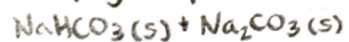


Solutions

Mixture- Contains 2 or more substances in varying composition



Solution- Homogeneous mixture
Components are mingled uniformly
Sugar dissolved in water

Solute- Present in a smaller quantity

Solvent- Present in a larger quantity



Solution Composition

pph: parts per hundred or mass percentage (%)

$$\frac{\text{mass solute(s)}}{\text{mass solution}}$$

Molarity (M)

$$\frac{\frac{\text{mass solute}}{\text{molar mass}}}{\text{volume solution}}$$

Dilutions

Amount of solute after dilution = Amount of solute before dilution

$$\begin{array}{ccc}
 \text{0.01 mol solute} & \xrightarrow{\text{Add H}_2\text{O}} & \text{0.01 mol solute} \\
 100 \text{ mL} & & 200 \text{ mL}
 \end{array}$$

$$\frac{0.01}{100 \times \frac{1}{1000}} = 0.1 \text{ M} \qquad \frac{0.01}{200 \times \frac{1}{1000}} = 0.05 \text{ M} \qquad M_1 V_1 = M_2 V_2$$

A solution is prepared by dissolving 3.47 g of $\text{Al}_2(\text{SO}_4)_3$ (s) (342.15 g/mol) in enough water to make 250.0 mL of solution. Determine the molar concentration (M) of $\text{Al}_2(\text{SO}_4)_3$.

$$\frac{3.47 \text{ g} \cdot \frac{1 \text{ mol}}{342.15 \text{ g}}}{0.25 \text{ L}} = 0.0406 \text{ M}$$

A 50.00 mL portion of the above solution was diluted to a final volume of 125.0 mL using water. Determine the new concentration of the $\text{Al}_2(\text{SO}_4)_3$ solution.

$$\begin{aligned}
 0.0406 \text{ M} \cdot 0.05 \text{ L} &= M_2 \cdot 0.125 \text{ L} \\
 M_2 &= \frac{0.0406(0.05)}{0.125} = 0.0162 \text{ M}
 \end{aligned}$$

Calculate the molar concentration of SO_4^{2-} ($[\text{SO}_4^{2-}]$) in this solution.

$$0.0162 \text{ M} \cdot \frac{3 \text{ SO}_4}{1 \text{ Al}_2(\text{SO}_4)_3} = 0.0486 \text{ M SO}_4^{2-}$$