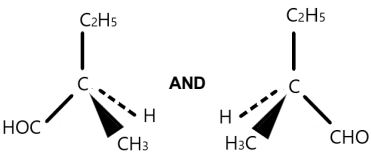
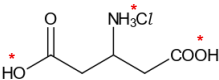
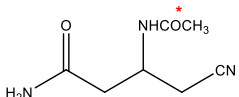
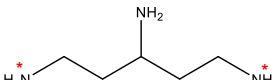


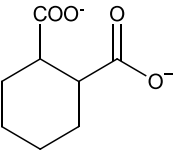
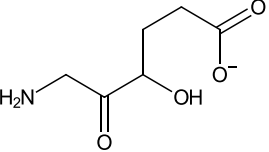
7(a)	M1: $\text{Q CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CHO}$ M2: 
7(b)(i)	T $\text{CH}_3\text{CH}_2\text{CH}_2\text{COCH}_3$ AND V $(\text{CH}_3)_2\text{CHCOCH}_3$
7(b)(ii)	- yellow solid $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ OR $(\text{CH}_3)_2\text{CHCOOH}$ CHI_3 Any two [1], all three [2]
7(c)(i)	S $(\text{CH}_3)_3\text{CCHO}$
7(c)(ii)	U $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3$
7(c)(iii)	triplet AND two hydrogen atoms on neighbouring carbon atoms
7(c)(iv)	TMS / tetramethylsilane / $\text{Si}(\text{CH}_3)_4$
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)	<table border="1"> <thead> <tr> <th>compound</th><th>number of peaks observed</th></tr> </thead> <tbody> <tr> <td>Y</td><td>2</td></tr> <tr> <td>Z</td><td>2</td></tr> </tbody> </table>	compound	number of peaks observed	Y	2	Z	2
compound	number of peaks observed						
Y	2						
Z	2						
6(c)(ii)	M1: Y (two) singlet(s) M2: Z triplet AND quartet						

6(a)	sp = 1 AND sp ² = 1 AND sp ³ = 3															
6(b)(i)	acid-base / neutralisation AND hydrolysis															
6(b)(ii)	reaction 7  reaction 8  reaction 9  any two * [1], any three * [2], any five * [3], all six * [4]															
6(c)(i)	five / 5															
6(c)(ii)	<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]				proton environment	a	b	c	name of splitting pattern	doublet	multiplet	doublet	chemical shift range, δ / ppm	2.2–3.0	3.2–4.0	2.0–3.0
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name of splitting pattern	doublet	multiplet	doublet													
chemical shift range, δ / ppm	2.2–3.0	3.2–4.0	2.0–3.0													

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(a)	- chlorobenzene is less reactive than ethanoyl chloride - p orbital / lone pair on Cl / $-\text{Cl}$ will overlap / delocalise into the ring OR C of COC has most electron deficient OR has an electronegative oxygen atom / two electronegative atoms / electron withdrawing $\text{C}=\text{O}$ group - due to partial double $\text{C}-\text{Cl}$ bond OR $\text{C}-\text{Cl}$ bond strengthened (more) / stronger bond between Cl and benzene / ring OR $\text{C}-\text{Cl}$ 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