

CHEMISTRY ESSENTIALS

Adding Atomic Masses

A step-by-step guide to calculating molecular mass.

NCERT Chapter 1.7.3

Defining Molecular Mass

Molecular mass is the sum of the atomic masses of the elements present in a single molecule. It is obtained by multiplying the atomic mass of each element by the number of its atoms and adding them together.

$$[\text{Atomic Mass of Element A}] \times [\text{Number of Atoms}]$$

+

$$[\text{Atomic Mass of Element B}] \times [\text{Number of Atoms}]$$

=

Molecular Mass



Unit Note: Atomic and molecular masses are expressed in **u** (unified mass), replacing the older 'amu'.

Calculating Methane **CH₄**



C (1 atom)

$$1 \times 12.011 \text{ u} = 12.011 \text{ u}$$

H (4 atoms)

$$4 \times 1.008 \text{ u} = 4.032 \text{ u}$$

$$12.011 \text{ u} + 4.032 \text{ u} = 16.043 \text{ u}$$

$$\text{CH}_4 = 16.043 \text{ u}$$



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$$E=mc^2$$



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Calculating Water **H₂O**

H (2 atoms)

$$2 \times 1.008 \text{ u} = 2.016 \text{ u}$$

O (1 atom)

$$1 \times 16.00 \text{ u} = 16.000 \text{ u}$$

$$2.016 \text{ u} + 16.00 \text{ u} = 18.02 \text{ u}$$

$$\text{H}_2\text{O} = 18.02 \text{ u}$$

Calculating Glucose $\text{C}_6\text{H}_{12}\text{O}_6$

C (6 atoms)

$$6 \times 12.011 \text{ u} \\ = 72.066 \text{ u}$$

H (12 atoms)

$$12 \times 1.008 \text{ u} \\ = 12.096 \text{ u}$$

O (6 atoms)

$$6 \times 16.00 \text{ u} \\ = 96.000 \text{ u}$$

$$72.066 \text{ u} + 12.096 \text{ u} + 96.00 \text{ u} = 180.162 \text{ u}$$

$$\text{C}_6\text{H}_{12}\text{O}_6 = 180.162 \text{ u}$$

The Core Algorithm

KEY TAKEAWAY

Step 1

COUNT ATOMS

Identify the quantity of each specific element in the chemical formula.



Step 2

MULTIPLY

Multiply the number of atoms by the element's average atomic mass.



Step 3

ADD

Sum all the calculated values together to find the total molecular mass in **u**.



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