## **Step-by-step Chemical Calculations**

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

## **Step-by-step Chemical Calculations**

*Given the quantity of each reactant and the balanced equation determine the excess and limiting reactant* 

- 1. For the purpose of following these instructions, label the reactants A and B
- 2. Calculate the moles present of each
  - Use  $n = \frac{m}{M}$  if given mass
  - Use n = CV if given concentration and volume
- 3. Use the balanced chemical equation to determine the mole ratio  $\frac{n_A}{n_B}$ 
  - Use the coefficients (balancing numbers out the front of each species)
- 4. Calculate moles required of A by multiplying the moles present of B by the mole ratio
- 5. Compare moles present of A with moles required of A
  - If present is less than required, *A* is the limiting reactant (*B* is in excess)
  - If present is more than required, B is the limiting reactant (A is in excess)
  - If present is equal to required, neither reactant is in excess.

SUMMARY

1. Calculate moles present of each

2. Calculate moles of one required to exactly react with the other

3. Compare moles required with moles present