

APOLLO

How much? The amount of chemical
change

HL

Chemistry

First assessment 2025

11 questions | mark schemes

Mark-scheme answers

Chemistry HL | Paper 1A | May 2025 TZ1 | Q26 | 1 marks

26. C

Chemistry HL | Paper 1A | May 2025 TZ1 | Q27 | 1 marks

27. A

Chemistry HL | Paper 1A | May 2025 TZ2 | Q23 | 1 marks

23. D

Chemistry HL | Paper 1A | May 2025 TZ3 | Q25 | 1 marks

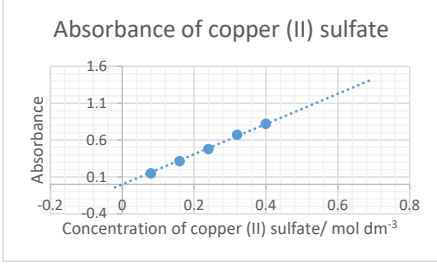
25. A

Chemistry HL | Paper 1A | May 2025 TZ3 | Q30 | 1 marks

30. D

Chemistry HL | Paper 1A | May 2025 TZ3 | Q33 | 1 marks

33. A

3.	(a)	 reasonable line of best fit ✓ extrapolated past data given «extended beyond 0.08 AND 0.4 mol dm⁻³» ✓	Line can touch all data points. Accept range of extrapolation through origin to 0.02 mol dm⁻³ AND past data given for M2. Line can extend beyond graph range.	2
3.	(b)	«directly/positively» proportional OR positive linear ✓	Accept answers based on $y=mx+b$. Accept “«directly/positively» proportional OR positive linear” if extrapolation started from 0.02 mol dm⁻³. Do not accept “positive correlation” alone.	1

Question		Answers	Notes	Total
3.	(c)	wavelength with maximum absorbance required OR absorbance varies with wavelength ✓	Accept “different substances absorb at different wavelength to determine concentration” OR “to quantify a substance more accurately” Do not accept “to improve accuracy/precision of the instrument” alone. Do not accept “CuSO₄ can only absorb complimentary color/certain wavelength of light” alone.	1
3.	(d)	gradient = 2.0 ✓ absorbance/A = 2.0 concentration/C OR $y = 2.0 \times$ ✓	Accept gradient/slope range of 1.9-2.3 for M1. Accept “$y=mx+b$” with range of -0.03-0 for b. Do not accept equation with +b values for M2.	2
3.	(e)	1.22 ✓	Accept answer in the range of 1.20-1.30. Do not ECF from calculation as error is contradiction to graph.	1

Question			Answers	Notes	Total
3.	(f)		no «significant» difference/they give the same value ✓		1
3.	(g)		635 «nm» ✓	Accept any value OR range of values from 585-647 «nm».	1

2.	(a)	«fully» dissolve in distilled/deionized/pure water ✓ use volumetric flask ✓ make up to line ✓ mix/invert/shake «the final solution» ✓	<i>Marking points can be in any order.</i>	3 max
2.	(b)	«dilute solution to» make several/multiple concentrations ✓ measure the absorbance/transmittance «of these solutions» ✓ plot graph of absorbance/transmittance vs/against concentration «with a straight line of best fit» ✓	<i>Do not accept “colour” for absorbance/transmittance for M2.</i>	3

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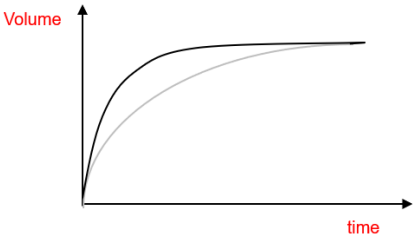
2225–6220M

Question		Answers	Notes	Total
2.	(c)	measure the absorbance/transmittance «of the unknown» AND use graph to determine concentration ✓	<i>Accept “Draw a line across from the absorbance/transmittance «on the y-axis» to the calibration curve and read off «intercept on» the concentration «axis».</i> <i>Accept use of the equation of the line.</i> <i>Do not accept “colour” instead of absorbance, unless applying ECF from 2(b).</i>	1

4.	(a)	(i)	does not contribute to global warming ✓ $\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$ correct products AND state symbols ✓ correct balancing ✓	Do not accept $\text{H}_2\text{CO}_3(\text{aq})$ for M1. Accept ionic equation.	2
4.	(a)	(ii)	$n(\text{CaCO}_3) \llcorner \frac{3.162 \text{ g}}{100.09 \text{ g mol}^{-1}} \llcorner = 0.0316 \llcorner \text{mol} \llcorner$ AND $n(\text{HCl}) \llcorner 4.00 \text{ mol dm}^{-3} \times 20.0 \times 10^{-3} \text{ dm}^3 \llcorner = 0.0800 \llcorner \text{mol} \llcorner$ ✓ CaCO_3 is limiting ✓	Do not award M2 without working/answer seen for M1	2
4.	(a)	(iii)	$\llcorner V = 0.0316 \text{ mol} \times 22.7 \text{ dm}^3 \text{mol}^{-1} = \llcorner$ $0.717 \llcorner \text{dm}^3 \llcorner$ ✓		1

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2225 – 6209M

Question	Answers	Notes	Total
4. (b) (i)	Volume  time Greater gradient AND from origin AND same final volume ✓	Lines must not cross.	1
4. (b) (ii)	ethanoic acid weak / HCl strong OR ethanoic acid partially ionizes «in water» / HCl fully ionizes ✓	Accept lower $[\text{H}^+]$.	1

Question			Answers	Notes	Total
4.	(c)	(i)		<i>Do not accept ionization energy for Processes.</i> <i>Accept ionization energies for Processes.</i>	3
4.	(c)	(ii)	Ca²⁺ has larger ionic radius «than Mg²⁺» OR greater distance between ion centres «in CaCl₂» ✓	<i>Must be clear reference to ionic for M1</i>	1

Question	Answers	Notes	Total
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Mark-scheme answers

Chemistry HL | Paper 1A | Nov 2025 TZ3 | Q4 | 1 marks

4. A

Chemistry HL | Paper 1A | Nov 2025 TZ3 | Q24 | 1 marks

24. C