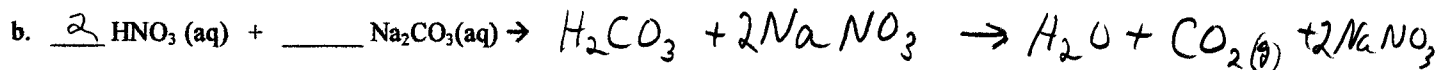
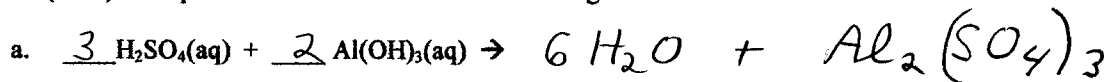


**Show work to receive credit!**

(Atomic masses: H = 1.008, C = 12.01, N = 14.01, O = 16.00, Na = 23.00, S = 32.07, P = 30.97, Ca = 40.08)

1. (6 Pts) Complete and balance each of the following:



2. (3 Pts) What volume of 12.0 M HNO<sub>3</sub> is required to prepare 900 mL of 2.0 M HNO<sub>3</sub> solution?

$$M_1 V_1 = M_2 V_2$$

$$(12.0 \text{ M})(V_1) = (2.0 \text{ M})(900 \text{ mL})$$

$$V_1 = 150 \text{ mL}$$

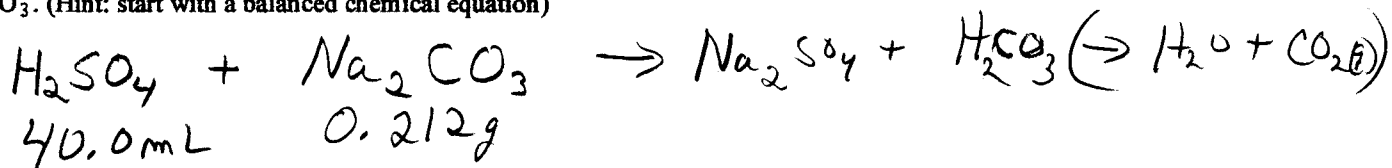
3. (4 Pts) What mass of Ca(OH)<sub>2</sub> is present in 500 mL of 0.00500 molar Ca(OH)<sub>2</sub>?

$$\frac{500 \text{ mL}}{1000 \text{ mL}} \times 0.00500 \text{ mol Ca(OH)}_2 \times 74.1 \frac{\text{g}}{\text{mol}} = 0.1853 \text{ g Ca(OH)}_2$$

4. (4 Pts) What is the molarity of 700 mL of solution containing 9.72 grams of nitric acid?

$$\frac{9.72 \text{ g HNO}_3}{63.0 \text{ g}} \times \frac{\text{mol}}{\text{mol}} = 0.2204 \frac{\text{mol HNO}_3}{\text{L}}$$

5. (8 Pts) Calculate the molarity of an H<sub>2</sub>SO<sub>4</sub> solution if 40.0 mL of the H<sub>2</sub>SO<sub>4</sub> solution reacts with 0.212 g of Na<sub>2</sub>CO<sub>3</sub>. (Hint: start with a balanced chemical equation)

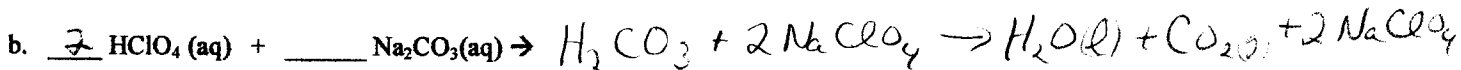
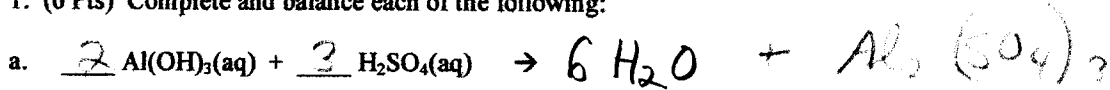


$$\frac{40.0 \times 10^{-3} \text{ L}}{40.0 \times 10^{-3} \text{ L}} \times \frac{0.212 \text{ g Na}_2\text{CO}_3}{106 \text{ g Na}_2\text{CO}_3} \times \frac{1 \text{ mol Na}_2\text{CO}_3}{1 \text{ mol Na}_2\text{CO}_3} \times \frac{1 \text{ mol H}_2\text{SO}_4}{1 \text{ mol Na}_2\text{CO}_3} = 0.0500 \frac{\text{mol H}_2\text{SO}_4}{\text{L H}_2\text{SO}_4}$$

