



...day June 20XX – Morning/Afternoon

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

J248/03 Paper 3 (Higher Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 45 minutes

MAXIMUM MARK 90

DRAFT

This document consists of 16 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 Chemistry 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.

SECTION A

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

SECTION B

Question		Answer						Marks	AO element	Guidance	
16	(a)	Particle	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons	Electronic structure	4	2 x 2.1 2 x 3.1b	one mark scored for each correct line
	A	11	23	11	12	11	2.8.1				
	B	9	19	9	10	9	2.7				
	C	17	37	17	20	17	2.8.7				
	D	13	27	13	14	10	2.8				
	(b)	particle A – one electron in outer shell or energy level (1) particle D – has more protons than electrons (1)						2	2.1		
	(c)	group 7 (1) as 7 electrons in outer shell (1) period 3 (1) as 3 shells occupied (1)						4	2.1		
	(d)		Charge	Mass in atomic mass units				2	1.1	one mark scored for each correct column (2)	
		proton	positive /+	1							
		neutron	neutral / no charge	1							
		electron	negative	0.0005							
	(e)	idea of the nuclear atom (1)						1	1.2	ALLOW 1/1760 or 1/1836 or 1/2000	

Question		Answer	Marks	AO element	Guidance
17	(a)	graphite – has a layered structure (1) electrons can move / electrons between layers or delocalised (1) diamond – no free electrons or ions (1)	3	1.1	
	(b)	it can bond to itself (and make chains and rings) (1)	1	1.1	
	(c)	liquid (1) liquid above -114°C and does not boil until 78°C (1)	2	2.2	

SPECIMEN

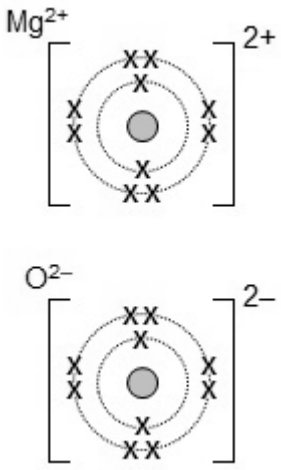
Question		Answer	Marks	AO element	Guidance
18	(a)	<p>any four from: reaction is exothermic (1) as reactants have more energy than products (1) A is the activation energy (1) activation energy is the amount of energy supplied to get the reaction started (1) B is the energy change for the reaction (1) the value of B is negative (1)</p>	4	2 x 1.1 2 x 3.2b	
	(b)	(i)	2	1.1	both required
		(ii)	3	2.1	Correct answer scores 3 if no working is shown
	(c)	<p>energy transferred = $4.2 \times 200 \times (100 - 15)$ (1) = 71400 J (1)</p> <p>Mass of fuel needed to boil water (g) = energy needed to boil water (J) / energy per gram</p> <p>50 kJ = 50000 J (1)</p> <p>= $71400 / 50000$ (1)</p> <p>= 1.43 g (1)</p>	5	2.2	ALLOW 1.428 g instead of 1.43 (1)

Question			Answer	Marks	AO element	Guidance
19	(a)	(i)	no of moles of X = 0.2 (1) no of moles of oxygen = 0.1 (1) no of moles of X oxide = 0.2 (1)	3	3.1a	
		(ii)	$2X + O_2 \rightarrow 2XO$ (2) formulae (1) balancing (1)	2	2.2 3.1a	balancing is conditional on correct formulae ALLOW ecf from calculations of numbers of moles
	(b)		16.9 (g) scores (3) but if answer incorrect then RFM of NaOH = 40.0 and RFM of Na ₂ SO ₄ = 142.1 (1) idea that 2 moles of NaOH react to produce 1 mole of Na ₂ SO ₄ (1)	3	1.1 2 x 2.1	ALLOW 16.89 (2) ALLOW ecf from incorrect RFMs

