6.5F

Solutions for 6.5E Extra Practice Questions: Solution Preparation

Communicate your problem-solving approach when answering the questions below.

1. Calculate the molar concentration of a solution made by dissolving 20.0 g of sodium hydroxide to make 300 mL of solution.

$$n_{NaOH} = 20.0\ g \times \frac{1\ mol}{40.00\ g} = 0.500\ mol$$

$$C_{NaOH} = \frac{0.500\ mol}{0.300\ L} = 1.67\ mol/L$$

2. Pure sodium thiosulfate-5-water, $Na_2S_2O_3 \cdot 5H_2O_{(s)}$, is used to make 250 mL of 20.0 mmol/L solution. Find the mass of solute required.

$$n_{Na_2S_2O_3 \cdot 5H_2O} = 0.250\ L \times \frac{20.0\ mmol}{1\ L} = 5.00\ mmol$$

$$m_{Na_2S_2O_3 \cdot 5H_2O} = 5.00\ mmol \times \frac{248.20\ g}{1\ mol} = 1.24\ g$$

3. What mass of copper(II) nitrate will be required to prepare 10.0 L of 0.100 mol/L solution?

$$n_{Cu(NO_3)_2} = 10.0\ L \times \frac{0.100\ mol}{1\ L} = 1.00\ mol$$

$$m_{Cu(NO_3)_2} = 1.00\ mol \times \frac{187.57\ g}{1\ mol} = 188\ g$$

4. What volume of 75 mmol/L solution can be prepared from 10 g of sodium carbonate?

$$n_{Na_2CO_3} = 10\ g \times \frac{1\ mol}{105.99\ g} = 94\ mmol$$

$$v_{Na_2CO_3} = 94\ mmol \times \frac{1\ L}{75\ mmol} = 1.3\ L$$

5. Determine the volume of concentrated hydrochloric acid required to prepare 10.0 L of a 0.200 mol/L solution.

$$v_i C_i = v_f C_f$$

$$v_i \times \frac{11.6\ mol}{1\ L} = 10.0\ L \times \frac{0.200\ mol}{1\ L}$$

$$v_i = 0.172\ L$$

6. What volume of concentrated ammonia is required to prepare 2.0 L of a 1.0 mol/L solution?

$$v_i C_i = v_f C_f$$

$$v_i \times \frac{14.8\ mol}{1\ L} = 2.0\ L \times \frac{1.0\ mol}{1\ L}$$

$$v_i = 0.14\ L$$