



Oxford Cambridge and RSA

...day June 20XX – Morning/Afternoon

AS Level Chemistry B (Salters)

H033/01 Foundations of chemistry

PRACTICE MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 70

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**.

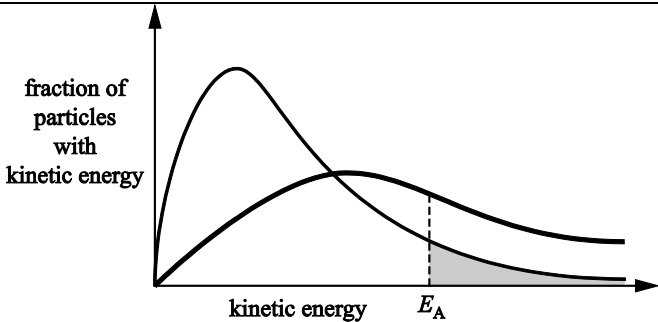
Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

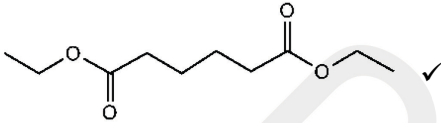
SECTION A



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

SECTION B

Question			Answer	Marks	Guidance
21	(a)	(i)	C_2HBrCF_3 AND bromotrifluoromethane ✓	1	for molecular formula allow atoms in any order
		(ii)	solid wedges coming out of plane of paper, dashed wedges going behind ✓ AW	1	DO NOT ALLOW 'shows 3D shape' or AW
		(iii)	skeletal ✓	1	
	(b)	(i)	<p>$\text{C}-\text{Cl}$ bond broken (in stratosphere) by UV radiation ✓</p> <p>Cl (free) <u>radicals</u> formed ✓</p> <p>these catalyse the breakdown of ozone ✓</p> <p>can produce 2 Cl radicals per molecule OR has more $\text{C}-\text{Cl}$ bonds than other molecules in the table ✓</p>	4	<p>IGNORE statements referring to $\text{C}-\text{Br}$ and $\text{C}-\text{I}$ bonds</p> <p>catalysis must be stated or implied, not just 'breakdown of ozone'</p>
		(ii)	<p>FIRST CHECK THE ANSWER ON THE ANSWER LINE</p> <p>frequency = 6.013×10^{14} (Hz) award 3 marks</p> <p>energy to break one bond = $\frac{240\,000}{6.02 \times 10^{23}}$</p> <p>(= 3.987×10^{-19} J) ✓</p> <p>use of $E = h\nu$ ($E/h = \nu$) ✓</p> <p>frequency = $\frac{3.987 \times 10^{-19}}{6.63 \times 10^{-34}} = 6.013 \times 10^{14}$ (Hz) ✓</p>	3	<p>Mark for evaluation stated or implied</p> <p>ECF on first marking point ALLOW 3 or more sig figs correctly rounded</p>

Question		Answer	Marks	Guidance
(c)	(i)	 <p>fraction of particles with kinetic energy</p> <p>kinetic energy E_A</p> <p>peak moved to right ✓</p> <p>curved flattened ✓</p>	2	
	(ii)	minimum energy needed in collision to cause reaction ✓	1	
	(iii)	idea that student is partially correct / collision frequency is not the only/most important factor ✓ molecules have greater (average) KE ✓ greater proportion of collisions (at higher temp.) have activation energy ✓	3	
(d)	(i)	Nucleophilic substitution (both needed) ✓	1	
	(ii)	$\text{Ag}^+(\text{aq}) + \text{Br}^-(\text{aq}) \rightarrow \text{AgBr}(\text{s})$ correct equation ✓ state symbols ✓	2	award ss mark for correct equation but wrong anion
		Total	19	

Question			Answer	Marks	Guidance
22	(a)		Trad. route $146/226 = 0.6460 = 65\%$ ✓ Green route $146/218 = 0.6697 = 67\%$ ✓	2	IGNORE number of dec. places
	(b)		Easier to recover/separate from product ✓	1	ALLOW easier to recycle/re-use catalyst
	(c)	(i)	adipic acid / solute has high solubility in hot solvent and low in cold ✓ dissolve in minimum amount of hot solvent ✓ filter hot solution, insoluble impurities removed ✓ leave to crystallise/cool, soluble impurities removed ✓ filter off crystals and dry (in oven) ✓	5	
		(ii)	Any one of: ✓ side reactions; loss of product(s) when transferring between beakers; reaction doesn't go to completion/equilibrium; some solid remains in solution after recrystallisation; loss of solid when washing final product	1	
		(iii)	 ethanol ✓	2	structure must be all correct
			Total	11	

