

Answers to examination-style questions

Answers	Marks	Examiner's tips
1 a) order with respect to A = 1 order with respect to B = 2	2	
b) i) $\text{rate} = k [\text{C}][\text{D}]^2$	1	
ii) $k = \frac{1.45 \times 10^{-4}}{(2.5 \times 10^{-2})(6.65 \times 10^{-2})^2}$ Rate = $1.31 \text{ mol}^{-2} \text{ dm}^6 \text{ s}^{-1}$	3	If you place the units in the equation and cancel them out as you would with numbers, your answer will have the correct units.
2 a) i) electrophilic addition	1	
ii) $\text{CH}_3\text{-CH=CH-CH}_3$	1	The structure must show the C=C bond to which the HBr has added.
b) nucleophilic substitution	1	Three marks are for the curly arrows and one is for the structure with the N^+ .
	4	If you do not show the lone pair on the N of ammonia you will lose the mark for the curly arrow drawn from the ammonia molecule.
c) i) $\text{C}_4\text{H}_9\text{Br} \rightarrow \text{C}_4\text{H}_{11}\text{N}$ $M_r = 137$ and $M_r = 73$ $0.0730 \times 73 = 5.33$ $53.4\% = 0.534 \times 5.33 = 2.85 \text{ g}$	3	If you achieve the correct answer of 2.85g, you should be awarded full marks.
ii) Further substitution can happen.	1	Hint: you can say 'G reacts with F' or 'there is a further reaction to form secondary and tertiary amines'. 'Other products formed' does not merit a mark.
d) 4 peaks, a = doublet, b = triplet	3	
e) i)	1	

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F HCOOCH ₂ CH ₃	1	This can be written as HCO ₂ CH ₂ CH ₃ .
iv) G Any of the following are answers: CH ₃ CH=CHCH ₂ CH ₂ CH ₃ CH ₃ CH=CHCH(CH ₃) ₂ CH ₃ CH ₂ CH=CHCH ₂ CH ₃	1	You must show C=C in alkenes.
$ \begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \\ \text{H} \quad \text{CH}_2\text{CH}_3 \end{array} $		
H	1	There must be 4 different groups around the C.
$ \begin{array}{c} \text{H} \quad \text{CH} = \text{CH}_2 \\ \diagdown \quad \diagup \\ \text{C} \\ \diagup \quad \diagdown \\ \text{H}_3\text{C} \quad \text{CH}_2\text{CH}_3 \end{array} $		
v) I	1	
$ \begin{array}{c} \text{CH}_3 \\ \\ \text{H}_3\text{C} - \text{C} - \text{CH}_2\text{CH}_3 \\ \\ \text{OH} \end{array} $		
v) J	1	
$ \begin{array}{c} \text{CH}_3 \\ \\ \text{H}_3\text{C} - \text{C} - \text{CH}_2\text{OH} \\ \\ \text{CH}_3 \end{array} $		
b) i)	5	Each H must be in a completely different environment.
ii)	2	
a) singlet		
b) triplet		