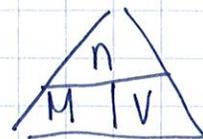


# Dilutions

What does it mean to dilute a solution?  
to add more solvent to the solution.



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

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

$$M_1 V_1 = M_2 V_2$$

(Ex) What volume of 1.50M sodium hydroxide is needed to create .600L of a 1.00M solution?

$$M_1 = 1.50M$$

$$V_1 = ?$$

$$V_2 = .600L$$

$$M_2 = 1.00M$$

$$\frac{(1.50M) V_1}{1.50M} = \frac{(1.00M)(.600L)}{1.50M}$$

$$V_1 = .400L$$

(Ex) You have 7.52 mL of a 12.0M sulfuric acid solution. You need .500M, what should the volume of your new solution be?  $M_2$

$$M_1 = 12.0M$$

$$V_1 = 7.52 \text{ mL} = .00752L$$

$$M_2 = .500M$$

$$V_2 = ?$$

$$M_1 V_1 = M_2 V_2$$

$$\frac{(12.0M)(.00752L)}{.500M} = \frac{(.500M) V_2}{.500M}$$

$$.180L = V_2$$

or  
180. mL

$$\text{molality} = \frac{\# \text{ moles of solute}}{\text{kg of solvent}}$$

$$m = \frac{n}{\text{kg}}$$



(Ex) Determine the <sup>m</sup>molality when 36.0 g of sodium chloride dissolves in 1000. g of solvent <sup>kg</sup> <sub>kg</sub>.

$$\begin{array}{r} 22.99 \text{ g} \\ + 35.45 \text{ g} \\ \hline 58.44 \text{ g} \end{array}$$

$$m = ?$$

$$n = \frac{36.0 \text{ g NaCl} | 1 \text{ mol}}{58.44 \text{ g}} = .616 \text{ mol}$$

$$\text{kg} = 1000. \text{ g} = 1.000 \text{ kg}$$

$$m = \frac{n}{\text{kg}} = \frac{.616 \text{ mol}}{1.000 \text{ kg}}$$

$$= .616 \text{ mol/kg} \text{ or } .616 \text{ m}$$

(Ex) How many <sup>kg</sup>kg of solvent are needed to dissolve <sup>n</sup>26.00 g potassium oxalate (MM = 166.21 g) to create a 1.25 m solution?  $m = \frac{n}{\text{kg}}$

$$m = 1.25 \text{ m}$$

$$n = \frac{26.00 \text{ g } \text{K}_2\text{C}_2\text{O}_4 | 1 \text{ mol}}{166.21 \text{ g}} = .1564 \text{ mol}$$

$$\text{kg} = ?$$

$$\text{kg} = \frac{n}{m} = \frac{.1564 \text{ mol}}{1.25 \text{ mol/kg}}$$

$$\text{kg} = .125 \text{ kg}$$