

Molar Mass of a Compound

-add molar masses of the elements

Example: $\text{Ca}(\text{OH})_2$

$$\begin{array}{rcl}
 1 \text{ Ca} \times 40.08 & = & 40.08 \\
 2 \text{ O} \times 16.00 & = & 32.00 \\
 2 \text{ H} \times 1.01 & = & 2.02 \\
 \hline
 & & 74.10 \text{ g/mol}
 \end{array}$$

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Conversion

Example 1: How many grams are in 5 moles of CCl_2 ?Giv: 5 mol CCl_2 Unk: g CCl_2

$$\begin{array}{rcl}
 1 \text{ C} \times 12.01 & = & 12.01 \\
 2 \text{ Cl} \times 35.45 & = & 70.90 \\
 \hline
 & & 82.91 \text{ g/mol}
 \end{array}$$

$$5 \text{ mol } \text{CCl}_2 \times \frac{82.91 \text{ g } \text{CCl}_2}{1 \text{ mol } \text{CCl}_2} = 414.55 \text{ g } \text{CCl}_2$$

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Example 2: How many molecules are in 150.0 g H_2SO_4 ?Giv: 150.0 g H_2SO_4 Unk: molecules H_2SO_4 molar mass
 H_2SO_4

98.08 g/mol

$$\begin{array}{rcl}
 150.0 \text{ g } \text{H}_2\text{SO}_4 & \times & \frac{1 \text{ mol } \text{H}_2\text{SO}_4}{98.08 \text{ g } \text{H}_2\text{SO}_4} \times \frac{6.022 \times 10^{23} \text{ molecules}}{1 \text{ mol } \text{H}_2\text{SO}_4} \\
 & = & 9.21 \times 10^{23} \text{ molecules } \text{H}_2\text{SO}_4
 \end{array}$$

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Percent Composition

$$\% \text{ mass of element} = \frac{\text{molar mass of element}}{\text{molar mass of compound}} \times 100$$

Example: Calculate the percent composition of dinitrogen trioxide. N_2O_3

$$2 \text{ N} \times 14.01 = 28.02$$

$$3 \text{ O} \times 16.00 = 48.00$$

$$\frac{76.02 \text{ g/mol}}$$

$$\% \text{ N} = \frac{28.02}{76.02} \times 100 = 36.9\%$$

$$\% \text{ O} = \frac{48.00}{76.02} \times 100 = 63.1\%$$

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