OCR
Oxford Cambridge and RSA

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…day June 20XX – Morning/Afternoon

GCSE (9–1) Chemistry B (Twenty First Century Science)

J258/03 Breadth in chemistry (Higher Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 45 minutes

MAXIMUM MARK 90

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 component. 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 appreciate

10. **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

11. **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 B:

	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.

Question			Answer	Marks	AO element	Guidance
1	(a)		water vapour condensed/turned into a liquid/became oceans ✓ because the Earth cooled/surface temperature fell ✓	2	2.1	
	(b)		carbon dioxide percentage decreases ✓ plants use carbon dioxide for photosynthesis/to make glucose ✓	2	2.1 1.1	
2	(a)		zinc is recovered at the end of the process/ a way of making zinc from waste ✓	1	3.2a	
	(b)		zinc ions are toxic if they enter drinking water/water supplies ✓ risk is reduced if zinc ions are stored in plants ✓	2	3.2a	
	(c)		**any two from:** larger plants therefore take up more zinc ions ✓ more plants grow per m^2 therefore absorb more zinc ions per m^2 ✓ plants grow more quickly therefore more zinc ions can be removed in a shorter time ✓	2	3.1b	
	(d)		find out amount/ concentration of zinc ions in cress ✓ find out tolerance of sheep for zinc ions / whether zinc ions get into wool/meat ✓	2	3.3a	
	(e)		**A** contains zinc (ions) ✓ **B** contains copper (ions) ✓ **C** does not contain any (identifyable) metal ions ✓	3	3.2b	
3	(a)		(blue) Litmus paper ✓ goes red then white / red then bleaches ✓	2	1.1	
	(b)		water evaporates (from sea water) by the heat of the sun ✓ water condenses (on the sides of the dome) and collects in the trough ✓	2	1.1	

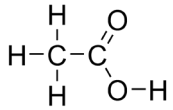
Question			Answer	Marks	AO element	Guidance
4	(a)		solid ✓	1	2.1	
	(b)		covalent ✓ simple structure / single molecules ✓	2	1.1 2.1	
	(c)		alkanes ✓	1	1.1	
5	(a)		hydrogen needs more energy to produce/ ora ✓ hydrogen only produces water (which is not a pollutant) / does not produce carbon dioxide / methane produces carbon dioxide ✓ methane gives out more energy (per mole) ✓	3	3.1b 2.1 3.1b	
	(b)	(i)	shows products lower than reactants and energy change greater than for hydrogen ✓	1	2.2	
		(ii)	-890 ≈ 3 -286 therefore 3 x as much energy produced so energy change on diagram 3 x as large ✓	1	3.1b	**DO NOT ALLOW** just 'more energy produced' without calculation

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>6</td><td>(a)</td><td></td><td>left to right:
Bohr, Dalton, Rutherford, Thomson ✓✓</td><td>2</td><td>2.1</td><td>3 or 4 correct = 2 marks
2 correct = 1 marks
1 correct = 0 mark</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Thomson ✓</td><td>1</td><td>1.1</td><td></td></tr>
<tr><td>7</td><td>(a)</td><td></td><td>$2Na + 2H_2O \rightarrow 2NaOH + H_2$ ✓✓</td><td>2</td><td>1.1</td><td>One mark for correct symbols
One mark for balancing</td></tr>
<tr><td></td><td>(b)</td><td></td><td><table><tr><td></td><td>Chlorine</td><td>Bromine</td><td>Iodine</td></tr><tr><td>Formula</td><td>Cl_2</td><td>Br_2</td><td>I_2✓</td></tr><tr><td>State</td><td>gas</td><td>Liquid</td><td>Solid✓</td></tr><tr><td>Colour</td><td>Green/yellow</td><td>red/brown/ orange</td><td>Purple/grey✓</td></tr></table></td><td>3</td><td>1.1</td><td>(1) for each correct row</td></tr>
<tr><td></td><td>(c)</td><td></td><td>strontium chloride ✓

$SrCl_2$ ✓</td><td>2</td><td>2.2</td><td>

DO NOT ALLOW $SrCl$</td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>8</td><td>(a)</td><td></td><td>acids are colourless / cannot be seen ✓

locating agent gives spots colour / dyes the spots ✓</td><td>2</td><td>1.1</td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>H^+ ion is made ✓</td><td>1</td><td>1.1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td> 
COOH drawn fully correctly ✓

CH_3 drawn correctly ✓</td><td>2</td><td>1.2</td><td>Allow -OH without O-H bond shown

CH_3 must be fully displayed</td></tr>
<tr><td></td><td>(c)</td><td></td><td>(no because….)

empirical formula of methanoic acid is CH_2O_2 ✓

empirical formula of ethanoic acid is CH_2O ✓

ratio of oxygen atoms is different / more oxygen (by proportion) in methanoic acid ✓</td><td>3</td><td>2.2</td><td></td></tr>
<tr><td></td><td>(d)</td><td>(i)</td><td><table><tr><th></th><th>true (✓)</th><th>false (✓)</th></tr><tr><td>Both types of acids form water in neutralisation reactions.</td><td>✓</td><td></td></tr><tr><td>Weak acids are always less concentrated than strong acids.</td><td></td><td>✓</td></tr><tr><td>The same concentration of a weak and strong acid will have a different pH.</td><td>✓</td><td></td></tr><tr><td>Weak acids have a higher degree of ionisation than strong acids.</td><td></td><td>✓</td></tr></table></td><td>3</td><td>1.1</td><td>All correct = (3)
2 or 3 correct = (2)
1 correct = (1)</td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
		(ii)	**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **If answer = 3 award 2 marks** $HCl \rightarrow H^+ + Cl^-$ $[H^+] = 0.001$ moles. $= 1 \times 10^{-3}$ moles ✓ pH = 3 ✓	**2**	**2.1**	

