Warm Up

Determine the mass of $CaCl_2$ found in 750. mL of a 0.950 M solution.

$m = ?$

$CaCl_2$

$V = 750.\ mL$

$C = 0.950\ M$

$= 0.950\ mol/L$

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

$$0.950\ mol/L = \frac{n}{0.750\ L}$$

$$n = (0.950\ mol/L)(0.750\ L)$$

$$n = 0.7125\ mol$$

$$0.7125\ mol\ CaCl_2 \times \frac{110.98\ g\ CaCl_2}{1\ mol\ CaCl_2} = \boxed{79.1\ g}$$

$$CaCl_2 \rightarrow (1 \times 40.08) + (2 \times 35.45) = 110.98\ g/mol$$

Check #1-11

(11) $n = ?$

$V = 250\,mL$

$C = 2.0\,M$

$CaCl_2$

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

$$2.0\,mol/L = \frac{n}{0.250\,L}$$

$$n = (2.0\,mol/L)(0.250\,L)$$

$$\boxed{n = 0.50\,mol}$$

$$0.50\,mol\,CaCl_2 \times \frac{110.98\,g\,CaCl_2}{1\,mol\,CaCl_2} = \boxed{55\,g\,CaCl_2}$$

$$36.0\,g\,C_6H_{12}O_6 \times \frac{1\,mol\,C_6H_{12}O_6}{180.18\,g\,C_6H_{12}O_6} = 0.200\,mol\,C_6H_{12}O_6$$

(8) $V = 2.0\,L$

$m = 36.0\,g$

$C_6H_{12}O_6$

$C = ?$

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

$$C = \frac{0.200\,mol}{2.0\,L}$$

$$\boxed{C = 0.10\,mol/L}$$

Concentration Ratios

Percent by Volume

$$\%(v/v) = \frac{\text{volume of solute}}{\text{volume of solution}} \times 100\%$$

Ex. 5% acetic acid

$$\Rightarrow \frac{5 \text{ mL of acid}}{100\text{mL of solution}}$$

Mass - Mass Ratio (% (m/m))

$$\%(m/m) = \frac{\text{mass of solute}}{\text{mass of solution}} \times 100\%$$

Ex. 6% m/m of hydrogen peroxide

$$\Rightarrow \frac{6 \text{ g of } H_2O_2}{100 \text{ g of solution}}$$

Sample Problems

What is the percent by volume of ethanol in the final solution when 85mL of ethanol is diluted to a total volume of 250 mL with water?

$\%v/v = ?$

$V_{solute} = 85mL$

$V_{sol'n} = 250\,mL$

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

$$\%v/v = \frac{85\,mL}{250\,mL} \times 100\%$$

$$\%v/v = 34\%$$

What mass of KNO_3 would be needed to prepare 1250 g of a 15.0% (m/m) KNO_3 solution?

$m_{solute} = ?$

$m_{sol'n} = 1250g$

$\%m/m = 15.0\%$

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

$$15.0\% = \frac{m_{solute}}{1250g} \times 100\%$$

$$0.15 = \frac{m_{solute}}{1250g}$$

$$m_{solute} = (0.15)(1250g)$$

$$m_{solute} = 188g$$

Homework

p. 485 #14, 15
p. 486 #16-23 skip #21