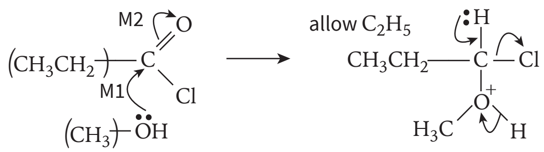
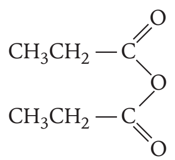
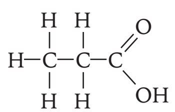
A Level OCR Chemistry

Chapter 25 – answers

Question	Answers	Extra information	Mark	AO Spec reference
1(a)	$CH_3OH + CH_3CH_2COOH \rightarrow CH_3CH_2COOCH_3 + H_2O$		1	6.2.5, 6.1.3
1(b)(i)			1 1 1	6.2.5, 6.1.3
1(b)(ii)	Choose any **one** of the following: • Use TLC • *Explanation:* product should only show as one spot on TLC plate/have the same R_f value as known samples/data • Melting point analysis • *Explanation:* melting point should be sharp and close to known data	Only **one** method needed, but explanation needed for second mark	2	6.2.5
1(c)(i)	 or $(CH_3CH_2CO)_2O$		1	4.1.1, M4.2
1(c)(ii)	Anhydride less easily hydrolysed/reaction less violent/no corrosive/no toxic HCl fumes given off/anhydride cheaper		1	6.2.5
2(a)(i)			1	6.2.5, M4.2
2(a)(ii)	$K_2Cr_2O_7$ / H^+ **OR** acidified potassium dichromate		1	6.2.5
2(a)(iii)	Propanoic acid		1	6.2.5

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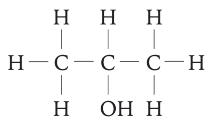
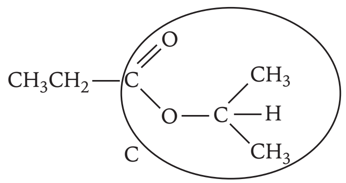
2(b)(i)	$NaBH_4$		1	6.2.5
2(b)(ii)	Reduction		1	6.2.5
2(b)(iii)			1	4.1.1, M4.2
2(c)(i)	H_2SO_4 **OR** HCl	Only one acid needed	1	6.2.5
2(c)(ii)	Dilute acid **AND** heat		1	6.2.5
2(c)(iii)			1	6.2.5
3(a)	$CH_3CH_2Cl + 2\ NH_3 \rightarrow CH_3CH_2NH_2 + NH_4Cl$	**1** mark for each correct side of the reaction	1 1	6.2.1
3(b)	CH_3CN **AND** H_2/Ni		1 1	6.2.5
3(c)	The reduction from a nitrile/ part b) is likely to give a greater yield as it has only one product		1 1	6.2.5
4(a)(i)	HCN **OR** KCN/HCl		1	6.2.5
4(a)(ii)	Nucleophilic addition		1	6.2.5

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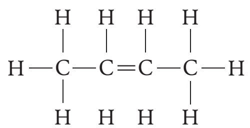
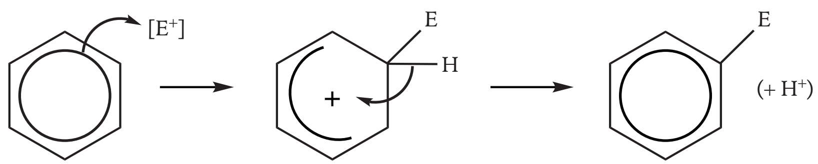
4(a)(iii)	M_r butanone = 72 and M_r hydoxynitrile = 99 5 g butanone = 5 / 72 = 0.0694 moles (Moles butanone = moles hydroxynitrile) Mass hydroxynitrile = 0.0694 × 99 = 6.87 g theoretical yield actual yield = 0.64 × 6.87 = 4.40 g		1 1 1 1	2.1.3, M0.2, M0.1, M0.0
4(b)(i)	$NaBH_4$		1	6.2.5
4(b)(ii)	Racemic mixture formed / 50 : 50 / equal amounts of enantiomers		1	6.2.5
4(c)(i)			1	4.1.1, M4.2
4(c)(ii)	It involves the loss/removal of water		1	6.2.5
5(a)			3	6.1.1
5(b)(i)	Nucleophilic addition		1	6.2.5
5(b)(ii)	$NaBH_4$		1	6.2.5
5(b)(iii)	Q contains asymmetrical carbon/chiral carbon/four different groups bonded to same carbon atom		1	6.2.2
5(c)(i)	H_3PO_4 **OR** H_2SO_4 Heat		1	6.2.5
5(c)(ii)	*Cis-trans* / geometrical isomerism		1	4.1.3

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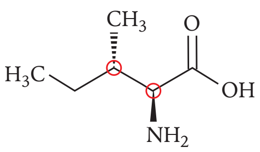
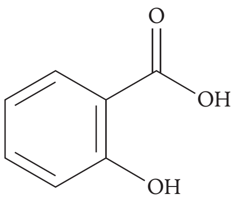
5(c)(iii)	Double bond / C═C bond and two different groups attached to each of the Cs in the double bond		1	4.1.3
6(a)	2-methylpropene The absorption at 1650 cm^{-1} indicates an alkene / C═C present	Can also show this using a diagram	1 1	6.2.5
6(b)(i)	HBr	All methods that would allow HBr to form in situ e.g. NaBr and H_2SO_4	1	6.2.5
6(b)(ii)		1 mark for: curly arrow from π-bond to $H^{\delta+}$ Dipoles on the H—Br bond curly arrow from H—Br bond to $Br^{\delta-}$ Curly arrow from Br^- to C^+	4	4.1.3
6(b)(iii)	P gives 3 peaks (in its NMR spectrum) R gives 1 peak (in its NMR spectrum)		1 1	6.3.2

Skills box answers:

a)



b) So no product or reactant is lost by evaporation

c) (Measure and record the mass of a dry, clean weighing boat (or another suitable container))
- Add to salicylic acid to the weigh boat. Record mass of boat + solid.
- Transfer the solid to the flask for refluxing
- Re-weigh the weigh boat. Record mass.
- Calculate (mass of boat + solid) – (boat after transferring solid)

d) Place solid in melting point tube.
- Place in oil / melting point apparatus and heat gently
- Record temperature at which solid starts melting and stops melting
- Compare melting point to values in data book / from tables / compare to other results.