Chapter 4: Worksheet #1 Mass Relationships Molarity

1. Calculate the molarity of a 184.6 mg sample of potassium dichromate if it is dissolved in enough water to give 500.0 mL of solution.

   \[0.001255 \text{ M } \text{K}_2\text{Cr}_2\text{O}_7\]

2. Calculate the mass of sodium hydroxide in 250.0 mL of a 0.4000 M solution.

   \[4.000 \text{ g NaOH}\]

3. How would you prepare 1.0 L of a 0.50 M solution of sulfuric acid from concentrated (18 M) sulfuric acid?

   \[28 \text{ mL H}_2\text{SO}_4 \text{ diluted to } 1.0 \text{ L with H}_2\text{O}\]

4. A 0.4508 g sample of iron is dissolved in a small amount of concentrated nitric acid forming Fe\(^{3+}\) ions in solution. It is then diluted to a total volume of 500.0 mL. Calculate the molarity of the Fe\(^{3+}\) solution.

   \[0.01614 \text{ M Fe}^{3+}\]

5. Environmental chemists commonly use the unit of parts per million (ppm) when referring to aqueous solutions. 1 ppm means 1 part of solute for every 10\(^6\) parts of solution or:

   \[
   \text{ppm} = \frac{\mu g \text{ solute}}{g \text{ solution}} = \frac{\text{mg solute}}{kg \text{ solution}} = \frac{\text{mg solute}}{\text{L of dilute, aqueous solution}}
   \]

   Calculate the molarity of a solution with 0.10 ppm DDT (C\(_{14}\)H\(_9\)Cl\(_5\)) in water.

   \[2.8 \times 10^{-7} \text{ M DDT}\]