Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

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

2.1

- $\mathbf{6.02 \times 10^{23}}$
- the number of particles in one mole of a substance

2.2

- **2.00 mol**
- **10.0 g**

2.3

- $\mathbf{1.20 \times 10^{24}}$ molecules
- $\mathbf{3.61 \times 10^{24}}$ atoms

2.4

- $M = \dfrac{22.0}{0.250}$
- $\mathbf{88.0\ g\,mol^{-1}}$

2.5

- $0.200 \times \dfrac{250}{1000}$
- **0.0500 mol**

3.1

- $n(\mathrm{NaCl}) = 0.100$; $\mathbf{6.02 \times 10^{22}}$ ions
- $n(\mathrm{CaCl_2}) = 0.0500$, so 0.100 mol $\mathrm{Cl^-}$; $\mathbf{6.02 \times 10^{22}}$ ions

3.2

- $n = \dfrac{1.204 \times 10^{23}}{6.02 \times 10^{23}} = 0.200$
- $M = 24.3\ \mathrm{g\ mol^{-1}}$
- **magnesium**

3.3

(a) $n = \dfrac{2.65}{106.0} = 0.0250$; $c = \dfrac{0.0250}{0.250} = \mathbf{0.100\ mol\,dm^{-3}}$

(b) $\mathbf{10.6\ g\,dm^{-3}}$

3.4

(a) $\dfrac{0.300}{180.0} = \mathbf{1.67 \times 10^{-3}\ mol}$

(b) $\mathbf{1.00 \times 10^{21}}$

(c) $\times 4 = \mathbf{4.01 \times 10^{21}}$

(d) $\dfrac{1.67 \times 10^{-3}}{0.100} = \mathbf{0.0167\ mol\,dm^{-3}}$

(e) $\dfrac{1}{4 \times 1.67 \times 10^{-3}} = \mathbf{150}$ days