

# Measuring Concentration (Molarity)

$$\text{Molarity (M)} = \frac{\text{\# moles of solute (mol)}}{\text{Volume of solution (L)}}$$

$$M = \frac{n}{V}$$



Ex) What is the molarity of a solution made by dissolving 63.41 g of sodium hydrogen carbonate in .225 L of solution?

$$M = ?$$

$$n = \frac{63.41 \text{ g NaHCO}_3}{84.01 \text{ g}} \cdot 1 \text{ mol} = .7548 \text{ mol}$$

$$V = .225 \text{ L}$$

$$M = \frac{.7548 \text{ mol}}{.225 \text{ L}} = 3.35 \text{ mol/L}$$

3.35 mol/L  
or  
3.35 molar  
or  
3.35 M

$$\begin{array}{r} 22.99 \text{ g} \\ 1.01 \text{ g} \\ 12.01 \text{ g} \\ + 48.00 \text{ g} \\ \hline 84.01 \text{ g} \end{array}$$

Ex) What volume of solution is needed to dissolve 25.00 g of sulfuric acid to make a 1.674 Molar solution?

$$M = 1.674 \text{ mol/L}$$

$$n = \frac{25.00 \text{ g H}_2\text{SO}_4}{98.09 \text{ g}} \cdot 1 \text{ mol} = .2549 \text{ mol}$$

$$V = ?$$

$$V = \frac{n}{M} = \frac{.2549 \text{ mol}}{1.674 \text{ mol/L}}$$

$$V = .1523 \text{ L}$$

152.3 mL

$$\begin{array}{r} 2.02 \text{ g} \\ 32.07 \text{ g} \\ 64.00 \text{ g} \\ \hline 98.09 \text{ g} \end{array}$$

Ex) What mass of calcium hydroxide is needed to make 300.0 mL of a 1.11 M solution?

$$M = 1.11 \text{ mol/L}$$

$$n = ?$$

$$V = 300.0 \text{ mL} = .3000 \text{ L}$$

$$n = M \cdot V$$

$$= 1.11 \text{ mol/L} \cdot .3000 \text{ L}$$

$$= .333 \text{ mol} \cdot \frac{74.10 \text{ g}}{1 \text{ mol}} = 24.7 \text{ g}$$

$$\begin{array}{r} 40.08 \text{ g} \\ 32.00 \text{ g} \\ + 2.02 \text{ g} \\ \hline 74.10 \text{ g} \end{array}$$