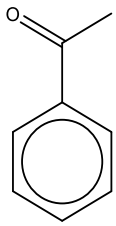
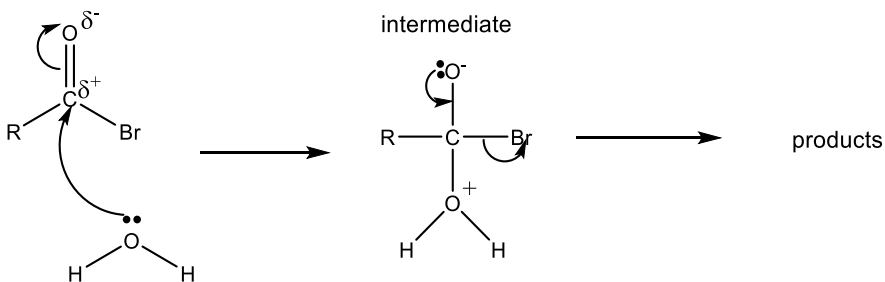
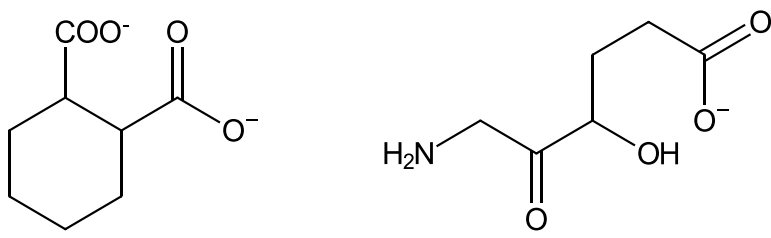


8(a)(i)	NO ₂ group directs to 3 (and 5) / meta position AND due to being an electron-withdrawing / electronegative group
8(a)(ii)	$\text{HNO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{NO}_2^+ + \text{HSO}_4^- + \text{H}_2\text{O}$ OR $\text{HNO}_3 + 2\text{H}_2\text{SO}_4 \rightarrow \text{NO}_2^+ + 2\text{HSO}_4^- + \text{H}_3\text{O}^+$
8(b)(i)	
8(b)(ii)	M1: (reaction 1) ethanoyl chloride / CH ₃ COCl AND AlCl ₃ M2: (reaction 2) 2-bromopropane / (CH ₃) ₂ CHBr AND FeBr ₃
8(c)	M1: with C ₆ H ₅ Br no change / no precipitate AND with C ₆ H ₅ CH ₂ Br cream precipitate in C ₆ H ₅ Br M2: lone pair / p-orbital on Br delocalised / overlaps with ring / π system M3: C–Br bond stronger / has partially double bond character
8(d)(i)	(nucleophilic) addition–elimination
8(d)(ii)	 M1 M2: • lone pair on O • curly arrow from (lone pair) O (in H₂O) to C (of C=O) • correct dipole on C=O • curly arrow from the C=O bond to O atom any two [1], all four [2] M3: correct intermediate M4: curly arrow from (lone pair on) O(–) to C–O bond AND curly arrow from C–Br to Br

8(a)	- chlorobenzene is less reactive than ethanoyl chloride - p orbital / lone pair on Cl / -Cl will overlap / delocalise into the ring OR C of COCl has most electron deficient OR has an electronegative oxygen atom / two electronegative atoms / electron withdrawing C=O group - due to partial double C-Cl bond OR C-Cl bond strengthened (more) / stronger bond between Cl and benzene / ring OR C-Cl weakened in ROCl any two [1], all three [2]
8(b)(i)	- nitrile - amide - ketone / carbonyl - ester any two [1], all four [2]
8(b)(ii)	8 / eight
8(b)(iii)	no need to separate optical isomers
8(c)	 M1: amide bond hydrolysed and COO⁻ and NH₂ formed M2: nitrile bond hydrolysed and COO⁻ formed M3: ester bond hydrolysed and COO⁻ and OH formed
8(d)(i)	percentage = $100 \times 28 / (28 + 58 + 13 + 42) = 19.9 (\%)$ min 2sf
8(d)(ii)	D is attracted more strongly to the stationary phase / forms stronger intermolecular forces with the stationary phase