Solutions

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

2.1

- its molecular mass / M_r (the mass of the whole molecule)

2.2

- bromine (Br) – the $^{79}Br/^{81}Br$ ratio is about 1:1

2.3

- $46 - 29 =$ **17**, the loss of an OH group

2.4

- about 1.1% of carbon atoms are the ^{13}C isotope, so some molecules are one mass unit heavier

3.1 B

- $A_r = \dfrac{(35 \times 75) + (37 \times 25)}{100} = 35.5$

3.2 B

- A loss of 15 is a CH_3 group

3.3

(a)

- $n = \dfrac{100 \times 4.4}{1.1 \times 100} = 4$

(b)

- $C_4H_8O_2$ (e.g. butanoic acid)

3.4

- bromine; the two peaks two apart in a ~1:1 ratio match the ^{79}Br and ^{81}Br isotopes

3.5

(a)

- chlorine has two isotopes, ^{35}Cl and ^{37}Cl
- in the ratio 3 : 1, so molecules containing ^{35}Cl are three times as common as those with ^{37}Cl

(b)

- $M_r = 64$ with ^{35}Cl: $64 - 35 = 29 = C_2H_5$, so it is **chloroethane**, C_2H_5Cl

3.6

(a)

- $CH_3CH(OH)^+$, that is $[C_2H_5O]^+$

(b)

- the peak at 45 is the molecular ion (60) minus a CH_3 (15); propan-2-ol, $CH_3CH(OH)CH_3$, has a CH_3 on the carbon bearing OH
- propan-1-ol would give a large peak at 31 (CH_2OH^+), which is absent, so the compound is **propan-2-ol**