

Mole Unit WS #2: Determining Molar Mass



In many problems in chemistry it is necessary to know the mass of one mole of a given compound. The units for molar mass are g/mole (g/mol).

Here are the steps you follow to calculate the molar mass.

1. First determine the total number of each type of atom present.
2. Find the mass of each type of atom from the Periodic table.
3. Multiply the mass of a specific type of atom by the number of that type of atom.
4. Add the total masses for each type of atom in the problem to determine the total

Example: CO₂ (carbon dioxide)

1. In carbon dioxide there is one (1) carbon atom and two (2) oxygen atoms.
2. The molar mass of carbon is 12.0 g/mol and the molar mass of oxygen is 16.0 g/mol.
3. Now multiply the 1 carbon atom by carbon's molar mass (1 X 12.0 g/ mole) to get 12.0 and multiply the 2 oxygen atoms by oxygen's molar mass (2 X 16.0 g/ mole) to get 32.0.
4. Finally, we add the 12.0g/mol and the 32.0g/mol to get the Molar Mass of carbon dioxide (CO₂), which is 44.0 g/mol. This process is mathematically represented below.

FORMULA	CALCULATION	Molar Mass
CO ₂	$(1 \times 12.0\text{g/mol}) + (2 \times 16.0\text{g/mol}) =$	44.0 g/mol
FeS		
NaCl	$(1 \times 23.0) + (1 \times 35.5)$	58.5 g/mol
Al ₂ (CO ₃) ₃	$(2 \times 27.0) + (3 \times 12.0) + (6 \times 16.0)$	186 g/mol
SiO ₂		
H ₂ O	$(2 \times 1.00) + (1 \times 16.0)$	18.0 g/mol
H ₂ SO ₄		
C ₁₂ H ₂₂ O ₁₁	$(12 \times 12.0) + (22 \times 1.00) + (11 \times 16.0)$	342 g/mol
Fe ₂ O ₃		
ZnCl ₂	$(1 \times 65.4) + (2 \times 35.5)$	136.4 g/mol
Ca(OH) ₂		
CH ₄	$(1 \times 12) + (4 \times 1.00)$	16.0 g/mol
NH ₃		
H ₂ O ₂	$(2 \times 1.00) + (2 \times 16.0)$	34.0 g/mol
NaHCO ₃		
C ₆ H ₁₂ O ₆	$(6 \times 12.0) + (12 \times 1.00) + (6 \times 16.0)$	180 g/mol