

Markscheme

May 2026

Chemistry

Higher level

Paper 1B

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Subject Details: Chemistry Higher Level Paper 1B Markscheme

Candidates are required to answer **ALL** questions. Maximum total = **[35 marks]**.

1. Each row in the “Question” column relates to the smallest subpart of the question.
2. The maximum mark for each question subpart is indicated in the “Total” column.
3. Each marking point in the “Answers” column is shown by means of a tick (✓) at the end of the marking point.
4. A question subpart may have more marking points than the total allows. This will be indicated by “**max**” written after the mark in the “Total” column. The related rubric, if necessary, will be outlined in the “Notes” column.
5. An alternative word is indicated in the “Answers” column by a slash (/). Either word can be accepted.
6. An alternative answer is indicated in the “Answers” column by “**OR**”. Either answer can be accepted.
7. An alternative markscheme is indicated in the “Answers” column under heading **ALTERNATIVE 1** etc. Either alternative can be accepted.
8. Words inside chevrons « » in the “Answers” column are not necessary to gain the mark.
9. Words that are underlined are essential for the mark.
10. The order of marking points does not have to be as in the “Answers” column, unless stated otherwise in the “Notes” column.
11. If the candidate’s answer has the same “meaning” or can be clearly interpreted as being of equivalent significance, detail and validity as that in the “Answers” column then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by **OWTTE** (or words to that effect) in the “Notes” column.
12. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.
13. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script.
14. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the “Notes” column.
15. If a question specifically asks for the name of a substance, do not award a mark for a correct formula unless directed otherwise in the “Notes” column. Similarly, if the formula is specifically asked for, do not award a mark for a correct name unless directed otherwise in the “Notes” column.
16. If a question asks for an equation for a reaction, a balanced symbol equation is usually expected, do not award a mark for a word equation or an unbalanced equation unless directed otherwise in the “Notes” column.
17. Ignore missing or incorrect state symbols in an equation unless directed otherwise in the “Notes” column.

Question			Answers	Notes	Total
1.	(a)	(i)	$\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$ ✓ correct state symbols ✓	Accept ionic equation. Do not accept H_2CO_3 as a product for M1.	2
1.	(a)	(ii)	release of CO_2 / gas ✓	Accept formation instead of release. Accept loss of mass AND release of CO_2 / gas.	1
1.	(a)	(iii)	$n \text{HCl}(\text{aq})$: $\llbracket 0.050 \times 0.15 \Rightarrow 7.5 \times 10^{-3} \text{mol} \rrbracket$ ✓ CaCO_3 : $\llbracket 7.5 \times 10^{-3} \times 0.5 \times 100.09 \Rightarrow 0.38 \text{g} \rrbracket$ ✓	Award [2] for correct final answer.	2
1.	(b)		tangent drawn at $t=0$ s ✓ $\llbracket \text{rate} \Rightarrow 5 \times 10^{-3} \text{g s}^{-1} \rrbracket$ ✓	Do not award M1 for a line that only joins two data points. Accept values in the range 4.5×10^{-3} to $5.8 \times 10^{-3} \text{g s}^{-1}$ for M2. Do not award M2 for a negative rate. Accept correct answer in other units, such as $1.14 \times 10^{-4} \text{mol s}^{-1}$, provided units are given.	2

Question			Answers	Notes	Total
1.	(c)	(i)	$T = 293 / 293.15 \text{ «K» } \checkmark$ $V = \left\langle \frac{nRT}{P} = \frac{3.75 \times 10^{-3} \times 8.31 \times 293}{100} \right\rangle = 0.091 \text{ «dm}^3\text{»}$ OR $V = \left\langle \frac{nRT}{P} = \frac{3.75 \times 10^{-3} \times 8.31 \times 293}{1 \times 10^5} \right\rangle = 9.1 \times 10^{-5} \text{ «m}^3\text{» } \checkmark$	Award [2] for correct final answer. Accept values in the range 0.091-0.093 «dm³» / 9.1- 9.3x10⁻⁵ «m³». Accept 91-93 «cm³». Do not award M2 if the calculated volume is inconsistent with the stated units. Award [1 max] for 0.085 «dm³» (volume at STP). Award [2] for 0.061 «dm³» if 0.250 g used.	2
1.	(c)	(ii)	«data obtained with» Method 1 «more precise» AND uncertainty «of averaged values» is low $\checkmark$	Accept Method 2 less precise AND raw data is inconsistent / not reproducible. Accept Method 1 «more precise» AND Method 2 data is inconsistent / not reproducible. Accept reference to small error bars as proof of precision with Method 1.	1

