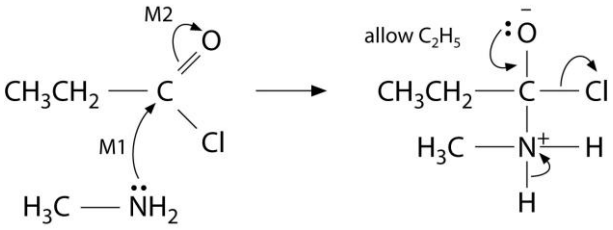
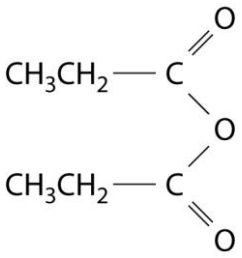
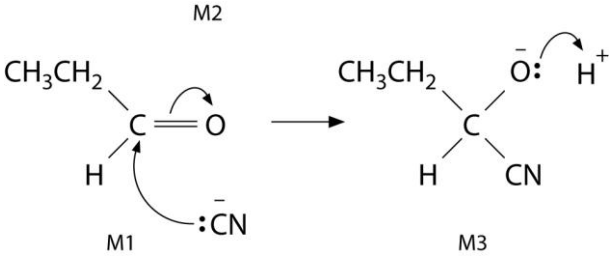
Answers to examination-style questions

Answers	Marks	Examiner's tips
1 a) $CH_3OH + CH_3CH_2COOH \rightarrow CH_3CH_2COOCH_3 + H_2O$	**1**	
b) nucleophilic addition–elimination	**1**	Acylation should be marked incorrect.
	**4**	Mark 1 and 2 are for the curly arrows as shown (M1 and M2). Mark 3 is for the structure of the intermediate and Mark 4 is for showing the 3 arrows and lone pair on the last structure shown above.
c) 	**1**	
d) i) A selection of answers are correct here. These are: faster/ not reversible/ bigger yield /purer product/ no acid catalyst required	**1**	
ii) anhydride less easily hydrolysed or reaction less exothermic.	**1**	You could argue a different way by stating that no corrosive HCl fumes formed or that it is less toxic. You could also state something about cost, i.e. expense of acid chloride or that the anhydride is cheaper.
2 **a)** nucleophilic addition	**5**	One mark is given for the name, marks M1, 2, 4 are for the curly arrows and M3 is for the intermediate structure shown.
		
b) i) 2 - hydroxybutanenitrile	**1**	

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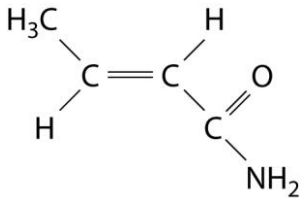
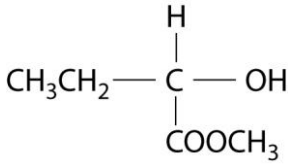
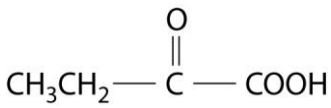
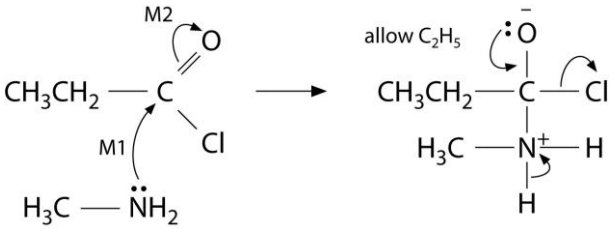
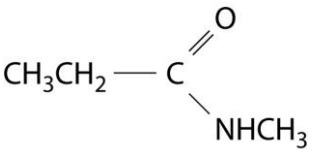
ii) 	**2**	One mark can be gained by realising that an amide is formed even if not C_4H_7NO, i.e. $RCONH_2$ would score one mark.
c) i) 	**3**	When doing part **c)**, think about the fact that R has 2 functional groups – an alcohol and an acid – and decide which is going to react with the reagent in each part of the question, e.g. carboxylic acids react with alcohol in the presence of the acid catalyst to form esters in **i)**.
ii) 		
iii) $CH_3CH = CHCOOH$		
3 a) (nucleophilic) addition – elimination;	**1**	Nucleophilic does not need to be stated for the mark.
	**4**	Marks 1 and 2 are for the curly arrows as shown (M1 and M2). Mark 3 is for structure of the intermediate. Mark 4 is for 3 curly arrows and a lone pair on the intermediate.
b) 	**1**	

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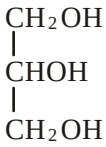
4 a)  propan(e)-1,2,3-triol	**2**	The name glycerol is acceptable.
b) $CH_3(CH_2)_{16}COONa$ or $C_{17}H_{35}COONa$	**1**	Give the mark if there is a 3 in front of the formula (since it forms 3 of these species in the equation). There must be the Na in the formula. The anion only will not gain the mark.