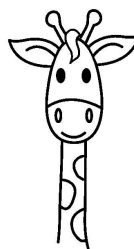


## Step-by-step Chemical Calculations

Given the quantity of a substance and a balanced equation  
determine the quantity of another substance

1. Determine which quantity is *known* and which is *unknown*
2. If *known* is a mass, calculate its molar mass  $M$  (using the periodic table)
3. Calculate the number of moles for *known*
  - Use  $n = \frac{m}{M}$  if *known* is a mass
  - Use  $n = C \times V$  if *known* is a concentration and volume
4. Use the balanced chemical equation to determine the mole ratio  $\frac{n_{\text{unknown}}}{n_{\text{known}}}$ 
  - Use the coefficients (balancing numbers out the front of each species)
5. Calculate the moles of *unknown* by multiplying moles of *known* by the mole ratio
6. If *unknown* is a mass, calculate its molar mass  $M$  (using the periodic table)
7. Calculate the quantity for *unknown*
  - Use  $m = n \times M$  if mass is required
  - Use  $C = \frac{n}{V}$  if concentration is required
  - Use  $V = \frac{n}{C}$  if volume is required



## SUMMARY

**1.**  
Calculate  
moles of  
*known*

**2.**  
Use mole  
ratio to  
determine  
moles of  
*unknown*

**3.**  
Calculate  
required  
quantity of  
*unknown*