

**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)      | <b>M1</b> (have a) general formula of $C_nH_{2n+2}$<br><b>M2</b> differ from one member to the next by a $-CH_2-$ unit |
| 5(b)(i)   | increases                                                                                                              |
| 5(b)(ii)  | <b>M1</b> physical property<br><b>M2</b> change as chain length increases                                              |
| 5(c)      | all carbon–carbon bonds are single (bonds)                                                                             |
| 5(d)(i)   | ultraviolet light                                                                                                      |
| 5(d)(ii)  | <b>M1</b> $CH_3CH_2CH_2Cl$<br><b>M3</b> 1-chloropropane<br><b>M2</b> $CH_3CHClCH_3$<br><b>M4</b> 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.