

More Dilution Calculations

Name - _____

$$\text{Molarity} = \frac{\text{moles of solute}}{\text{litre of solution}}$$

$$[\text{final}] = \frac{[\text{initial}] \times (\text{initial volume})}{(\text{final volume})}$$

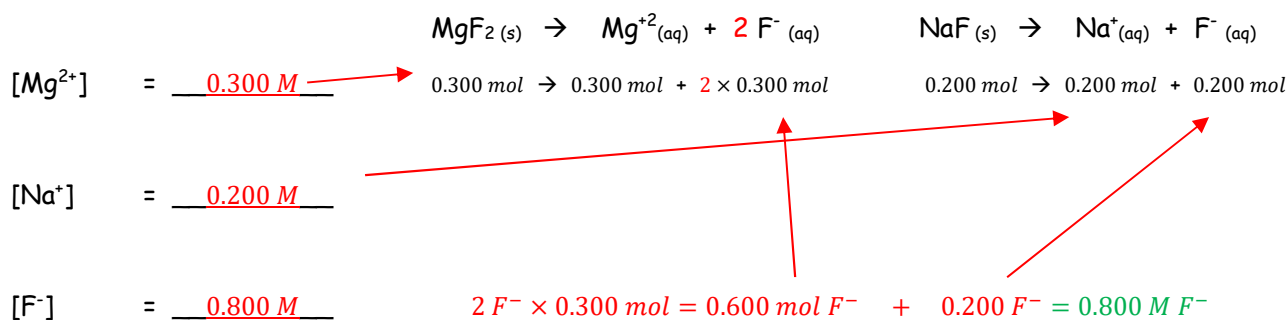
1.) How many litres of a 0.250 M K_2CrO_4 solution contain 26.3 grams of K_2CrO_4 ?

$$\text{Answer - Molarity} = \frac{\text{moles of solute}}{\text{litre of solution}} \quad 0.250 \text{ M} = \frac{26.3 \text{ g} \times \frac{1 \text{ mol}}{194.2 \text{ g}}}{\text{litre of solution}} \quad \underline{\underline{= 0.542 \text{ L } \text{K}_2\text{CrO}_4}}$$

2.) How many grams of sodium sulphate are there in 0.27 L of a 1.13 M solution?

$$\text{Answer - Molarity} = \frac{\text{moles of solute}}{\text{litre of solution}} \quad 1.13 \text{ M} = \frac{\text{moles of solute}}{0.27 \text{ L}} \quad 0.3051 \text{ mol} \times \frac{142.04 \text{ g}}{1 \text{ mol}} \\ = 43.3364 \text{ mol} \quad \underline{\underline{= 43 \text{ g } \text{Na}_2\text{SO}_4}}$$

3.) 1.00 L of solution contains 0.200 moles of NaF (s) and 0.300 moles of MgF_2 (s). Find;



4.) What would be the molarity of a solution in which 50.0 litres of HCl (aq) measured at STP, is dissolved in 2.00 L of water? (assume no change in volume of the water when the gas is added).

$$\text{Answer - Molarity} = \frac{\text{moles of solute}}{\text{litre of solution}} \quad \text{Molarity} = \frac{50.0 \text{ L} \times \frac{1 \text{ mol}}{22.4 \text{ L}}}{2.00 \text{ L}} \quad = 1.11607 \text{ M} \\ \underline{\underline{= 1.12 \text{ M } \text{HCl}}}$$

5.) To what volume must 100. mL of 6.00 M HCl (aq) be diluted in order that the resulting solution be 1.00 M?

$$\text{Answer - } [\text{final}] = \frac{[\text{initial}] \times (\text{initial volume})}{(\text{final volume})} \quad 1.00 \text{ M} = \frac{6.00 \text{ M} \times 0.100 \text{ L}}{(\text{final volume})} \quad = 0.600 \text{ L} \\ \underline{\underline{= 0.600 \text{ L } \text{HCl}}}$$

6.) How many molecules of sucrose, $C_{12}H_{22}O_{11}$, would there be in 1.00 mL of a 1.00 M solution?

Answer - $0.001 L \times \frac{1.00 \text{ mol}}{1 L} \times \frac{6.022 \times 10^{23} \text{ molec}}{1 \text{ mol}} = 6.022 \times 10^{20} \text{ molec}$
 $= 6.022 \times 10^{20} \text{ molec } C_{12}H_{22}O_{11}$

7.) How many grams of $CuSO_4 \cdot 5H_2O$ (s) would be required to prepare 1.00 L of 2.00 M $CuSO_4$?

Answer - $1.00 L \times \frac{2.00 \text{ mol } CuSO_4}{1 L} \times \frac{249.71 \text{ g}}{1 \text{ mol}} = 499.42 \text{ g } CuSO_4$
 $= 499 \text{ g } CuSO_4$

8.) 2.00 L of 12.0 M HCl (aq) is diluted to 20.0 L. What is the molarity of the diluted solution?

Answer - $C_{conc} \times V_{conc} = C_{dil} \times V_{dil}$ $12.0 \times 2.00 = C_{dil} \times 20.0$ $C_{dil} = 1.20 \text{ M } HCl$