SCIENCE FOUNDATIONS

Molar mass calculations

Difficulty level: Intermediate

Science Foundations

This document was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

Overview of the concept

This is how a pharmacist weighs out the exact amount of a chemical for a medicine, by turning the recipe amount into grams on a scale. A lab tech making a cleaning solution needs the right mass of powder to match the strength on the label. A farmer mixing fertilizer works out how many grams of a compound give the crop the nitrogen it needs. Knowing molar mass tells you how to turn a counted amount (see Avogadro's number) of a chemical into a weight you can actually measure.



Rule

Molar mass calculations: molar mass = sum of (atomic mass × subscript) for every atom.

The units are grams per mole.

© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q Find the molar mass of water, H_2O.

SOLUTION

List atomic masses: hydrogen about 1.0, oxygen about 16.0.

Multiply by subscripts:

$2 \times 1.0 + 1 \times 16.0$

Add:

$2.0 + 16.0 = 18.0$ g/mol

The result is 18.0 g/mol.

EXAMPLE 2

Q Find the molar mass of carbon dioxide, CO_2.

SOLUTION

List atomic masses: carbon about 12.0, oxygen about 16.0.

Multiply by subscripts:

$1 \times 12.0 + 2 \times 16.0$

Add:

$12.0 + 32.0 = 44.0$ g/mol

The result is 44.0 g/mol.

© 2026 Brett Robbins. All Rights Reserved.

Practice questions

1 **Molar mass of hydrogen chloride, HCl?**

Understand It with Pulse | Flag a mistake

2 **What is the mass of 2 mol of magnesium oxide, MgO? (Mg 24.3, O 16.0)**

Understand It with Pulse | Flag a mistake

3 **How many moles are in 117.0 g of table salt, NaCl? (Na 23.0, Cl 35.5)**

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

4 Hydrogen gas is H_2. What is its molar mass? (H 1.0)

Understand It with Pulse | Flag a mistake

5 Which has the greater molar mass: O_2 or CO? (O 16.0, C 12.0)

A CO

B O_2

C They are equal

D Cannot tell without more data

Understand It with Pulse | Flag a mistake

6 What is the molar mass of methane, CH_4? (C 12.0, H 1.0)

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

7 **A student calculates the molar mass of ammonia, NH_3, as 14.0 + 1.0 = 15.0 g/mol. What did they forget?**

- **A** To use the wrong mass for nitrogen.
- **B** To add oxygen's mass.
- **C** To multiply hydrogen's mass by its subscript, 3.
- **D** Nothing, 15.0 g/mol is correct.

Understand It with Pulse | Flag a mistake

8 **A student writes a molar mass as 44.0 g. What is missing from the units?**

- **A** Grams per mole
- **B** Grams per litre
- **C** Moles per gram
- **D** Kilograms per mole

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

9 What is the molar mass of calcium hydroxide, $Ca(OH)_2$? (Ca 40.1, O 16.0, H 1.0)

Understand It with Pulse | Flag a mistake

10 One mole of carbon monoxide, CO, contains how many moles of oxygen atoms?

A 2 mol

B 0.5 mol

C 28 mol

D 1 mol

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. 36.5 g/mol

2. 80.6 g

3. 2.0 mol

4. 2.0 g/mol

5. O_2

6. 16.0 g/mol

7. To multiply hydrogen's mass by its subscript, 3.

8. Grams per mole

9. 74.1 g/mol

10. 1 mol

© 2026 Brett Robbins. All Rights Reserved.