

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 C—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 C—Br is weaker (than C—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)	<i>ions</i>	FA 4	FA 5
	cations	Fe ³⁺ ; H ⁺	Al ³⁺
	anions	SO ₄ ²⁻	SO ₄ ²⁻
	5 ions correct = 3 marks 3 or 4 ions correct = 2 marks 2 ions correct = 1 mark		

3(b)(i)	2 * = 1 mark (round down)		
	<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 *

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