Warm Up

Determine the molar concentration of a solution that contains 47.0 g of $CaCl_2$ dissolved in 550 mL of water.

$C = ?$

$m = 47.0g$

$V = 550mL$

$CaCl_2$

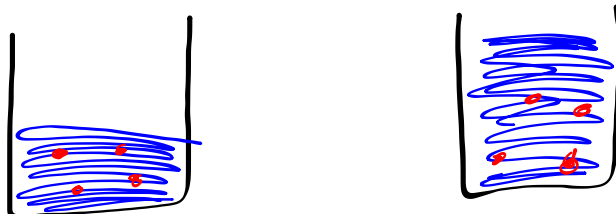$C = \dfrac{n}{V}$

$C = \dfrac{0.423\,mol}{0.550L} = \boxed{0.77\,mol/L}$

$47.0g\,CaCl_2 \times \dfrac{1\;mol\,CaCl_2}{110.98\;g\,CaCl_2} = 0.423\,mol\;CaCl_2$

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 ✱ $C = \dfrac{n}{V}$

- volume of solution (V) ?   ↑

- concentration of solution (C) ?   ↓ $\boxed{n = C \times V}$

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

$$n_i = n_F$$

$V_i = 250.0\,mL$

$C_i = 0.15\,mol/L$

$V_F = 350\,mL$

$C_F = \ ?$

$$V_i\, C_i = V_F\, C_F \quad ✱$$

$$(250.0mL)(0.15\,mol/L) = (350.mL)C_F$$

$$C_F = \frac{(250.mL)(0.15\,mol/L)}{(350.mL)}$$

$$\boxed{C_F = 0.11\ mol/L}$$

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

Sample Problems

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

$V_i = 50. mL$

$C_i = 0.50 mol/L$

$V_F = ?$

$C_F = 0.20 mol/L$

$$V_i C_i = V_F C_F$$

$$(50. mL)(0.50 mol/L) = V_F (0.20 mol/L)$$

$$V_F = \frac{(50. mL)(0.50 mol/L)}{(0.20 mol/L)}$$

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

Today's Assignment

Worksheet

p. 484 #12,13
p. 486 #21
p. 499 #52