

Question 34 (Answer: **C**)

- Ethane is saturated, so it cannot add anything – it can only substitute.
- One hydrogen is replaced by one chlorine atom.
- So the products are chloroethane and hydrogen chloride.

Question 31 (Answer: **D**)

- Ultraviolet light starts a free-radical reaction.
- Methane is saturated, so nothing can be added to it.
- One hydrogen is replaced by one chlorine, which makes it a substitution.

5(a)	M1 (have a) general formula of C_nH_{2n+2} M2 differ from one member to the next by a $-CH_2-$ unit
5(b)(i)	increases
5(b)(ii)	M1 physical property M2 change as chain length increases
5(c)	all carbon–carbon bonds are single (bonds)
5(d)(i)	ultraviolet light
5(d)(ii)	M1 $CH_3CH_2CH_2Cl$ M3 1-chloropropane M2 $CH_3CHClCH_3$ M4 2-chloropropane
5(d)(iii)	(compounds with) the same molecular formula but different structural formulae or structure

Question 34 (Answer: **C**)

- Propane is $CH_3CH_2CH_3$.
- There are 2 carbon–carbon bonds and 8 carbon–hydrogen bonds.
- Total = 10 covalent bonds.

Question 35 (Answer: **C**)

- Ultraviolet light starts a free-radical *substitution*, not an addition.
- One hydrogen of the ethane is replaced by one chlorine atom.
- The displaced hydrogen leaves with the other chlorine as HCl: $C_2H_5Cl + HCl$.

Question 35 (Answer: **B**)

- A hydrocarbon contains only carbon and hydrogen, which rules out carboxylic acids and alcohols.
- Single bonds only means it is saturated.
- Saturated hydrocarbons are the alkanes.

Question 36 (Answer: **D**)

- Ultraviolet light provides the energy to start a free-radical substitution.
- A chlorine atom replaces one hydrogen of the methane.
- The products are chloromethane and hydrogen chloride – methane reacts with chlorine, not with HCl.

Question 36 (Answer: **B**)

- Methylpropane has only two *kinds* of hydrogen: the nine on the methyl groups and the one on the central carbon.
- Replacing a methyl hydrogen gives 1-chloro-2-methylpropane.
- Replacing the central hydrogen gives 2-chloro-2-methylpropane – so two isomers.