Solutions

Each answer shows the steps, then the **result**.

2.1

- alkanes: $\mathbf{C_nH_{2n+2}}$

2.2

- structural isomers have the **same molecular formula** but **different structural formulae**

2.3

- alkenes: $\mathbf{C_nH_{2n}}$
- four carbons: $\mathbf{C_4H_8}$

2.4

- any **two** of: same functional group / same general formula / neighbours differ by CH_2 / similar chemistry / gradual change in physical properties

2.5

- the molecules get **longer**
- intermolecular forces are **stronger**, so more energy is needed to separate them

3.1 B

- a saturated hydrocarbon has **only single C–C bonds**
- A is an alkene; C is an alcohol; D is a carboxylic acid

3.2

(a)

- they have the **same functional group**

(b)

- consecutive members differ by a $\mathbf{CH_2}$ unit

3.3

- straight chain: **butane** $CH_3CH_2CH_2CH_3$
- branched: **2-methylpropane**
- both named correctly

3.4

(a)

- the **alkanes**; general formula $\mathbf{C_nH_{2n+2}}$

(b)

- a chain of **five carbons**, all single-bonded
- every carbon has four bonds, 12 hydrogens in total

(c)

- e.g. **2-methylbutane**: a four-carbon chain with CH_3 on carbon 2
- same formula C_5H_{12}, atoms joined in a **different order**

(d)

- straight-chain molecules **pack more closely**, so intermolecular forces are stronger
- more energy is needed to separate them, so the **boiling point is higher**

(e)

- **alkenes**; they contain a **C=C**
- bromine **adds** across the double bond, so orange bromine water is **decolourised**