

Check Homework #16-23

20) $n = ?$

$$V = 50.0 \text{ mL}$$

$$C = 0.20 \text{ M} \\ = 0.20 \text{ mol/L}$$

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

$$0.20 \text{ mol/L} = \frac{n}{0.0500 \text{ L}}$$

$$n = (0.20 \text{ mol/L})(0.0500 \text{ L})$$

$$n = 0.010 \text{ mol}$$

22) $\% (v/v) = ?$

$$V_{\text{solute}} = 50 \text{ mL}$$

$$V_{\text{sol'n}} = 2.5 \text{ L}$$

$$\% (v/v) = \frac{V_{\text{solute}}}{V_{\text{sol'n}}} \times 100\%$$

$$\% (v/v) = \frac{50 \text{ mL}}{2500 \text{ L}} \times 100\%$$

$$\% (v/v) = 2\%$$

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) ? *increase*
- concentration of solution (C) ? *decrease*

$$n_i = n_f$$
$$V_i C_i = V_f C_f$$
$$C = \frac{n}{V}$$
$$n = C \times V$$

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

$$V_i = 45.0 \text{ mL}$$
$$C_i = 4.2 \text{ mol/L}$$
$$V_f = 250 \text{ mL}$$
$$C_f = ?$$
$$V_i C_i = V_f C_f$$
$$(45.0 \text{ mL})(4.2 \text{ mol/L}) = (250 \text{ mL}) C_f$$
$$C_f = \frac{(45.0 \text{ mL})(4.2 \text{ mol/L})}{(250 \text{ mL})}$$
$$C_f = 0.76 \text{ mol/L}$$

$$C_i > C_f$$

$$V_i < V_f$$

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?

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

$$\begin{aligned}V_i C_i &= V_f C_f \\(45.0 \text{ mL})(4.2 \text{ mol/L}) &= (295 \text{ mL}) C_f \\C_f &= \frac{(45.0 \text{ mL})(4.2 \text{ mol/L})}{(295 \text{ mL})}\end{aligned}$$

$$C_f = 0.64 \text{ mol/L}$$

Today's Assignment

p. 484 #12,13

p. 486 #21

p. 499 #52

To Try...

p. 499 #50-55