

# Diluting a Solution

moles acid before dilution = moles acid after dilution

$$n_{\text{before}} = n_{\text{after}}$$

$$\left\{ \begin{array}{l} M = \frac{n}{V} \\ n = m \cdot V \end{array} \right.$$

$$M_{\text{before}} V_{\text{before}} = M_{\text{after}} V_{\text{after}}$$

$$M_1 V_1 = M_2 V_2$$

ex) How many liters of 3.0M  $\text{H}_2\text{SO}_4$  are needed to create 2.0L of a .10M solution?

$$M_1 = 3.0 \text{ M}$$

$$V_1 = ?$$

$$M_2 = .10 \text{ M}$$

$$V_2 = 2.0 \text{ L}$$

$$(3.0 \text{ M}) V_1 = (.10 \text{ M})(2.0 \text{ L})$$

$$\frac{(3.0 \text{ M}) V_1}{3.0 \text{ M}} = \frac{.20 \text{ M} \cdot \text{L}}{3.0 \text{ M}}$$

$$V_1 = .067 \text{ L}$$

Ex) How many mL of 6.00 M HCl are needed to make 125 mL of a diluted 2.00 M solution?

$$M_1 V_1 = M_2 V_2$$

$$M_1 = 6.00 \text{ M}$$

$$V_1 = ?$$

$$M_2 = 2.00 \text{ M}$$

$$V_2 = 125 \text{ mL} = 0.125 \text{ L}$$

$$(6.00 \text{ M}) V_1 = (2.00 \text{ M})(0.125 \text{ L})$$

$$\frac{(6.00 \text{ M}) V_1}{6.00 \text{ M}} = \frac{0.25 \text{ M} \cdot \text{L}}{6.00 \text{ M}}$$

$$V_1 = 0.042 \text{ L}$$

$$V_1 = 42.00 \text{ mL}$$