



Oxford Cambridge and RSA

...day June 20XX – Morning/Afternoon

Cambridge OCR Level 3 Advanced Subsidiary GCE in Chemistry B (Salters)

H033/01 Foundations of chemistry

SAMPLE MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 70

This document consists of 12 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. 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.

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Mark Scheme

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SECTION A

Question		Answer	Marks	Guidance
1		B	1	
2		C	1	
3		C	1	
4		C	1	
5		D	1	
6		C	1	
7		C	1	
8		A	1	
9		B	1	
10	(a)	D	1	
10	(b)	C	1	
11	(a)	B	1	
11	(b)	B	1	
12		A	1	
13		B	1	
14		A	1	
15		A	1	
16		A	1	
17		B	1	
18		A	1	
		Total	20	

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SECTION B

Question		Answer	Marks	Guidance
19	(a)	<u>Nichrome wire</u> dipped in sample and <u>concentrated HCl</u> then placed in blue/roaring Bunsen flame OR dissolve limestone in acid and put a splint soaked in the solution into blue/roaring Bunsen flame OR add the limestone to ethanol in a spray bottle and spray the solution into blue/roaring Bunsen flame ✓ (Brick) red ✓	2	
	(b)	$n(\text{HCl}) = (25 - 7) \times 0.1/1000 = 1.80 \times 10^{-3} \text{ (mol) } \checkmark$ $n(\text{CaCO}_3) = 1.80 \times 10^{-3}/2 = 9.0 \times 10^{-4} \text{ mol}$ mass $\text{CaCO}_3 = 9.0 \times 10^{-4} \times 100.1 = 9.0 \times 10^{-2} \text{ (g) } \checkmark$ $\% = 0.09 \times 100/0.13 = 69(.3) \% \checkmark$	3	The second mark is for the working or the answer ALLOW ECF on any value for first mark smaller than 0.13 ALLOW any sig figs greater than 1 69% scores 2 without reference to the working
	(c)	Use a lump of calcium carbonate weighing more than 1 g ✓ more (or more concentrated) acid (and alkali) ✓	2	
	(d)	Test on filtrate (or solution in any acid): Fe(III) gives brown ppt with NaOH ✓ Test on solution in HNO_3: AgNO_3 gives white ppt with chloride ✓	2	No marks for tests alone without indication of what is tested ALLOW 'purple/pink colour with phenol' for first mark only
		Total	9	

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Question			Answer	Marks	Guidance
20	(a)	(i)	$n \text{ H}_2\text{C}=\text{CHCl} \rightarrow \{-\text{CH}_2-\text{CHCl}-\}_n$ ✓	1	Formulae can be represented in any unambiguous way but 'end bonds' must be shown for the polymer. Brackets (any type) and 'n's essential
		(ii)	phosphoric acid ✓	1	ALLOW phosphoric(V) acid and H_3PO_4 IGNORE adjectives implying 'concentrated' (e.g. 'syrupy') but 'dilute' contradicts mark
	(b)	(i)	Choice and plotting of axes ✓ Accuracy of plotting points ✓ Best straight line drawn (ignoring anomalous point) ✓ Extrapolation and reading off temperature at 2 minutes (15.9 ± 0.1) ✓	4	Correct labels including units; scales chosen so that the plotted points occupy at least half the graph grid in both the x and y directions
		(ii)	Use of $m \times c \times \Delta T$ and selection of appropriate data from data sheet for c; assumption that mass of 1 cm^3 of HI = 1 g $20 \times 4.18 \times 15.9 = 1329 \text{ (J)}$ ✓ $n(\text{Ba}(\text{OH})_2) = 2/171.3 = 0.0117 \text{ (mol)}$ ✓ $1329/(1000 \times 0.0117 \times 2)$ $\Delta_{\text{neut}}H = 57 \text{ kJ mol}^{-1}$ ✓	3	ALLOW ECF between steps and answers to 2 or more sf
		(iii)	uncertainty = $[(2 \times 0.05)/20] \times 100\% = 0.5\%$	1	
			Total	10	

