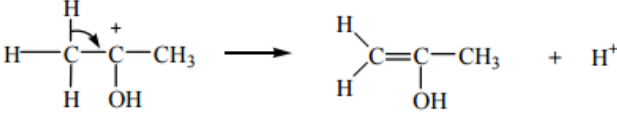


Question number	Answer	Marks	Guidance
1 (a) (i)	2 or two or second or $[E]^2$	1	
1 (a) (ii)	1 or one or first or $[F]^1$ or $[F]$	1	
1 (b) (i)	$k = 8.6 \times 10^{-4} / ((3.8 \times 10^{-2})^2 \times (2.6 \times 10^{-2}))$	1	mark is for insertion of numbers into a correctly rearranged rate equ , $k =$ etc. AE (-1) for copying numbers wrongly or swapping two numbers
	= 22.9 (Allow 22.9 – 24 after correct rounding)	1	
	$\text{mol}^{-2} \text{dm}^6 \text{s}^{-1}$	1	
1 (b) (ii)	$6.8(2) \times 10^{-3} \text{ (mol dm}^{-3} \text{ s}^{-1})$ <b>OR</b> if their $k$ is wrong, award the mark consequentially a quick check can be achieved by using their answer / their $k = 2.9768 \times 10^{-4}$ Allow $2.9 - 3.1 \times 10^{-4}$ for the mark	1	Allow $6.8 \times 10^{-3}$ to $6.9 \times 10^{-3}$  Ignore units
2 (a)	Experiment 2 $4.5 \times 10^{-4}$	1	Minimum 2 s.f.  If three wrong answers, check their value of $k$ in 2(b).  They can score all 3 marks if they have used their (incorrect) value of $k$ . See below: Experiment 2 rate = $k \times (1.0125 \times 10^{-4})$ Experiment 3 $[Q] = 0.02/k$ Experiment 4 $[P] = 0.0913/\sqrt{k}$
	Experiment 3 $4.5 \times 10^{-3}$	1	
	Experiment 4      0.043      OR $4.3 \times 10^{-2}$ OR 0.044      OR $4.4 \times 10^{-2}$	1	
2 (b)	$k = 5.0 \times 10^{-5} / ((2.5 \times 10^{-2})^2 \times (1.8 \times 10^{-2}))$	1	Mark is for insertion of numbers into a correctly rearranged rate equation. If upside down, score only units mark from their $k$ AE (-1) for copying numbers wrongly or swapping two numbers  Any order If $k$ calculation wrong, allow units conseq to their $k$ expression
	= 4.4(4) (allow 40/9)	1	
	$\text{mol}^{-2} \text{dm}^6 \text{s}^{-1}$	1	
3 (a)	2 or two or second	1	

3 (b)	$k = 1.24 \times 10^{-4} / (4.40 \times 0.82)$  $= 3.44 \times 10^{-5}$ (min 3 s.f.)  $\text{mol}^{-1} \text{dm}^3 \text{s}^{-1}$	1  1  1	mark is for insertion of numbers into a correctly rearranged rate equ , $k =$ etc if upside down, (or use of $I_2$ data) score  only units mark  any order
3 (c)	no change or no effect or stays the same or $1.24 \times 10^{-4}$	1	
3 (d)	1 or 2 or 1 and 2  rate equation doesn't involve $I_2$ or only step which includes 2 species in rate equation	1  1	if wrong no further mark but mark on from no answer
3 (e)		1	any second arrow loses the mark