Question			Answer	Marks	Guidance																		
23	(a)		two light nuclei join to form a heavier nucleus ✓ overcome repulsion between positive nuclei ✓	2	DO NOT ALLOW repeat of fuse/fusion (in stem)																		
	(b)	(i)	<table><tr><th>Isotope</th><th>Number of protons</th><th>Number of neutrons</th></tr><tr><td>^{15}O</td><td>8</td><td>7</td></tr><tr><td>^{15}N</td><td>7</td><td>8</td></tr></table> <p style="text-align: center;">OR</p> <table><tr><th>Isotope</th><th>Number of protons</th><th>Number of neutrons</th></tr><tr><td>^{13}C</td><td>6</td><td>7</td></tr><tr><td>^{13}N</td><td>7</td><td>6</td></tr></table> <p>✓</p>	Isotope	Number of protons	Number of neutrons	^{15}O	8	7	^{15}N	7	8	Isotope	Number of protons	Number of neutrons	^{13}C	6	7	^{13}N	7	6	1	all correct
Isotope	Number of protons	Number of neutrons																					
^{15}O	8	7																					
^{15}N	7	8																					
Isotope	Number of protons	Number of neutrons																					
^{13}C	6	7																					
^{13}N	7	6																					
		(ii)	P = ^8_4Be ✓ Q = ^4_2He ✓	2																			
	(c)	(i)	<div> s-Orbital</div> <div> p-Orbital ✓</div>	1	i.e. circle and 'dumbbell'; award mark for correct shapes, IGNORE shading																		

Question			Answer	Marks	Guidance
		(ii)	<p>✓ ($1s^2 2s^2 2p^3$) ✓ arrows up/down</p>	2	<p>must be singly occupied in p orbitals</p> <p>ALLOW single sided arrowheads ALLOW 2p arrows all up or all down</p>
	(d)		$\frac{(99.63 \times 14) + (0.368 \times 15)}{100} = 14.003 \checkmark$ <p>to 3 decimal places ✓</p>	2	
			Total	10	

Question			Answer	Marks	Guidance
24	(a)	(i)	$\text{IO}_3^- + 5\text{I}^- + 6\text{H}^+ \rightarrow 3\text{I}_2 + 3\text{H}_2\text{O}$ Oxidn state: +5 -1 0 ✓✓	2	one mark for +5 one mark for both -1 and 0
		(ii)	FIRST CHECK ANSWER ON THE ANSWER LINE amount of IO_3^- is 2.57×10^{-6} or 2.567×10^{-6} mol award 2 marks $n(\text{Na}_2\text{S}_2\text{O}_3) = 15.40/1000 \times 0.00100 = 1.540 \times 10^{-5}$ (mol) ✓ $n(\text{IO}_3^-) = n(\text{Na}_2\text{S}_2\text{O}_3)/6 = 2.56(7) \times 10^{-6}$ (mol) ✓	2	ALLOW ECF from first mark
		(iii)	FIRST CHECK ANSWER ON THE ANSWER LINE mass of KIO_3 is 5.49 mg award 2 marks $n(\text{KIO}_3)$ in $250 \text{ cm}^3 = 2.56(7) \times 10^{-5}$ (mol) mass = $2.56(7) \times 10^{-5} \times 214 = 5.49 \times 10^{-3} \text{ g}$ ✓ = 5.49 mg (to 3 sig figs) ✓	2	ALLOW ECF from part (ii) ALLOW 5.50 (using rounded value 2.57×10^{-5})
	(b)		$n(\text{I}_2) = 0.20/253.8 = 7.880 \times 10^{-4}$ (mol) volume occupied by I_2 at RTP = $n(\text{I}_2) \times 24.0$ evaluated (= $1.891 \times 10^{-2} \text{ dm}^3$) ✓ % by volume = volume at RTP/300000 $\times 100\%$ evaluated (= $6.304 \times 10^{-6}\%$) ppm = % by volume $\times 10^4 = 0.063 \text{ ppm}$ ✓ which is below the safe working limit ✓	3	ALLOW ECF from first mark
	(c)		$\text{Cl}_2 + 2\text{I}^- \rightarrow \text{I}_2 + 2\text{Cl}^-$ ✓	1	ignore state symbols
			Total	10	