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?

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

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

$$= 34\%$$

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

15% m/m

$m_{sol'n} = 1250g$

$m_{solute} = ?$

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

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

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

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

$$m_{solute} = 188g$$

Solutions Test

Quiz

- Net Ionic Equations
- Concentration → $C = \frac{n}{V}$ / % v/v / % m/m
- Dilutions → $v_i C_i = v_f C_f$

$K^+SO_4^{2-}$ $Ca^{2+}NO_3^-$

a) $K_2SO_{4(aq)} + Ca(NO_3)_{2(aq)} \longrightarrow KNO_{3(aq)} + CaSO_{4(s)}$

Complete Ionic:

$K^+_{(aq)} + SO^{2-}_{4(aq)} + Ca^{2+}_{(aq)} + NO^-_{3(aq)} \longrightarrow K^+_{(aq)} + NO^-_{3(aq)} + CaSO_{4(s)}$

Spectator Ion(s):

$K^+_{(aq)}$, $NO^-_{3(aq)}$

Net Ionic:

$SO^{2-}_{4(aq)} + Ca^{2+}_{(aq)} \longrightarrow CaSO_{4(s)}$

Test Review

Worksheet