

Stoichiometry Cheat Sheet

1 mole = molar mass of the substance	1 mole = 6.022×10^{23} particles	1 mole = 22.4L of a gas at STP
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$$\text{Amount known} \times \frac{1 \text{ mol known}}{\begin{matrix} \text{a) Molar mass} \\ \text{b) } 6.022 \times 10^{23} \text{ particles} \\ \text{c) 22.4L} \end{matrix}} \times \frac{(y) \text{ mol unknown}}{(x) \text{ mol known}} \times \frac{\begin{matrix} \text{d) Molar mass} \\ \text{e) } 6.022 \times 10^{23} \text{ particles} \\ \text{f) 22.4L} \end{matrix}}{1 \text{ mol unknown}} = \text{ANSWER}$$

- a) – used when amount known is a mass (g)
- b) – used when amount known is particles (molecules, formula units, atoms)
- c) – used when amount known is liters of gas at STP (L)

- d) – used when answer is unknown in mass (g)
- e) – used when answer is unknown in particles (molecules, formula units, atoms)
- f) – used when answer is unknown in liters of gas at STP (L)

(x) = coefficient of known substance from balanced equation
 (y) = coefficient of unknown substance from balanced equation

Example: (mass to mass problem)

Given the equation $\text{Al}(\text{NO}_3)_3 + \text{NaOH} \rightarrow \text{Al}(\text{OH})_3 + \text{NaNO}_3$, find the mass of NaNO_3 formed if 275g of NaOH reacts.

1. Known substance = NaOH
2. Unknown substance = NaNO_3
3. Balance equation = $\text{Al}(\text{NO}_3)_3 + 3\text{NaOH} \rightarrow \text{Al}(\text{OH})_3 + 3\text{NaNO}_3$
4. Start with known amount (275g NaOH) and solve for grams of NaNO_3

“3” mol of NaNO_3 because coefficient of NaNO_3 in balanced equation is “3”

Molar mass of NaNO_3 because question asks for “mass”

$$275\text{g NaOH} \times \frac{1 \text{ mol NaOH}}{39.997\text{g NaOH}} \times \frac{3 \text{ mol NaNO}_3}{3 \text{ mol NaOH}} \times \frac{84.994 \text{ g NaNO}_3}{1 \text{ mol NaNO}_3} = 584\text{g NaNO}_3$$

Molar mass of NaOH because question gives info “275g of NaOH ”

“3” mol of NaOH because coefficient of NaOH in balanced equation is “3”