OCR
Oxford Cambridge and RSA

…day June 20XX – Morning/Afternoon

GCSE (9–1) Chemistry A (Gateway Science)
J248/02 Paper 2 (Foundation Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 45 minutes

MAXIMUM MARK 90

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:

   a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks

   b. 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.

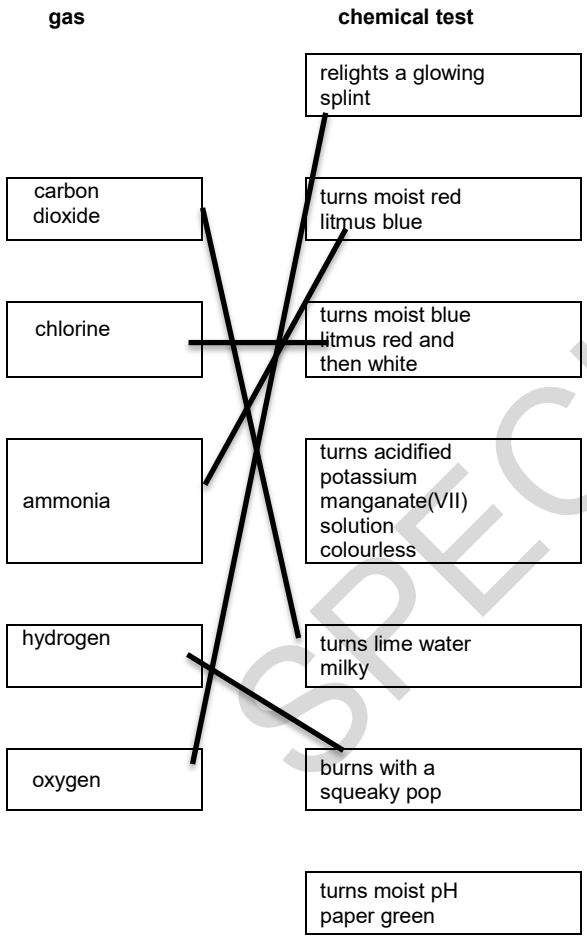
The breakdown of Assessment Objectives for GCSE (9–1) in Chemistry A:

	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	A	1	1.1	
2	C	1	1.1	
3	B	1	2.1	
4	C	1	2.2	
5	A	1	2.2	
6	B	1	1.1	
7	A	1	1.2	
8	D	1	1.2	
9	B	1	2.2	
10	D	1	1.1	
11	C	1	2.1	
12	D	1	2.1	
13	C	1	1.2	
14	B	1	2.1	
15	C	1	2.1	

SECTION B

Question			Answer	Marks	AO element	Guidance
16	(a)			5	1.2	**Each link** = 1 mark

Question			Answer	Marks	AO element	Guidance
	(b)		Use a flame test wire (1) Moisten wire and dip into sample (1) Introduce sample into blue flame of Bunsen burner (1)	**3**	**1.2**	**ALLOW** use a wooden splint **ALLOW** spray bottle **ALLOW** moisten wooden splint and dip into sample **ALLOW** have ions dissolved in the spray bottle
	(c)		Hydrogen, chloride and sulfate are present (1) Hydrogen ions because pH is 3 (1) Sulfate because white precipitate with barium chloride (1) Chloride because white precipitate with silver nitrate (1)	**4**	**3.1a** **3.2b** **3.2b** **3.2b**	**ALLOW** H^+, Cl^- and SO_4^{2-} **ALLOW** (1) for the three correct ions **ALLOW** (1) for each correct explanation (must be linked to correct ion)

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>17</td><td>(a)</td><td></td><td>Use a pipette filler (1)

Potassium hydroxide is caustic / potassium hydroxide can burn skin (1)</td><td>2</td><td>1.2</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>When one drop makes the litmus change colour (1)

Correct colour change blue to red (1)</td><td>2</td><td>1.2</td><td>ALLOW use a pH probe = 1 mark