**Show work to receive credit!**

(Atomic masses: H = 1.008, C = 12.01, N = 14.01, O = 16.00, Na = 23.00, S = 32.07, P = 30.97, Ca = 40.08)

1. (6 Pts) Complete and balance each of the following:



2. (3 Pts) What volume of 10.0 M HNO<sub>3</sub> is required to prepare 900 mL of 3.0 M HNO<sub>3</sub> solution?

$$M_1 V_1 = M_2 V_2$$

$$(10.0 \text{ M}) V_1 = (3.0 \text{ M})(900 \text{ mL})$$

$$V_1 = 270 \text{ mL}$$

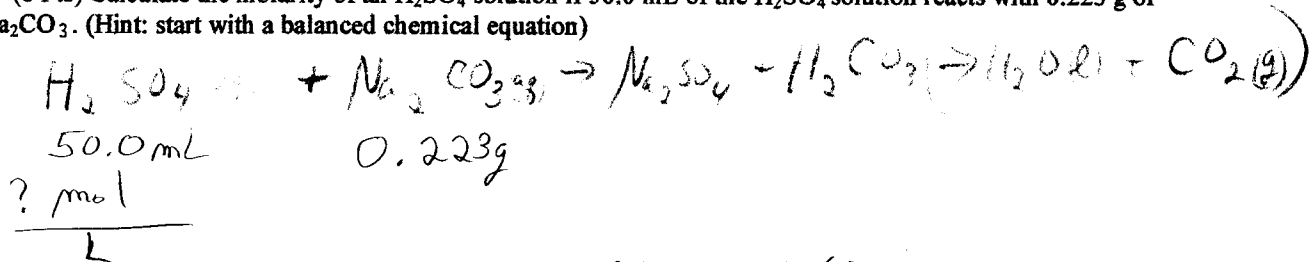
3. (4 Pts) What mass of Ca(OH)<sub>2</sub> is present in 400 mL of 0.00300 molar Ca(OH)<sub>2</sub>?

$$\frac{400 \text{ mL}}{1000 \text{ mL}} \times \frac{0.00300 \text{ mol Ca(OH)}_2}{1 \text{ L}} \times \frac{74.10 \text{ g}}{1 \text{ mol}} = 0.0889 \text{ g Ca(OH)}_2$$

4. (4 Pts) What is the molarity of 700 mL of solution containing 7.72 grams of nitric acid?

$$\frac{7.72 \text{ g HNO}_3}{700 \times 10^{-3} \text{ L}} \times \frac{1 \text{ mol}}{63.0 \text{ g}} = 0.175 \frac{\text{mol}}{\text{L}} \text{ HNO}_3$$

5. (8 Pts) Calculate the molarity of an H<sub>2</sub>SO<sub>4</sub> solution if 50.0 mL of the H<sub>2</sub>SO<sub>4</sub> solution reacts with 0.223 g of Na<sub>2</sub>CO<sub>3</sub>. (Hint: start with a balanced chemical equation)



$$\frac{50.0 \times 10^{-3} \text{ L H}_2\text{SO}_4}{0.223 \text{ g Na}_2\text{CO}_3} \times \frac{1 \text{ mol Na}_2\text{CO}_3}{106 \text{ g Na}_2\text{CO}_3} \times \frac{1 \text{ mol H}_2\text{SO}_4}{1 \text{ mol Na}_2\text{CO}_3} = 0.0421 \frac{\text{mol H}_2\text{SO}_4}{\text{L H}_2\text{SO}_4}$$