Question		Answer	Marks	AO element	Guidance
20	(a)*	<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>Suggestion would enable pure samples of all three components to be obtained in the correct sequence with clear explanations of why the methods work. <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>Suggestion would enable pure samples of two of the components of the mixture to be obtained with an attempt at an explanation. <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks)</p> <p>Suggestion would enable a pure sample of one of the components to be obtained. <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 <i>No response or no response worthy of credit.</i></p>	6	2 x 1.2 2 x 2.2 2 x 3.3a	<p>AO1.2: Knowledge of process of fractional distillation</p> <ul style="list-style-type: none"> • Use fractional distillation to separate substance A from substance B. • Substance B will come off first as it has lowest boiling point. • Stronger forces between molecules in substance A / ora. <p>AO2.2: Apply knowledge of process of fractional distillation</p> <ul style="list-style-type: none"> • Fractional distillation works as substances A and B have different boiling points. • As substance C is insoluble in water. • Because there are differing forces of attraction between the molecules. <p>AO3.3a: Analyse information in the table to develop experimental procedure</p> <ul style="list-style-type: none"> • Heat mixture to boil off substances A and B leaving pure C. • Filter mixture to remove substance C. • Substance C can be washed with water and dried.

Question		Answer	Marks	AO element	Guidance
	(b)	measure its melting point or boiling point (1) if pure melting point or boiling point will be sharp / if impure melting point is lowered / if impure boiling point is elevated (1)	2	1.2 2.1	
21	(a)	$\text{ZnO} + 2\text{HNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{H}_2\text{O}$ correct formulae (1) balancing (1)	2	2.2	balancing mark is conditional on correct formulae ALLOW any correct multiple e.g. $2\text{ZnO} + 4\text{HNO}_3 \rightarrow 2\text{Zn}(\text{NO}_3)_2 + 2\text{H}_2\text{O}$ (2) ALLOW = or \rightleftharpoons or \rightleftharpoons for arrow DO NOT ALLOW 'and' or & for + ALLOW one mark for correct balanced equation with minor errors in case, subscript and superscript e.g. $\text{ZnO} + 2\text{HNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{H}_2$
	(b)	Any four from: idea that an excess of zinc oxide must be added (1) so reaction is complete / all nitric acid is reacted (1) filter off excess zinc oxide (1) evaporate off some of the water (1) allow to crystallise (1)	4	3.3b	
	(c)	reaction between nitric acid (HNO_3), an acid and zinc oxide (ZnO), a base (1) to make zinc nitrate ($\text{Zn}(\text{NO}_3)_2$), a salt and water (only) (1)	2	1.1	Only award marks if reactions and products are named in the answer ALLOW the use of just chemical formulae

Question		Answer	Marks	AO element	Guidance
22	(a)	The oxidising agent is oxygen and the reducing agent is magnesium (1)	1	1.2	
	(b)	24.3 / 6.022 x 10 ²³ (1) 4.04 x 10 ⁻²³ (1)	2	2.1	1 mark for 4.03520425 x 10 ⁻²³ or correctly rounded up but not to 3 sig. fig.
23	(a)	electrolysis needs to run for longer than 30 seconds (1) otherwise insufficient change at electrodes (1) after electrolysis anode and cathode need to be washed (1) and then dried (1) before measuring the mass	4	2 x 3.2a 2 x 3.3b	
	(b)	copper is deposited at the cathode (1) copper anode dissolves / copper ions produced at anode (1)	2	1.2	ALLOW higher level answers in terms of half equations e.g. at cathode $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$ (1) e.g. at anode $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$ / $\text{Cu} - 2\text{e}^- \rightarrow \text{Cu}^{2+}$ (1)

Question		Answer	Marks	AO element	Guidance
24	(a)	strong electrostatic force of attraction between ions (1) must be broken to melt sodium chloride (1)	2	1.1	
	(b)	weak intermolecular forces / weak forces between molecules (1) easily broken (1)	2	1.1	
	(c)	 <p>electronic structure of magnesium ion (1) electronic structure of oxide ion (1) charges correct on both ions (1)</p>	3	2.1	
25		$\text{Ca} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2$	2	1.2	1 mark for both correct reactants 1 mark for both correct products