

APOLLO

How fast? The rate of chemical change HL

Chemistry

First assessment 2025

24 questions | mark schemes

Mark-scheme answers

Chemistry HL | Paper 1A | May 2025 TZ1 | Q28 | 1 marks

28. A

Chemistry HL | Paper 1A | May 2025 TZ1 | Q30 | 1 marks

30. A

Chemistry HL | Paper 1A | May 2025 TZ1 | Q31 | 1 marks

31. B

Chemistry HL | Paper 1A | May 2025 TZ2 | Q24 | 1 marks

24. C

Chemistry HL | Paper 1A | May 2025 TZ2 | Q25 | 1 marks

25. A

Chemistry HL | Paper 1A | May 2025 TZ2 | Q26 | 1 marks

26. A

Chemistry HL | Paper 1A | May 2025 TZ2 | Q27 | 1 marks

27. D

Chemistry HL | Paper 1A | May 2025 TZ2 | Q28 | 1 marks

28. A

Chemistry HL | Paper 1A | May 2025 TZ3 | Q26 | 1 marks

26. A

Chemistry HL | Paper 1A | May 2025 TZ3 | Q27 | 1 marks

27. A

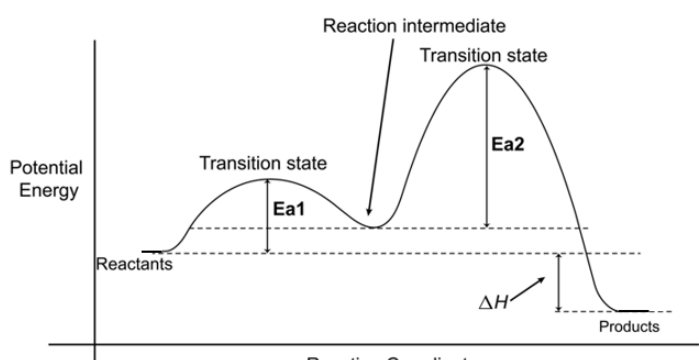
Chemistry HL | Paper 1A | May 2025 TZ3 | Q28 | 1 marks

28. C

8.	(a)	(i)	«since Si has higher melting point» ✓ C AND E ✓	1
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2225 – 6221M

Question	Answers	Notes	Total
8. (a) (ii)	 profile shows two transition states ✓ E_a of second step is larger AND products lower potential energy than reactants ✓ correct labels for reactants, products, both transition states and the intermediate ✓	E_a and ΔH labels are not required. Do not penalize if intermediate is at lower potential energy than the reactant.	3
8. (a) (iii)	A: first order AND B: second order ✓ «rate =» $k[A][B]^2$ ✓	Award [2] for correct rate equation.	2
8. (b)	Any 3 of the following: temperature increases kinetic energy/speed of molecules ✓ more frequent collisions ✓ more molecules have $E \geq E_a$ at higher temperature ✓ larger ratio/percentage of collisions are successful ✓	M2 requires time reference for probability, chance, or number of collisions.	3 max

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2225 – 6221M

Question	Answers	Notes	Total
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Mark-scheme answers

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

27. A

Chemistry HL | Paper 1A | Nov 2025 TZ1 | Q28 | 1 marks

28. D

Chemistry HL | Paper 1A | Nov 2025 TZ1 | Q29 | 1 marks

29. B

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

25. D

Chemistry HL | Paper 1A | Nov 2025 TZ3 | Q26 | 1 marks

26. B

Chemistry HL | Paper 1A | Nov 2025 TZ3 | Q27 | 1 marks

27. D

Chemistry HL | Paper 1A | Specimen 2025 | Q26 | 1 marks

26. B

Chemistry HL | Paper 1A | Specimen 2025 | Q27 | 1 marks

27. A

Chemistry HL | Paper 1A | Specimen 2025 | Q29 | 1 marks

29. C

Chemistry HL | Paper 1A | Specimen 2025 | Q31 | 1 marks

31. A

2.	(a)		Any two for [1 max] type of orange juice temperature light intensity «initial» surface area OR «initial» volume AND flask ✓		1 max
2.	(b)	i	Any one of: to perform multiple titrations ✓ too concentrated «so using too much iodine solution» ✓ end-point colour easier to see ✓		1 max
2.	(b)	ii	flask has to be opened to withdraw samples «so not 0 h» OR air was present in the flask at the start «so the ascorbic acid was exposed to air» ✓		1
2.	(b)	iii	titrate only once after two weeks OR fill flask with nitrogen/argon/inert gas OR withdraw samples with syringe «without opening flask» ✓		1
2.	(c)		$\left\langle \frac{0.1 \text{ cm}^3}{15.0 \text{ cm}^3} \times 100 = \right\rangle 0.7 \text{ \%}$ ✓		1
2.	(d)	i	$\left\langle \frac{(5.3 \times 10^{-3} \text{ mol dm}^{-3} - 1.1 \times 10^{-3} \text{ mol dm}^{-3})}{14 \text{ d}} \right\rangle = 3.0 \times 10^{-4}$ ✓ $\text{mol dm}^{-3} \text{ d}^{-1}$ ✓	Accept values in the range $2.9 \times 10^{-4} - 3.1 \times 10^{-4}$. Accept values converted to other units, such as $3.4 \times 10^{-9} - 3.6 \times 10^{-9} \text{ mol dm}^{-3} \text{ s}^{-1}$ or $0.29 - 0.31 \text{ mmol dm}^{-3} \text{ d}^{-1}$.	2

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2.	(d)	ii	«support» longer daily exposure leads to lower concentration of ascorbic acid OR 0 h decreases the least ✓ «doesn't support» no direct evidence of oxidation by oxygen ✓		2
2.	(d)	iii	should be stored in sealed container OR should be consumed in a few days after opening ✓		1
2.	(e)		Any one of: effect of temperature/light AND would show the value of refrigeration/darkness ✓ effect of preservative ✓ compare types of orange juice «e.g. fresh, from concentrate, etc.» ✓		1 max

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Question	Answers	Notes	Total
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3.	(a)	tangent drawn at $t = 0$ ✓ « $\frac{40.0 \text{ cm}^3}{35.0 \text{ s}} \Rightarrow 1.14 \text{ cm}^3 \text{ s}^{-1}$ » ✓	Accept values in the range $1.04 - 1.24 \text{ cm}^3 \text{ s}^{-1}$.	2
3.	(b)	any value between 35 and 50 s ✓	Only a simple estimation is required.	1
3.	(c)	Any two: drink releases gas more slowly at higher pressure ✓ gas occupies lower volume at higher pressure ✓ gas is more soluble «in carbonated drink» at higher pressure ✓		2 max
3.	(d)	« $\frac{33.0 \text{ cm}^3 - 11.5 \text{ cm}^3}{33.0 \text{ cm}^3} \times \frac{100}{4} = 16.3 \text{ \% per 100 g}$ » ✓	Accept values in the range 15.8 – 16.7 «% per 100 g».	1
3.	(e)	horizontal line ✓ closed system ✓		2