

Multiple Choice Answers

Q5: B

Multiple Choice Answers

Q25: B

Q26: D

Multiple Choice Answers

Q28: A

4(a)(i)	reduction
4(a)(ii)	$\text{PCl}_5 / \text{PCl}_3 / \text{SOCl}_2$ OR KCl / NaCl AND conc. H_2SO_4 / conc. H_3PO_4
4(a)(ii)	M1 $\text{C}_2\text{H}_5\text{CH}_2\text{Cl} + \text{NaOH} \rightarrow \text{C}_3\text{H}_6 + \text{H}_2\text{O} + \text{NaCl}$ M2 ethanol (solvent) AND heat / reflux
4(a)(iv)	conc. H_2SO_4 OR conc. H_3PO_4 OR Al_2O_3 AND heat
4(b)(i)	addition
4(b)(ii)	M1 (molecules that have the) same structural formula (and same molecular formula) M2 but different 3D / spatial arrangement of atoms / groups
4(b)(iii)	$\begin{array}{cccc} \text{H} & \text{CH}_3 & \text{H} & \text{CH}_3 \\ & & & \\ \text{---C---} & \text{C---} & \text{C---} & \text{C---} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ M1 M2 optical isomerism M3 the methylated carbon has four different groups attached
4(b)(iv)	M1 non-biodegradability M2 harmful combustion products
4(c)(i)	2,3-dimethylbut-1-ene
4(c)(ii)	(The spectrum is of) X AND 41 is $[\text{CH}_2=\text{CCH}_3]^+ / 41$ is C_3H_5^+ OR 43 is $[\text{CH}_3\text{CHCH}_3]^+ / 43$ is C_3H_7^+ OR X would NOT have significant peak at 54 / $[(\text{CH}_3)_2\text{C}=\text{C}^+] / \text{C}_4\text{H}_6^+$ OR X would NOT have significant peak at 42 due to $[(\text{CH}_3)_2\text{C}^+] / \text{C}_3\text{H}_6^+$
4(c)(iii)	$([\text{M}+1]^+ / 34.7 \times 100 / 1.1 = 6)$ $[\text{M}+1]^+ = 2.29$

3(a)(i)	
3(a)(ii)	yellow precipitate
3(a)(iii)	elimination
3(a)(iv)	
3(b)(i)	$(\text{CH}_3)_2\text{CHOH} + \text{Na} \rightarrow (\text{CH}_3)_2\text{CHO}^-\text{Na}^+ + \frac{1}{2} \text{H}_2$
3(b)(ii)	M1 correct dipole on $\delta^+\text{C}-\text{Br}\delta^-$ AND curly arrow from $\text{C}-\text{Br}$ bond to Br M2 intermediate M3 curly arrow from lone pair of $(\text{CH}_3)_2\text{CHO}^-$ to C^+
3(b)(iii)	M1 rate would decrease M2 $\text{C}-\text{Br}$ is weaker (than $\text{C}-\text{Cl}$, so breaks more easily)
3(b)(iv)	$\text{C}_6\text{H}_{14}\text{O} + 9\text{O}_2 \rightarrow 6\text{CO}_2 + 7\text{H}_2\text{O}$

3(a)(i)

2 * = 1 mark (round down). Max 5 marks.

test	observations	
	FA 4	FA 5
1 + NaOH(aq)	red-brown / brown ppt AND insoluble in excess *	white ppt * soluble in excess *
2 + NH ₃ (aq)	red-brown / brown ppt AND insoluble in excess *	white ppt AND insoluble in excess *
3 + Na ₂ CO ₃ (aq)	fizzing * gas gives white ppt with limewater * red-brown ppt *	white ppt * fizzing * gas gives white ppt with limewater (award if not awarded for FA 4)
4 + BaCl ₂ (aq) / Ba(NO ₃) ₂ (aq)	white ppt AND	white ppt *
5 + H ⁺ / KMnO ₄ (aq)	stays purple / no change AND	stays purple / no change *

3(a)(ii)	<table><tr><td><i>ions</i></td><td>FA 4</td><td>FA 5</td></tr><tr><td>cations</td><td>Fe³⁺; H⁺</td><td>Al³⁺</td></tr><tr><td>anions</td><td>SO₄²⁻</td><td>SO₄²⁻</td></tr></table> 5 ions correct = 3 marks 3 or 4 ions correct = 2 marks 2 ions correct = 1 mark	<i>ions</i>	FA 4	FA 5	cations	Fe ³⁺ ; H ⁺	Al ³⁺	anions	SO ₄ ²⁻	SO ₄ ²⁻								
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3(b)(i)	2 * = 1 mark (round down) <table><tr><th rowspan="2"><i>test</i></th><th colspan="2"><i>observations</i></th></tr><tr><th>FA 6</th><th>FA 7</th></tr><tr><td>1 + H⁺ / KMnO₄(aq)</td><td>(turns paler pink)</td><td>(purple fades slightly)</td></tr><tr><td>and warm</td><td>decolourises / turns colourless / turns (pale) yellow *</td><td>decolourises / turns colourless / turns (pale) yellow *</td></tr><tr><td>2 + I₂(aq) + NaOH (and warm)</td><td>no change *</td><td>ppt * that is (pale) yellow *</td></tr><tr><td>3 + Na₂CO₃(aq)</td><td>fizzing *</td><td>no change *</td></tr></table>	<i>test</i>	<i>observations</i>		FA 6	FA 7	1 + H ⁺ / KMnO ₄ (aq)	(turns paler pink)	(purple fades slightly)	and warm	decolourises / turns colourless / turns (pale) yellow *	decolourises / turns colourless / turns (pale) yellow *	2 + I ₂ (aq) + NaOH (and warm)	no change *	ppt * that is (pale) yellow *	3 + Na ₂ CO ₃ (aq)	fizzing *	no change *
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3(b)(ii)	M1 (FA 6) is methanoic acid because it produces CO₂ / reacts with sodium carbonate AND it can be oxidised / it reacts with KMnO₄ M2 (FA 7) is propan-2-ol as it gives a ppt in test 2 OR gives a positive tri-iodomethane/iodoform test OR has the -CH(OH)CH₃ group
3(c)	Correct equation CH₃CH₂COOH + CH₃CH₂OH → CH₃CH₂COOCH₂CH₃ + H₂O OR C₂H₅COOH + C₂H₅OH → C₂H₅COOC₂H₅ + H₂O