ALLOW gives a pH value of 7 when neutral = 1 mark</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td><table><tr><th>Titration number</th><th>1</th><th>2</th><th>3</th></tr><tr><td>final reading in cm^3</td><td>17.8</td><td>37.5</td><td>32.1</td></tr><tr><td>initial reading in cm^3</td><td>0.0</td><td>20.4</td><td>15.0</td></tr><tr><td>titre (volume of acid added) in cm^3</td><td>17.8</td><td>17.1</td><td>17.1</td></tr></table></td><td>2</td><td>2.2</td><td>Correct burette readings = 1 mark

Correct titre = 1 mark

DO NOT ALLOW 0</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Yes

Titration 1 is a rough estimate / titration 1 is an outlier / titrations 2 and 3 are identical (1)</td><td>1</td><td>3.2a</td><td></td></tr>
<tr><td></td><td>(d)</td><td></td><td>Atom economy = (M_r of desired products / sum of M_r of all products) x 100

= (101 ÷ 119) x 100 (1)

= 84.9 (%) (1)</td><td>2</td><td>2.2</td><td></td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
18	(a)		Tall column with condensers coming off at different heights (1) Column heated at the bottom so hot at the bottom and cool at the top (1) Substances with high boiling points condense at the bottom (1) Substances with low boiling points condense at the top (1)	4	1.2	
	(b)		$C_{15}H_{32} \rightarrow 2C_6H_{12} + C_3H_8$ (1)	1	2.1	**ALLOW** any correct multiple
	(c)		Can be made into fibres / waterproof / insoluble in water / flexible / soft (1)	1	2.1	

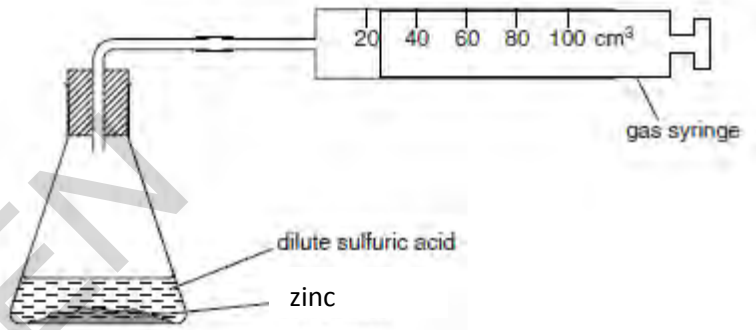
Question			Answer	Marks	AO element	Guidance
19	(a)		Rate of forward reaction equals the rate of the backward reaction (1) Concentration of reactants and products do not change (1)	2	1.1	**DO NOT ALLOW** concentration of reactant and products are the same **ALLOW** concentration of reactants and products stay the same
	(b)		Percentage yield = (actual yield ÷ predicted yield) × 100 or (2.2 ÷ 4.0) × 100 (1) 55 (1)	2	2.1	**ALLOW** full marks for answer with no working out

Question	Answer	Marks	AO element	Guidance
(c)*	*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)** **Describes the effect of changing the temperature and pressure on the percentage yield from the table and includes clear explanations on the effect of increasing the pressure on the rate of reaction** *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)** **Describes the effect of changing the temperature and pressure on the percentage yield from the table and either describes the effect of increasing the pressure on the rate of reaction or explains the effect increasing the pressure on the rate of reaction** *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)** **Describes the effect of changing the temperature and pressure on the percentage yield from the table or describes the effect of increasing the pressure on the rate of reaction** *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.* **0 marks** *No response or no response worthy of credit.*	**6**	**4 x 1.1** **2 x 3.1a**	**AO1.1: Knowledge of pressure on rate of reaction** • Increasing the pressure increases the rate of reaction. • Increasing the pressure means particles are closer together. • Increasing the pressure means more crowded particles / more particles in the same space. • Increasing the pressure means more collisions between particles. • More collisions the quicker the reaction. • More collisions more percentage yield. **AO3.1a: Analyse information in the table to interpret percentage yield** • As temperature increases the percentage yield decreases. • As pressure increases the percentage yield increases. • The highest yield is when the temperature is low and the pressure is high.