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Question			Answer	Marks	Guidance
21	(a)	(i)	$\text{O}_3 \rightarrow \text{O}_2 + \text{O} \checkmark$ (High freq radiation causes) skin cancer / damage to DNA / damage to skin / damage to eyes / damage to immune system / cell mutation / affects crops $\checkmark$	2	ALLOW $\text{O}_3 + h\nu \rightarrow \text{O}_2 + \text{O}$ (or $h\nu$ over arrow)
		(ii)	Recall and selection of appropriate constant from data sheet for $\Delta E = 6.63 \times 10^{-34} \times 1.25 \times 10^{15} \checkmark$ $= 8.29 \times 10^{-19} / 8.2875 \times 10^{-19} \text{ (J)} \checkmark$ multiply by N_A and divide by 1000 $= 8.29 \times 10^{-19} \times 6.02 \times 10^{23} / 1000 \checkmark$ bond enthalpy = 499/500 (kJ mol ⁻¹) $\checkmark$	4	ALLOW ECF
	(b)		$\text{RCl} \rightarrow \text{R} + \text{Cl} \text{ (initiation)} \checkmark$ $\text{O}_3 + \text{Cl} \rightarrow \text{ClO} + \text{O}_2 \checkmark$ $\text{ClO} + \text{O} \rightarrow \text{Cl} + \text{O}_2 \checkmark$ $\text{Cl} + \text{Cl} \rightarrow \text{Cl}_2$ OR $\text{R} + \text{R} \rightarrow \text{R}_2/\text{R-R}$ OR $2\text{ClO} \rightarrow \text{Cl}_2 + \text{O}_2 \text{ (termination)} \checkmark$	4	IGNORE dots on radicals ALLOW any chloroalkane formula Third equation depends on second being correct 'initiation' etc need not be labelled, unless the equations are given in a different order
	(c)		Explanation Fewer Cl atoms are formed in the troposphere than in the stratosphere. $\checkmark$ Radiation of high enough frequency is too low in the troposphere (AW) $\checkmark$ Ozone depletion can only occur in the troposphere when suitable catalysts are present. $\checkmark$ Impact Tropospheric ozone contributes to photochemical smog. $\checkmark$ Photochemical smog causes eye/nose irritation/ respiratory problems/ breathing difficulties/ damage to animals/ damage to plants/ damage to materials. $\checkmark$	5	

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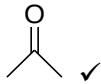
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Question		Answer	Marks	Guidance
	(d)	shape: bent OR V-shaped ✓ angle 120° (± 3) ✓ 3 groups of electrons / 3 areas of electron density ✓ (electrons) repel and get as far away from each other as possible ✓	4	no ECF between marking points Mark 4 th mpt separately must be in terms of the words allowed for the 3 rd mpt or 'electrons' or 'pairs of electrons' NOT 'bonds' ALLOW 'minimise repulsion' (in context of electrons or other appropriate wording) NOT 'maximum repulsion'
		Total	19	

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Question		Answer	Marks	Guidance
22	(a)	$\text{CH}_3\text{CHCH}_2 + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{CH}(\text{OH})\text{CH}_3 \checkmark$ Bonds broken $610 + (6 \times 410) + (460 \times 2) + (\text{C}-\text{C})$ AND Bonds made $460 + (7 \times 410) + 360 + 2(\text{C}-\text{C}) \checkmark$ $[3990 + (\text{C}-\text{C})] - [3690 + 2(\text{C}-\text{C})] = -50 \checkmark$ $300 - (\text{C}-\text{C}) = -50$ Average bond enthalpy of C–C bond = $350 \text{ (kJ mol}^{-1}\text{)} \checkmark$	4	ALLOW Structural formula for 1MP ALLOW ECF
	(b) (i)	Student is correct (about lower bpt) (AW) but reason is fewer/weaker instantaneous dipole–induced dipole bonds (in isopropyl alcohol) $\checkmark$ (due to) more branched/ fewer points of contact $\checkmark$	2	Assume isopropyl alcohol is being described unless otherwise stated. If so, allow ORA
	(ii)	$\text{CH}_3\text{CH}_2\text{OCH}_3 \checkmark$ <u>structural</u> isomers $\checkmark$	2	ALLOW any unambiguous formula ALLOW <u>functional group</u> isomers
	(c) (i)	 $\checkmark$ ketone $\checkmark$	2	IGNORE 'carbonyl'
	(ii)	$n(\text{isopropyl alcohol}) = 2.4/60 = 0.040 \text{ (mol)}$ AND maximum mass propanone = $0.040 \times 58 = 2.32 \text{ (g)}$ OR $n(\text{propanone}) = 1.2/58 = 0.0207 \text{ (mol)} \checkmark$ $(= 1.2 \times 100/2.32) \text{ OR } (=0.0207 \times 100/0.04)$ percentage yield = $52\% \checkmark$	2	ALLOW working OR answer for 1 st mpt ALLOW 2 sig figs or more ALLOW answers between 51.7 and 52.1 to allow for rounding Correct answer with no working scores 2 marks
		Total	12	

Summary of updates

Date	Version	Change
January 2019	2.0	Addition to the rubric clarifying the general rule that working should be shown for any calculation questions
March 2026	2.1	Withdrawal information of qualification including final first teach date and final assessment opportunity date.