

Solutions

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

2.1

- an atom or group of atoms that gives a molecule its characteristic chemical (and physical) properties

2.2

- 2,4,6-tribromophenol

3.1 C

- A skeletal formula omits the hydrogen atoms bonded to carbon (and the carbons are shown only as line-ends/bends)

3.2 A

- 2-aminobutanoic acid — the -COOH is C1, the -NH_2 is on C2

3.3

(a)

- 2-methylnitrobenzene / 1-methyl-2-nitrobenzene

(b)

- cyclohexanol

(c)

- propanenitrile

3.4

- a benzene hexagon with -COOH drawn at C1 and -NO_2 at C3

3.5

(a)

- 2-methylpent-3-en-1-ol. The chain is numbered from the end that gives the **principal functional group** — here the alcohol — the lowest number, so the OH carbon is C1; the double bond and the methyl branch are then numbered from that same end

(b)

- Empirical formula $\text{C}_6\text{H}_{12}\text{O}$ — the ratio 6:12:1 has no common factor, so it equals the molecular formula; the alcohols have the general formula $\text{C}_n\text{H}_{2n+1}\text{OH}$

(c)

- Every atom and every bond shown, with $\text{HOCH}_2\text{-CH(CH}_3\text{)-CH=CH-CH}_3$

(d)

- Alcohol (hydroxyl) — reacts with sodium (effervescence of hydrogen), or with acidified potassium dichromate(VI). Alkene (C=C) — reacts with bromine water, decolourising it, or adds hydrogen over a nickel catalyst