Question			Answer	Marks	AO element	Guidance
20	**(a)**		$S + O_2 \rightarrow SO_2$ (1) $2SO_2 + O_2 \leftrightharpoons$ (1) $2SO_3$ (1) $SO_3 + H_2O \rightarrow H_2SO_4$ (1)	**4**	**1.2**	One mark for each correct balanced equation One mark for reversible reaction sign
	(b)		Neutralisation (1)	**1**	**1.1**	
	(c)		17 (g) of ammonia makes 66 (g) of ammonium sulfate So 51 g makes 198 g of ammonium sulfate (1)	**1**	**2.1**	
	(d)		Slow evaporation of solution / heat solution over a steam bath (1)	**1**	**1.2**	

Question			Answer	Marks	AO element	Guidance
21	(a)		(150 000 ÷ 750 000) × 100 (1) 20 (1)	2	2.1	
	(b)		600 000:900 000 (1) 2:3 (1)	2	3.1a	
	(c)		**Any two from:** Number of vehicles has not increased (1) More use of public transport / cycling / walking / car sharing (1) New cars more efficient with less carbon dioxide being produced (1) Tax lower on low emission vehicles therefore more smaller engine vehicles being used (1)	2	3.1a	

Question			Answer	Marks	AO element	Guidance
22	(a)		….**4**…Fe(s) + $6H_2O(l)$ +…**3**… $O_2(g)$	**2**	**2.1**	
	(b)	**(i)**	((2 x 55.8) / 213.6) x 100 (1) = 52.25% (1)	**2**	**2.1**	
		(ii)	52.25% of rust is iron For a 1.0 kg Fe bar, total mass of rust produced = (1.0 (kg) / 52.25%) x 100% (1) = 1.914 kg (1) Therefore increase is 914 g which is greater than 800 g so student is incorrect (1)	**3** **2.1** **2.1** **3.2a**		

Question			Answer	Marks	AO element	Guidance
23	(a)		Suitable container for the reactants e.g. flask, boiling tube or test tube (1) Use of a gas syringe / upturned burette with water in trough of water / upturned measuring cylinder with water in trough of water (1) The method actually works (1)	3	3.3b	
	(b)	(i)	To allow a comparison between with and without the added substance (1)	1	2.2	
		(ii)	Idea that the rate of reaction will change if concentration is changed (1)	1	2.2	It is a fair test is not sufficient **ALLOW** if concentration is increased the rate of reaction is increased **ALLOW** to ensure there are the same number of acid particles present / same number of acid particles per unit volume
		(iii)	Copper Because the reaction is faster (1) There is no change in appearance (1)	2	3.2b	**No** marks for copper on its own If substance other than copper given then 0 marks for the question
		(iv)	Measure mass of catalyst before and after (1)	1	3.3b	
		(v)	(Relative rate) between above 1 and below 10 because of smaller surface area / less exposed particles / less collisions (2)	2	2.2	**No** marks for the prediction on its own **No** marks for whole question if prediction incorrect

Question			Answer	Marks	AO element	Guidance
24	(a)	(i)	Molecular formula: At_2 (1) Atomic radius: 148 – 168 (1)	2	2.1	**DO NOT ALLOW** AT_2 / At2 **ALLOW** any range of numbers provided it is completely within the range given for the answer
		(ii)	Makes iodine and sodium bromide (1)	1	2.1	
		(iii)	Bromine is more reactive than iodine (1)	1	2.1	**ALLOW** ORA
	(b)	(i)	Same number of electrons in outer shell / all have 7 electrons in outer shell (1)	1	1.1	**ALLOW** outer electrons or valence electrons rather than electrons in the outer shell **ALLOW** valence shell rather than outer shell **DO NOT ALLOW** the wrong number of electrons in the outer shell
		(ii)	$2Na + Br_2 \rightarrow 2NaBr$ Correct formulae of reactants and products (1) Balancing – depend on correct formulae (1)	2	2.1 2.2	**ALLOW** any correct multiple of the equation including fractions **ALLOW** = or ⇌ instead of → **DO NOT ALLOW** and or & instead of + **ALLOW** one mark for correct balanced equation with minor errors of case and subscript e.g. 2NA + Br2 → 2NaBr
		(iii)	KAt (1)	1	2.1	