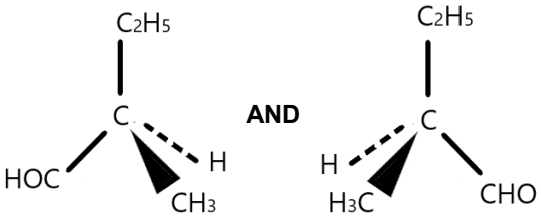
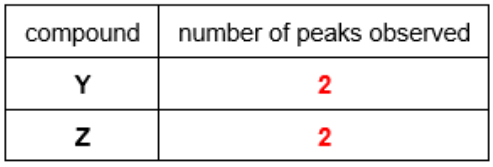
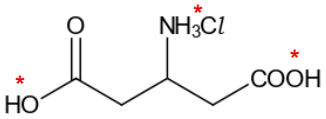
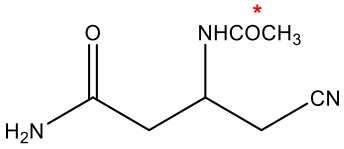
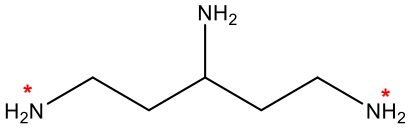
7(a)	**M1**: **Q** $CH_3CH_2CH(CH_3)CHO$ **M2:** 
7(b)(i)	**T** $CH_3CH_2CH_2COCH_3$ **AND V** $(CH_3)_2CHCOCH_3$
7(b)(ii)	• yellow solid • $CH_3CH_2CH_2COOH$ **OR** $(CH_3)_2CHCOOH$ • CHI_3 Any two [1], all three [2]
7(c)(i)	**S** $(CH_3)_3CCHO$
7(c)(ii)	**U** $CH_3CH_2COCH_2CH_3$
7(c)(iii)	triplet **AND** two hydrogen atoms on neighbouring carbon atoms
7(c)(iv)	TMS / tetramethylsilane / $Si(CH_3)_4$
7(d)	4 3 5 3 Any two [1], all four [2]

6(a)(i)	**M1:** (R_f value) is distance moved by a component / spot / solute **AND** divided by distance moved by solvent **OR** (R_f value) is the ratio of distance moved by a component / spot / solute **AND** by distance moved by solvent **M2:** (retention time) is (the time) between injection and detection (of a component)
6(a)(ii)	thin-layer chromatography: polar solvent **OR** non-polar solvent **OR** named solvent gas-liquid chromatography: non-volatile liquid **OR** high boiling point liquid
6(b)	**A** is more soluble in the mobile phase **OR A** has less adsorption to the stationary phase
6(c)(i)	
6(c)(ii)	**M1: Y** (two) singlet(s) **M2: Z** triplet **AND** quartet

<table>
<tr><td>6(a)</td><td>sp = 1 AND sp^2 = 1 AND sp^3 = 3</td></tr>
<tr><td>6(b)(i)</td><td>acid-base / neutralisation AND hydrolysis</td></tr>
<tr><td>6(b)(ii)</td><td>reaction 7 

reaction 8 

reaction 9 

any two * [1], any three * [2], any five * [3], all six * [4]</td></tr>
<tr><td>6(c)(i)</td><td>five / 5</td></tr>
<tr><td>6(c)(ii)</td><td>
<table>
<tr><td>proton environment</td><td>a</td><td>b</td><td>c</td></tr>
<tr><td>name of splitting pattern</td><td>doublet</td><td>multiplet</td><td>doublet</td></tr>
<tr><td>chemical shift range, δ / ppm</td><td>2.2–3.0</td><td>3.2–4.0</td><td>2.0–3.0</td></tr>
</table>
any three [1], all six [2]</td></tr>
</table>

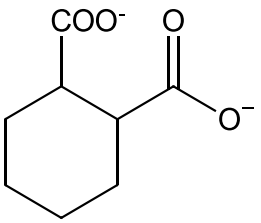
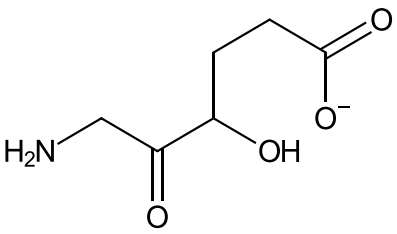
<table>
<tr><td>8(a)</td><td>

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]</td></tr>
<tr><td>8(b)(i)</td><td>

nitrile
amide
ketone / carbonyl
ester

any two [1], all four [2]</td></tr>
<tr><td>8(b)(ii)</td><td>8 / eight</td></tr>
<tr><td>8(b)(iii)</td><td>no need to separate optical isomers</td></tr>
</table>

8(c)	  **M1:** amide bond hydrolysed and COO^- and NH_2 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