Question			Answers	Notes	Total
1.	(c)	(iii)	uncertainty of volume measurement / measuring cylinder OR froth/bubbles/air trapped in measuring cylinder OR loss of gas by dissolving / when putting stopper on OR reaction time when inserting stopper OR loss of solution through fizzing ✓	Ignore any reference to error type. Do not accept gas leaks from the system other than while putting the stopper on.	1
2.	(a)		hexane AND «both solute and solvent have only» London/dispersion forces/LDF OR hexane AND «β-carotene» cannot form hydrogen/H- bonds ✓	Accept C ₆ H ₁₄ / upper layer for hexane.	1
2.	(b)	(i)	Reference solution: «a known concentration of β-» carotene AND hexane / C ₆ H ₁₄ ✓ Blank: solvent / hexane / C ₆ H ₁₄ ✓	Award ECF from 2(a) for: Reference solution: carotene AND water. Blank: water Do not award M2 for hexane if ECF is being applied.	2
2.	(b)	(ii)	«approximately» 450 «nm» ✓ maximum absorbance OR maximum sensitivity ✓	Accept any value in the range 430-470 nm for M1.	2

Question			Answers	Notes	Total
2.	(b)	(iii)	Any two of: «minimum of» five different concentrations ✓ «range of concentrations» must include expected sample concentration ✓ «data must be» precise ✓ concordant values «across replicate samples» ✓	Apply List Principle. Accept strong correlation / R^2 value >0.99/close to 1.	2 max
2.	(c)	(i)	$I_2(aq) + 2e^- \rightarrow 2I^-(aq)$ ✓	Do not award mark for oxidizing agent without half-equation.	1
2.	(c)	(ii)	indicator ✓ colour changes when all ascorbic acid has reacted OR colour changes when starch-iodine complex is formed OR starch reacts with excess iodine «at end point» OR starch forms blue-black complex with «excess» iodine ✓	Accept makes the end point easier to detect / clearer for M1. Accept colour changes at end point for M1.	2
2.	(c)	(iii)	$n I_2 = n C_6H_8O_6$ ✓ «Mass of ascorbic acid = $1.20 \times 10^{-3} \times 0.50 \times 176.14$» = 0.106 «g» ✓ % = «$\frac{0.106 \times 100}{10.0}$» = 1.06 «%» ✓	Award [3] for correct final answer.	3
2.	(c)	(iv)	«% uncertainty = $\frac{0.10}{1.20} \times 100$ = » 8.3 «%» ✓		1

Question			Answers	Notes	Total	
2.	(c)	(v)		Accept $1.1 \pm 8.6\%$ and 1.1 ± 0.1 for M1 and M2 respectively Award [1 max] If only correct uncertainty, without original value, given for both. Accept $2.0 \pm 8.6\%$ «g/100 g» and 2.0 ± 0.2 «g/100 g» for M1 and M2 respectively if 2.0% used.	2	
			<table><tr><td>Result from (c)(iii)</td><td>With percentage uncertainty</td><td>With absolute uncertainty</td></tr><tr><td>«1.06 g/100g»</td><td>$1.06 \pm 8.6\%$ «g/100g»✓</td><td>1.06 ± 0.09 «g/100g»✓</td></tr></table>			Result from (c)(iii)
Result from (c)(iii)	With percentage uncertainty	With absolute uncertainty				
«1.06 g/100g»	$1.06 \pm 8.6\%$ «g/100g»✓	1.06 ± 0.09 «g/100g»✓				
2.	(c)	(vi)	use less concentrated titrant/iodine/I ₂ OR increase sample size OR use burette with lower uncertainty ✓	Apply List Principle. Do not accept “smaller burette” without any reference to precision/uncertainty.	1	
2.	(d)		Any two of: unit of results ✓ reliability of database / source ✓ analytical method ✓ uncertainty /accuracy «of results» ✓ variety of tomatoes/juice ✓ ripeness of tomatoes ✓ growing conditions ✓	Apply List Principle.	2 max	

Question			Answers	Notes	Total		
3.	(a)				<i>Do not accept 0.01 for M2, as it is the given original concentration.</i> <i>If [CH₃COOH] rounded to 9.7 × 10⁻³ «mol dm⁻³», then value of K_a rounds up to 1.1 × 10⁻⁵.</i>	3	
			<i>[H₃O⁺]</i>	<i>[CH₃COOH]</i>			<i>K_a</i>
			3,16 × 10 ⁻⁴ «mol dm ⁻³ » ✓	«0.01 – 3.16 × 10 ⁻⁴ =» 9.68 × 10 ⁻³ «mol dm ⁻³ » ✓			1.03 × 10 ⁻⁵ ✓
3.	(b)		«Experimental error =» 39«%» ✓		<i>Accept answers in the range 35-41.</i> <i>Answer is 47«%» if 9.0 × 10⁻⁶ is used.</i> <i>Do not penalize failure to copy K_a result.</i>	1	
3.	(c)		«the uncertainty of the pH meter» has a major impact on the value «of K _a » ✓		<i>Accept the uncertainty is too high to produce accurate results.</i>	1	