

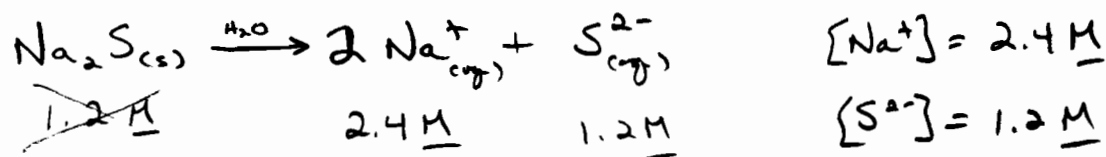
## Solutions & Concentration **3**

- ① What is the concentration of a solution prepared by dissolving 455 mg of  $\text{FeCl}_2$  in enough water to make 25.0 mL of solution?

$$\frac{455 \text{ mg}}{1000 \text{ mg/g}} \times \frac{1 \text{ mol FeCl}_2}{126.75 \text{ g}} = 0.003590 \text{ mol}$$

$$[\text{FeCl}_2] = \frac{0.003590 \text{ mol}}{0.0250 \text{ L}} = 0.144 \text{ M}$$

- ② What are the concentrations of  $\text{Na}^+$  and  $\text{S}^{2-}$  ions in a solution that is 1.2 M  $\text{Na}_2\text{S}$ ?



- 3 What mass of solid nickel (III) chloride is required to prepare 250.0 mL of a 0.750 M solution of  $\text{NiCl}_3$ ? Describe the preparation of this solution using the appropriate glassware and lab equipment.

$$\frac{250.0 \text{ mL}}{1000 \text{ mL}} \times \frac{1 \text{ L}}{1 \text{ L}} \times \frac{0.750 \text{ mol}}{1 \text{ mol}} \times \frac{165.05 \text{ g}}{1 \text{ mol}} = 30.9 \text{ g}$$

Mass out 30.9 g of  $\text{NiCl}_3$  & transfer it to a 250-mL volumetric flask. Add water to fill half-way. Shake to mix. Add water to the line. Mix again.

- 4 You wish to prepare 25.0 mL of a 0.112 M solution of  $\text{Na}_2\text{SO}_4$ . You have one liter of a 0.520 M stock solution of sodium sulfate. What volume of the stock solution is required to make the dilution? Describe its preparation.

$$M_1 = 0.520 \text{ M} \quad M_2 = 0.112 \text{ M}$$

$$V_1 = ? \quad V_2 = 25.0 \text{ mL}$$

$$(0.520 \text{ M})(V_1) = (0.112 \text{ M})(25.0 \text{ mL})$$

$$V_1 = 5.38 \text{ mL}$$

Pipette 5.38 mL of the stock solution into a 25-mL volumetric flask and fill with water to the line. Mix thoroughly.

- 5 A) A solution is prepared by dissolving 160. g of citric acid ( $\text{H}_3\text{C}_6\text{H}_5\text{O}_7$ ) in 500. g of water. What is the mass percent of citric acid in the resulting solution?

$$\% \text{ by mass} = \frac{160 \text{ g CA}}{(160 \text{ g} + 500 \text{ g})} \times 100\% =$$

$$24.2\%$$

- B) If the solution has a density of 1.10 g/mL, express the concentration of citric acid as a molarity.

$$\frac{24.2 \text{ g CA}}{100 \text{ g soln}} \times \frac{1.10 \text{ g soln}}{1 \text{ mL}} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{1 \text{ mol CA}}{192.12 \text{ g CA}} =$$

$$[CA] = 1.39 \text{ M}$$