

Question 33 (Answer: **A**)

- Count the oxygens: three [O] used and one water released tells you how far the oxidation goes.
- A primary alcohol to an aldehyde uses one [O] and releases one water; the aldehyde to the acid uses another [O] with no water.
- Only the structure that takes exactly three [O] while losing exactly one water fits.

Question 39 (Answer: **B**)

- For $C_xH_yO_z$ the oxygen needed for complete combustion is $x + y/4 - z/2$.
- 8.5 mol fits $C_6H_{12}O$ ($6 + 3 - 0.5$), so that is X's molecular formula.
- Of the candidates, only those that resist acidified $KMnO_4$ – a tertiary alcohol or a ketone – qualify.

Question 32 (Answer: **C**)

- $LiAlH_4$ reduces a carboxylic acid all the way to a primary alcohol.
- $NaBH_4$ on propanone gives a secondary alcohol, and steam on propene gives propan-2-ol, also secondary.
- Hot concentrated acidified $KMnO_4$ cleaves ethene's double bond rather than making an alcohol.

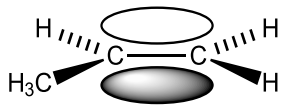
Question 35 (Answer: **B**)

- 2,4-DNPH gives an orange precipitate with any aldehyde or ketone.
- Alkaline iodine gives a yellow precipitate only for a CH_3CO- group, or a $CH_3CH(OH)-$ that oxidises into one.
- So compare which of those fragments Q already has, and which appear only after the oxidation.

Question 33 (Answer: **A**)

- Step 1 removes water from the alcohol to give cyclohexene – a dehydration.
- Step 2 adds two OH groups across that $C=C$ using cold dilute manganate(VII) – an oxidation.
- Neither step is a reduction or a substitution.

3(a)(i)	
3(a)(ii)	yellow precipitate
3(a)(iii)	elimination

3(a)(iv)	
3(b)(i)	$(\text{CH}_3)_2\text{CHOH} + \text{Na} \rightarrow (\text{CH}_3)_2\text{CHO}^{\ominus}\text{Na}^{\oplus} + \frac{1}{2} \text{H}_2$
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)	$\text{C}_6\text{H}_{14}\text{O} + 9\text{O}_2 \rightarrow 6\text{CO}_2 + 7\text{H}_2\text{O}$