Question			Answer	Marks	AO element	Guidance
9	(a)		**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **f answer = 11 (g) award 2 marks** percentage gold = 45% / reads 45% from graph other elements = 55 % ✓ $\frac{55}{100} \times 20 = 11$(g) ✓	**2**	**2.2**	
	(b)		**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **f answer = 18 (carat) award 3 marks** mass = number of moles x RAM or gives correct numbers = 197 x 0.19 ✓ = 37.43 ✓ % of gold = $\frac{37.43}{50} \times 100 = 74.86$ % = 18 carat ✓	**3**	**2.2**	
	(c)		**any two from:** group 1 metal only form ion with +1 charge whereas transition metals form ions with variable charges ✓ group 1 metals produce white compounds whereas transition metals produce coloured compounds ✓ transition metals act as catalysts whereas group 1 metals do not ✓	**2**	**1.1**	**IGNORE** comments on density/melting point

Question			Answer	Marks	AO element	Guidance
10	(a)		similarities: • both covalently bonded ✓ • both giant structures ✓ one difference from: • silicon dioxide contains two elements but diamond only contains one (carbon) ✓ • all carbon atoms form four bonds in diamond but only silicon atoms form four bonds in silicon dioxide✓	3	1.1	**IGNORE** melting points/boiling points/electrical conductivity **ALLOW** both are giant covalent lattices/structures for 2 marks
	(b)		**property** / **explanation** Conducts electricity. — Charged particles in structure can move. High melting point. — Strong giant structure. Flaky and soft. — Structure contains layers	2	1.1	All three correct = (2) One or two correct = (1)

Question			Answer	Marks	AO element	Guidance
11			(no because) energy of disposal is very small / only about 10 MJ / does not make a big difference ✓ total energy is about 500 MJ / energy cost of manufacture is about 450 MJ ✓	2	3.2b	
12	(a)		carbon dioxide ✓ turns lime water milky / cloudy ✓	2	1.1	
	(b)	(i)	**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **If answer = 0.0202 award 3 marks** calculates formula mass of $Ca(OH)_2$ = 74.1 (g) ✓ 1.5 / 74.1 = 0.0202(42…) ✓ gives answer to 3 sig figs ✓	3	2.2	
	(b)	(ii)	**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **If answer = 0.09696 award 3 marks** 200 cm^3 = 0.2 dm^3 ✓ 0.0202 x 0.2 = 0.00404 ✓ volume of SO_2 (1:1 ratio) = 0.00404 x 24 = 0.09696 (dm^3) ✓	3	2.2	**ALLOW** answers to significant figures or more correctly rounded **ALLOW** 0.0971(65…) calculator value carried forward from 12(b)(i) **ECF**

Question			Answer	Marks	AO element	Guidance
13	(a)		increasing the pressure increases the yield ✓ increasing the temperature decreases the yield ✓ using a catalyst has no effect on yield ✓	3	1.1	
	(b)		larger scale/ larger vessels ✓ reactant / products continuously added/ removed/ continuous process ✓ conditions used to compromise between rate and yield/ high temperature to increase rate but reduces yield ✓	3	1.1	
	(c)		phosphorous ✓ potassium ✓	2	1.1	
14	(a)	(i)	**A** ✓	1	1.2	
		(ii)	**D** ✓	1	1.2	
		(iii)	**B** ✓	1	1.1	
	(b)		higher surface area to volume ratio ✓ higher rate of collisions per unit time ✓	2	1.1	

Question			Answer	Marks	AO element	Guidance
15	(a)		**FIRST CHECK ANSWER ON ANSWER LINE if answer = 1.2625 g award 2 marks** mass of vinegar in 25 cm^3 = 25 × 1.01 g = 25.25 ✓ mass of ethanoic acid = $\frac{5 \times 25.25}{100}$ = 1.2625 (g) ✓	2	2.2	**ALLOW** answer of 1.26 to 1.3 (g)
	(b)		**FIRST CHECK ANSWER ON ANSWER LINE if answer = 21 cm^3 award 3 marks** number of moles of ethanoic acid in 25.0 cm^3 = $\frac{1.2625}{60}$ = 0.021 ✓ ratio 1:1 0.021 moles of Na0H required 1 (conc of Na0H) = $\frac{0.021}{\text{volume}}$ ✓ volume of Na0H = 0.021 dm^3 = 21 (cm^3) ✓	3	2.2	**ALLOW ECF** from 15(a)

Summary of updates

Date	Version	Change
May 2018	2	We've reviewed the look and feel of our papers through text, tone, language, images and formatting. For more information please see our assessment principles in our "Exploring our question papers" brochures on our website