

## Molarity (M)

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

*(n) mol  
M | V  
V = Volume*

Ex) How many moles of CuSO4 were used to make 750 mL of a .456 Molar solution?

$$M = .456 \frac{\text{mol}}{\text{L}}$$

$$n = ? \quad n = (.456 \frac{\text{mol}}{\text{L}})(.750 \text{L})$$

$$V = 750 \text{mL} \quad = .342 \text{ mol}$$

$$= .750 \text{L}$$

Ex) What mass of KNO3 is dissolved in 234 mL of solution to have a concentration of 1.20 molal?

$$M = 1.20 \frac{\text{mol}}{\text{L}} \quad M = \frac{n}{V}$$

$$n = ? \quad n = M \cdot V$$

$$V = 234 \text{mL} \quad = (1.20 \frac{\text{mol}}{\text{L}})(.234 \text{L})$$

$$= .234 \text{L} \quad \boxed{n = .281 \text{ mol}}$$

$$\text{mass} = .281 \text{ mol} \text{ KNO}_3 \left| \begin{array}{c} 101.11 \text{ g} \\ | \\ 1 \text{ mol} \end{array} \right. =$$

$$\cancel{\frac{39.10}{14.01}} \cancel{\frac{48.00}{101.11}} = 28.4 \text{ g}$$

## Molality (m)

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

Ex) What is the molality of a solution made by dissolving 130.0g of SiO2 in 1.33 kg of solvent?

$$m = ?$$

$$n = \frac{130.0 \text{g} \text{ SiO}_2}{1 \text{ mol}} \left| \begin{array}{c} 28.09 \\ 60.09 \end{array} \right. \frac{1 \text{ mol}}{60.09 \text{ g}} = 2.163 \text{ mol}$$

$$\text{kg} = 1.33 \text{ kg}$$

$$m = \frac{2.163 \text{ mol}}{1.33 \text{ kg}} = 1.63 \frac{\text{mol}}{\text{kg}}$$

Ex) How many grams of NaOH were dissolved in 800.0 g of water to make a .400 molal solution?

$$M = .400 \frac{\text{mol}}{\text{kg}}$$

$$n = ? \quad n = (.400 \frac{\text{mol}}{\text{kg}})(.800 \text{ kg})$$

$$\text{kg} = 800.0 \text{ g} \quad n = .320 \text{ mol NaOH}$$

$$= .800 \text{ kg}$$

$$\text{mass} = .320 \text{ mol NaOH} \left| \begin{array}{c} 40.00 \text{ g} \\ | \\ 1 \text{ mol} \end{array} \right.$$

$$\cancel{\times \frac{22.99}{40.00}} = 12.8 \text{ g}$$