

- 1) **How many moles of Na<sup>+</sup> ions are there in 22.0 mL of 0.150 M Na<sub>2</sub>CO<sub>3</sub> solution?**

$$M = \text{moles/Liter} \quad \text{mol} = ML = (.150M)(.0220 \text{ L}) = .0033 \text{ mol Na}_2\text{CO}_3$$

$$.0033 \text{ mol Na}_2\text{CO}_3 \times (2 \text{ mol Na} / \text{mol Na}_2\text{CO}_3) = .0066 \text{ mol Na}^+ \text{ ions}$$

- 2) **What is the molar concentration of potassium permanganate in a solution prepared by dissolving 47.4 g of KMnO<sub>4</sub> in water and then making up the solution to 2.50 L?**

$$47.4 \text{ g KMnO}_4 \times (\text{mol} / 157.58\text{g}) = .301 \text{ mol KMnO}_4$$

$$.301 \text{ mol} / 2.50 \text{ L} = .120 \text{ M}$$

- 3) **How many grams of KMnO<sub>4</sub> would be required to prepare 200mL of a 0.178M solution?**

$$\text{mol} = ML \rightarrow \text{mol} = .2 \times .178 = (.0356 \text{ mol KMnO}_4 \times 157.58\text{g/mol}) = 5.61 \text{ g KMnO}_4$$

- 4) **How many mL of a 0.130 M solution of CaCl<sub>2</sub> contains 2.00g of CaCl<sub>2</sub>?**

$$2.00\text{g CaCl}_2 \times (\text{mol} / 110.97\text{g}) = .018 \text{ mol CaCl}_2$$

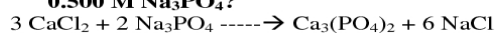
$$L = \text{mol} / M = .018 / .130 = .138\text{L} = 138 \text{ mL}$$

- 5) **How many grams of sodium chloride should be put into a 50.0 mL volumetric flask to give 0.15 M solution when the flask is filled to the score mark with water?**

$$M = \text{mol} / L \rightarrow \text{mol} = ML = (.05) (.15) = .0075 \text{ mol NaCl}$$

$$.0075 \text{ mol NaCl} \times 58.43\text{g/mol} = .438 \text{ g NaCl}$$

- 6) **What is the maximum weight of 2.00 L of 1.00 M of CaCl<sub>2</sub> with 3.00 L of 0.500 M Na<sub>3</sub>PO<sub>4</sub>?**



$$\text{Mole} = 1.00 \text{ M} \times 2.00 \text{ L} = 2.00 \text{ mol}$$

$$1.0 \text{ mol/L} \times 200\text{L} \times (1 \text{ Ca}_3(\text{PO}_4)_2 / 3 \text{ CaCl}_2) = .6667 \text{ mol Ca}_3(\text{PO}_4)_2 \text{ limiting reagent}$$

$$.500 \text{ mol/L} \times 3.00 \text{ L Na}_3\text{PO}_4 \times (1 \text{ Ca}_3(\text{PO}_4)_2 / 2 \text{ Na}_3\text{PO}_4) = .75 \text{ mol Ca}_3(\text{PO}_4)_2$$

$$.6667 \text{ mol Ca}_3(\text{PO}_4)_2 \times 310.07\text{g/mol} = 206.71\text{g Ca}_3(\text{PO}_4)_2$$