateau but approach near to it at the end of the time axis Curve B should be drawn completely above the original, rising more steeply to start with and reaching the plateau before that of the original