

Multiple Choice Answers

Q14: B

Q15: C

Multiple Choice Answers

Q15: A

Multiple Choice Answers

Q14: C

Q15: B

2(a)	M1 Al_2O_3 is ionic M2 P_4O_{10} is a (simple) molecule M3 ionic bonds are stronger than intermolecular forces
2(b)(i)	$\text{mol}^{-2} \text{ dm}^6$
2(b)(ii)	M1 at equilibrium: moles of $\text{CO} = 0.120$ AND moles of $\text{H}_2 = 0.240$ M2 $[\text{CH}_3\text{OH}] = 0.056$ AND $[\text{CO}] = 0.024$ AND $[\text{H}_2] = 0.048$ M3 use of K_c with correct evaluation = 1.01×10^3
2(b)(iii)	no effect AND K_c is not affected by pressure
2(c)(i)	increases rate by providing a different mechanism with a lower activation energy
2(c)(ii)	$2\text{CH}_3\text{OH} \rightarrow \text{CH}_3\text{OCH}_3 + \text{H}_2\text{O}$
2(c)(iii)	$\text{P}_4\text{O}_{10} + 6\text{H}_2\text{O} \rightarrow 4\text{H}_3\text{PO}_4$

1(a)	I Five experiments completed AND Table to show Volume of FA 1 , Volume of water, Time and Rate
	II Correct units for all data Volume: / cm ³ OR (cm ³) OR in cm ³ OR cm ³ by each volume Time: / s OR (s) OR in s OR s by each time Rate: / s ⁻¹ OR (s ⁻¹) OR in s ⁻¹ OR s ⁻¹ by each rate
	III All times recorded to nearest second AND Volumes of FA 1 and water both given 2 d.p. ending with 0 or 5
	IV Three additional experiments with volume FA 1 ≥ 15.00 cm ³ , < 40.00 cm ³ and no volume closer than 5.00 cm ³ to another volume. AND Volumes of water chosen so that total volume = 40.00 cm ³ for additional experiments.
	V Correctly calculates rate for all experiments and shown to 2 – 4 s.f.
	VI Award if all times recorded increase with decreasing volume of FA 1 .
	Examiner corrects time for $V_{FA1} = 40.00$ cm ³ and $V_{FA1} = 20.00$ cm ³ to the nearest s then calculates t_{20} / t_{40} to 2 d.p.
	VII Award if candidate's ratio is within the range 1.80 to 2.30.
	VIII Award if candidate's ratio is within the range 1.90 to 2.20.
1(b)(i)	I Unambiguous labelled axes with rate on the y-axis and volume of FA 1 on the x-axis OR correct units AND suitable linear scales starting at (0,0).
	II Points plotted correctly.
	III Line of best fit drawn, straight line or smooth curve, that ignores anomalous results identified by the candidate.
1(b)(ii)	M1 Correct line(s) drawn AND Rate correctly read within half a small square. M2 $1000 / \text{rate}$ AND correctly calculates answer to 2 – 4 s.f.
1(c)	M1 Correct line of best fit M2 (Rate and volume of FA 1 are) not directly proportional as the (straight) line / data / results does not / do not pass through the origin / (0,0) OR M1 unavailable for line of best fit through the origin. M2 (Rate and volume of FA 1 are) directly proportional as the (straight) line / data / results pass through the origin / (0,0)