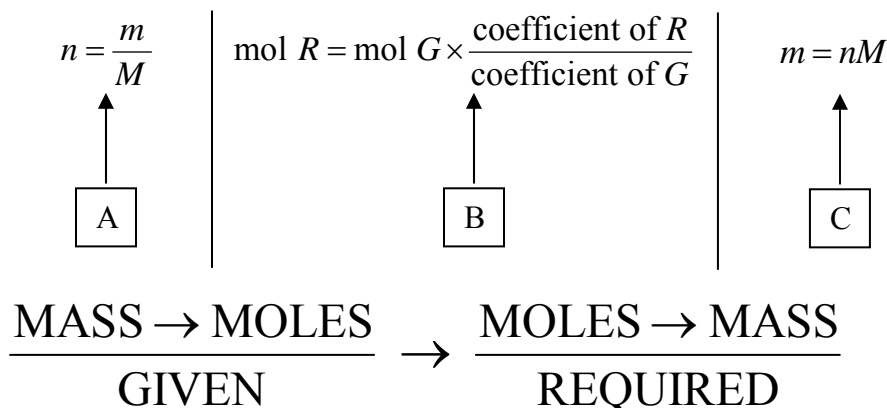


# Gravimetric Stoichiometry Tutorial

Calculations will proceed from information about a given substance in either mole or mass units. The calculation will proceed towards a required substance in either mole or mass units.

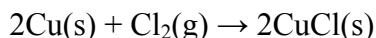


Depending on the question, you will do either some or all three of the conversions (A, B, C) above.

Calculations can be done by using the memorized formulas shown above for each of the conversions, or by doing all the calculations together using unit analysis. Both methods will be illustrated below.

**How many grams of chlorine will react with copper to produce 18.5 g of copper(I) chloride?**

**1. Solution using formulas:** This solution requires three calculations, as we are required to go from given mass to required mass.



$$\text{(a) Moles of CuCl} = \frac{m}{M} = \frac{18.5 \text{ g CuCl}}{99.00 \frac{\text{g}}{\text{mol}}} = 0.1867 \text{ mol CuCl} = 0.187 \text{ mol CuCl(s)}$$

**(b) Moles of chlorine**

$$= \text{mol CuCl} \left( \frac{\text{coeff Cl}_2}{\text{coeff CuCl}} \right) = (0.1867 \text{ mol CuCl}) \left( \frac{1 \text{ mol Cl}_2}{2 \text{ mol CuCl}_2} \right) = 0.0934 \text{ mol Cl}_2\text{(g)}$$

$$\text{(c) Mass of chlorine} = nM = (0.0934 \text{ mol Cl}_2) \left( 70.90 \frac{\text{g}}{\text{mol}} \right) = 6.62 \text{ g Cl}_2\text{(g)}$$

**2. Solution using unit analysis:** This solution requires one continuous calculation using appropriate information with a view to getting the correct units in your answer.

$$\text{grams of Cl}_2 = (18.5 \text{ g CuCl}) \left( \frac{1 \text{ mol CuCl}}{99.00 \text{ g CuCl}} \right) \left( \frac{1 \text{ mol Cl}_2}{2 \text{ mol CuCl}} \right) \left( 70.90 \frac{\text{g Cl}_2}{\text{mol Cl}_2} \right) = 6.62 \text{ g Cl}_2\text{(g)}$$