

Exercise walk-through

1.1

Moles and Molar Mass

AP Chemistry

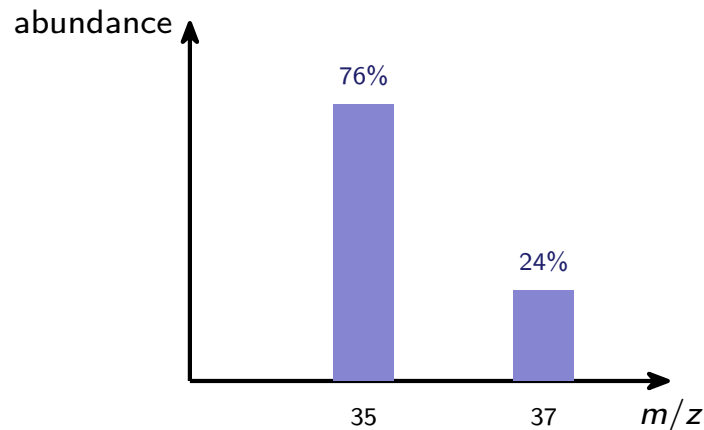
Mass spectra and isotopes

Isotopes share protons but differ in neutrons – so in mass. A **mass spectrometer** sorts them.

Average atomic mass

$$\bar{m} = \sum (\text{mass} \times \text{abundance})$$

Cl: $0.758(35) + 0.242(37) = 35.45$ – the taller bar pulls the average toward it.



Exercises 2.1-2.3

2.1 How many moles are in 44 g of CO_2 ($M = 44 \text{ g/mol}$)? [2]

2.2 Find the molar mass of water, H_2O ($\text{H} = 1, \text{O} = 16$). [2]

2.3 Find the mass of 3 mol of carbon atoms ($M = 12 \text{ g/mol}$). [2]

Exercises 2.1·2.3

2.1 How many moles are in 44 g of CO_2 ($M = 44 \text{ g/mol}$)? [2]

2.1

- $n = m/M = 44/44 = 1 \text{ mol}$

2.2 Find the molar mass of water, H_2O ($\text{H} = 1$, $\text{O} = 16$). [2]

2.2

- $2(1) + 16 = 18 \text{ g/mol}$

2.3 Find the mass of 3 mol of carbon atoms ($M = 12 \text{ g/mol}$). [2]

2.3

- $m = nM = 3 \times 12 = 36 \text{ g}$

Exercises 2.4·3.1

2.4 State the number of particles in one mole.

[1]

3.1 One mole of any substance contains

[1]

☐

A 1000 particles

B 6.022×10^{23} particles

C 6.022×10^{-23} particles

D 12 particles

Exercises 2.4·3.1

2.4 State the number of particles in one mole. [1]

2.4

- 6.022×10^{23}

3.1 One mole of any substance contains [1]

☐

A 1000 particles

B 6.022×10^{23} particles

C 6.022×10^{-23} particles

D 12 particles

3.1 B

- a mole is Avogadro's number of particles

Exercise 3.2

3.2 The molar mass of CO_2 ($\text{C} = 12$, $\text{O} = 16$) is

[1]

☐

A 28 g/mol

B 44 g/mol

C 12 g/mol

D 60 g/mol

Exercise 3.2

3.2 The molar mass of CO_2 ($\text{C} = 12$, $\text{O} = 16$) is

[1]

☐

A 28 g/mol

B 44 g/mol

C 12 g/mol

D 60 g/mol

3.2 B

- $12 + 2(16) = 44 \text{ g/mol}$

Exercise 3.3 (a)

3.3 A sample contains 88 g of CO_2 ($M = 44 \text{ g/mol}$).

(a) Find the number of moles.

[2]

Exercise 3.3 (a)

3.3 A sample contains 88 g of CO_2 ($M = 44 \text{ g/mol}$).

(a) Find the number of moles.

[2]

(a)

- $n = 88/44 = 2 \text{ mol}$

Exercise 3.3 (b)

3.3 A sample contains 88 g of CO_2 ($M = 44 \text{ g/mol}$).

(b) Find the number of molecules (use 6.022×10^{23}).

[2]

Exercise 3.3 (b)

3.3 A sample contains 88 g of CO_2 ($M = 44 \text{ g/mol}$).

(b) Find the number of molecules (use 6.022×10^{23}).

[2]

(b)

- $2 \times 6.022 \times 10^{23} = 1.2 \times 10^{24}$ molecules

Exercise 3.4 (a)

3.4 A student needs 0.5 mol of NaCl ($M = 58.5$ g/mol).

(a) Find the mass required.

[2]

Exercise 3.4 (a)

3.4 A student needs 0.5 mol of NaCl ($M = 58.5$ g/mol).

(a) Find the mass required.

[2]

(a)

- $m = nM = 0.5 \times 58.5 = 29.25$ g

Exercise 3.4 (b)

3.4 A student needs 0.5 mol of NaCl ($M = 58.5$ g/mol).

(b) State the units of molar mass.

[1]

Exercise 3.4 (b)

3.4 A student needs 0.5 mol of NaCl ($M = 58.5$ g/mol).

(b) State the units of molar mass.

[1]

(b)

- g/mol (grams per mole)