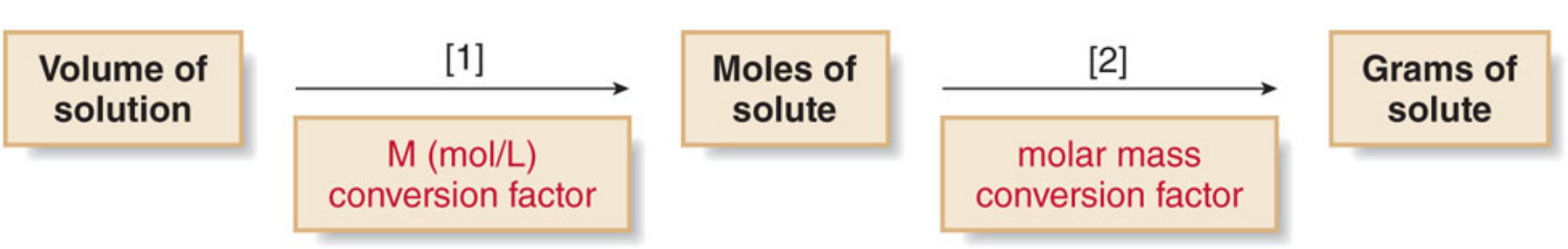
Solution Stoichiometry

Section 8.5

Molarity

- Compares moles to liters of a solution
- Similar to molar mass for solids and molar volume for gases at STP
- Can be used as a conversion factor in the stoichiometric flow chart to go from liters to moles or moles to liters

Solution Stoichiometry



Example #1

How many grams of H_2 are formed when 150.mL of 0.105M HCl react?

$$2Na(s) + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2(g)$$

Example #1 Solved

- Given: 150.mL of 0.105M HCl
- Need: g H_2

$$150.mLsol'n \times \frac{1L}{1000mL} \times \frac{0.105molHCl}{1Lsol'n} \times \frac{1molH_2}{2molHCl} \times \frac{2.016gH_2}{1molH_2} = 0.0159gH_2$$

Need liters

Molarity M = mol/L

Molar ratio

Molar mass

Example #2

How many mL of 5.25M HCl will react with 50.0 g of Na?

$$2Na(s) + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2(g)$$

Example #2 Solved

- Given: 50.0g of Na, 5.25M HCl
- Need: mL HCl

$$50.0\,gNa \times \frac{1\,molNa}{22.99\,gNa} \times \frac{2\,molHCl}{2\,molNa} \times \frac{1\,LHCl}{5.25\,molHCl} \times \frac{1000\,mLHCl}{1\,LHCl} = 414\,mLHCl$$

Molar mass

Molar ratio

Molarity
M = mol/L

Need
milliliters

Example #3

How many grams of H_2 are formed when 750.mL of 6.00M HCl react?

$$2Na(s) + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2(g)$$

Example #4

How many mL of 0.95M H2SO4 will react with 47 g of Mg?

$$Mg(s) + H_2SO_4(aq) \rightarrow MgSO_4(aq) + H_2(g)$$