

Question 36 (Answer: **B**)

- Hydrogenating an alkene uses a nickel catalyst.
- Iron is the Haber process catalyst and vanadium(V) oxide the Contact process one.
- Yeast is a biological catalyst for fermentation, not for hydrogenation.

Question 32 (Answer: **A**)

- A homologous series shares the same functional group and the same general formula.
- For the alkenes the functional group is the C=C double bond.
- Their relative molecular masses differ, and so do their physical properties – only the trend is shared.

Question 17 (Answer: **B**)

- Bonds broken: $\text{C}=\text{C} + 4(\text{C}-\text{H}) + \text{H}-\text{H} = 614 + 1640 + 436 = 2690 \text{ kJ}$.
- Bonds formed: $\text{C}-\text{C} + 6(\text{C}-\text{H}) = 350 + 2460 = 2810 \text{ kJ}$.
- $\Delta H = 2690 - 2810 = -120 \text{ kJ/mol}$.

Question 36 (Answer: **D**)

- Bromine adds across the double bond, putting a bromine on *each* of the two carbons.
- Hydrogen adds to give propane, and steam adds to give propan-2-ol.
- So look for the dibromo product on adjacent carbons, not a single bromine atom.

Question 33 (Answer: **C**)

- But-2-ene is C_4H_8 , so an isomer must have exactly that formula.
- Both the position of the double bond and the branching of the chain can be changed.
- So look for the structures that are still C_4H_8 but with the atoms joined differently.

6(a)	homologous series
6(b)	14
6(c)	$\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$ M1 $\text{CO}_2 + \text{H}_2\text{O}$ M2 correct equation
6(d)(i)	M1 decreases M2 decreases M3 decreases M4 no change
6(d)(ii)	M1 kinetic energy of particles increases M2 frequency of collisions between particles increases M3 higher percentage / proportion / fraction of collisions / particles have energy greater than / equal to activation energy
6(e)(i)	$\text{C}_5\text{H}_8\text{O}_4$
6(e)(ii)	it has a carbon-carbon bond which is not a single bond
6(e)(iii)	M1 one C – C single bond with continuation bonds M2 correct structure
6(e)(iv)	compound B has two carboxylic acid groups
6(e)(v)	M1 (mol of NaOH reacting) = 0.2(00) M2 volume = $1000 \times 0.2(00) / 0.250 = 800 \text{ cm}^3$

6(a)	M1 (have a) general formula of C_nH_{2n} M2 (have a) C=C functional group
6(b)	compounds made of C and H only
6(c)	$2\text{C}_3\text{H}_6 + 9\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$ M1 $\text{CO}_2 + \text{H}_2\text{O}$ as only products M2 correct equation
6(d)	CH_2
6(e)	but-2-ene
6(f)	displayed formula of but-1-ene
6(g)(i)	only one product is formed
6(g)(ii)	orange to colourless
6(g)(iii)	2,3-dibromobutane
6(h)(i)	displayed formula of ethanoic acid
6(h)(ii)	ethanoic acid
6(h)(iii)	$\text{CH}_3\text{CH}=\text{CHCH}_3 + 2\text{O}_2 \rightarrow 2\text{CH}_3\text{COOH}$