

Check Homework #14-23

$$m = 400\text{g}$$
$$\text{CuSO}_4$$

$$V = 4.00\text{L}$$

$$C = ?$$

$$400\text{g CuSO}_4 \times \frac{1\text{ mol CuSO}_4}{159.61\text{g CuSO}_4}$$

$$= 2.506\text{ mol CuSO}_4$$

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

$$C = \frac{2.506\text{ mol}}{4.00\text{L}}$$

$$C = 0.6\text{M}$$

$$\textcircled{23} \quad m_{\text{sol'n}} = 1500\text{g}$$

$$\% \text{m/m} = 5.0\%$$

$$m_{\text{solute}} = ?$$

$$\% \text{m/m} = \frac{m_{\text{solute}}}{m_{\text{sol'n}}} \times 100\%$$

$$5.0\% = \frac{m_{\text{solute}}}{1500\text{g}} \times 100\%$$

$$0.050 = \frac{m_{\text{solute}}}{1500\text{g}}$$

$$m_{\text{solute}} = (0.050)(1500\text{g})$$

$$m_{\text{solute}} = 75\text{g}$$

Dilutions

Dilution - process of decreasing the concentration of a solution by adding more solvent (normally water).

Calculating new concentration after a dilution...

Start with 250. mL of a 0.15 mol/L solution.

100. mL of water is added to dilute the solution.

Which quantity is the same before and after the dilution?

- moles of solute (n) ? *same*
- volume of solution (V) ? \uparrow $V_i < V_f$
- concentration of solution (C) ? \downarrow $C_i > C_f$

$$n_i = n_f$$

$$V_i C_i = V_f C_f$$

What would be the concentration of a solution after diluting 45.0 mL of 4.2 mol/L KOH to 250 mL?

$$\begin{aligned} V_i &= 45.0 \text{ mL} \\ C_i &= 4.2 \text{ mol/L} \\ V_f &= 250 \text{ mL} \\ C_f &= ? \end{aligned}$$
$$V_i C_i = V_f C_f$$
$$(45.0 \text{ mL})(4.2 \text{ mol/L}) = (250 \text{ mL}) C_f$$
$$C_f = \frac{(45.0 \text{ mL})(4.2 \text{ mol/L})}{(250 \text{ mL})}$$

$$C_f = 0.76 \text{ mol/L}$$

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

$$n = V \times C$$

Sample Problems

How much 0.20 mol/L glucose solution can be made from 50. mL of 0.50 mol/L glucose solution?

$$\begin{aligned}V_i &= 50. \text{ mL} \\C_i &= 0.50 \text{ mol/L} \\V_F &= ? \\C_F &= 0.20 \text{ mol/L}\end{aligned}$$

$$\begin{aligned}V_i C_i &= V_F C_F \\(50. \text{ mL})(0.50 \text{ mol/L}) &= V_F (0.20 \text{ mol/L}) \\V_F &= \frac{(50. \text{ mL})(0.50 \text{ mol/L})}{0.20 \text{ mol/L}}\end{aligned}$$

$$V_F = 130 \text{ mL}$$

What would be the concentration of a solution made by adding 250 mL of water to 45.0 mL of 4.2 mol/L KOH?

$$\begin{aligned}V_i &= 45.0 \text{ mL} \\C_i &= 4.2 \text{ mol/L} \\V_F &= 295 \text{ mL} \\C_F &= ?\end{aligned}$$

$$\begin{aligned}V_i C_i &= V_F C_F \\(45.0 \text{ mL})(4.2 \text{ mol/L}) &= (295 \text{ mL}) C_F \\C_F &= 0.64 \text{ mol/L}\end{aligned}$$

Today's Assignment

p. 484 #12,13

p. 486 #21

p. 499 #52