

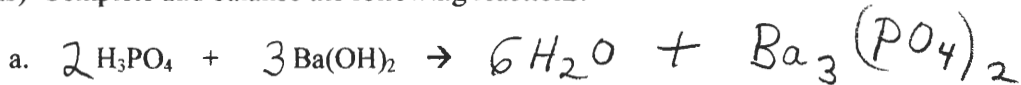
Molar Masses: Na 22.99, K 39.10, S 32.07, O 16.00, Cl 35.45, H 1.008

1. (4 Pts) How many grams of Na₂SO₄ are needed to prepare 350.0 mL of 0.10 M solution?

$$\frac{350.0 \text{ mL}}{1000 \text{ mL}} \times \frac{0.10 \text{ mol Na}_2\text{SO}_4}{1 \text{ L}} \times 142.05 \text{ g/mol} = 4.97 \text{ g Na}_2\text{SO}_4$$

↑
"shortcut"

2. (4 Pts) Complete and balance the following reactions:

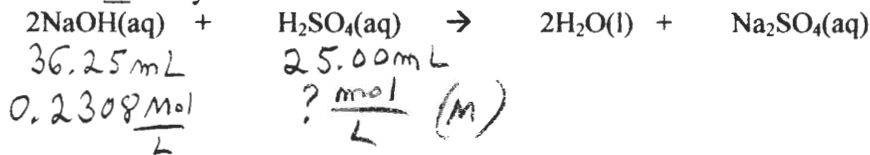


3. (4 Pts) How many mL of 0.50 M HCl solution are needed to prepare 400 mL of 0.15 M HCl solution?

$$M_1 = 0.50 \text{ M} \quad M_2 = 0.15 \text{ M} \quad M_1 V_1 = M_2 V_2$$

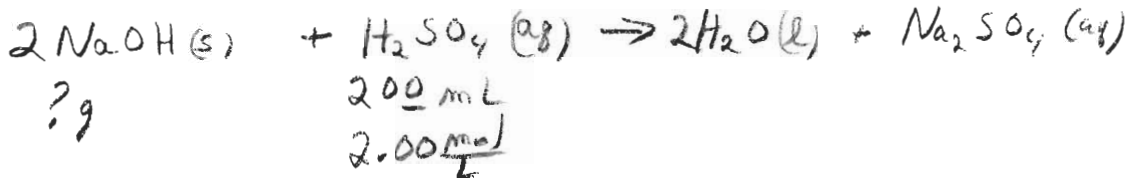
$$V_1 = ? \text{ mL} \quad V_2 = 400 \text{ mL} \quad V_1 = \frac{M_2 V_2}{M_1} = \frac{(0.15 \text{ M})(400 \text{ mL})}{0.50 \text{ M}} = 120 \text{ mL}$$

4. (7 Pts) It took 36.25 mL of 0.2308 M NaOH solution to neutralize 25.00 mL of sulfuric acid solution. Determine the Molarity of the sulfuric acid solution.



$$\frac{25.00 \times 10^{-3} \text{ L H}_2\text{SO}_4}{36.25 \text{ mL NaOH}} \times \frac{0.2308 \text{ mol NaOH}}{1000 \text{ mL NaOH}} \times \frac{1 \text{ mol H}_2\text{SO}_4}{2 \text{ mol NaOH}} = 0.16733 \frac{\text{mol H}_2\text{SO}_4}{\text{L H}_2\text{SO}_4}$$

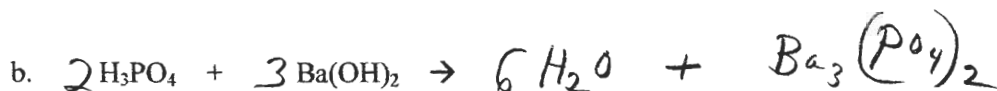
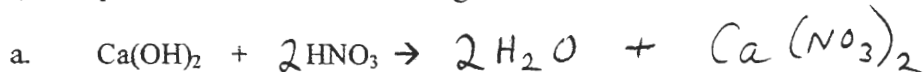
5. (6 Pts) How many grams of NaOH are needed to neutralize 200 mL of 2.00 M H₂SO₄ solution?



$$\frac{200 \text{ mL H}_2\text{SO}_4}{1000 \text{ mL H}_2\text{SO}_4} \times \frac{2.00 \text{ mol H}_2\text{SO}_4}{1 \text{ L H}_2\text{SO}_4} \times \frac{2 \text{ mol NaOH}}{1 \text{ mol H}_2\text{SO}_4} \times 40.00 \text{ g/mol NaOH} = 32.0 \text{ g NaOH}$$

Molar Masses: Na 22.99, K 39.10, S 32.07, O 16.00, Cl 35.45, H 1.008

1. (4 Pts) Complete and balance the following reactions:

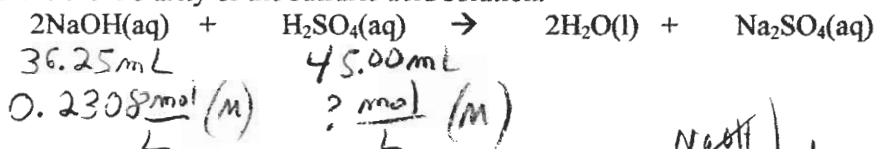


2. (4 Pts) How many grams of K_2SO_4 are needed to prepare 350.0 mL of 0.10 M solution?

$$\frac{350.0 \text{ mL}}{1000 \text{ mL}} \times 0.10 \text{ mol/L} \times 174.27 \text{ g/mol} = 6.099 \text{ g} \approx 6.1 \text{ g } \text{K}_2\text{SO}_4$$

↑
(short cut)

3. (7 Pts) It took 36.25 mL of 0.2308 M NaOH solution to neutralize 45.00 mL of sulfuric acid solution. Determine the molarity of the sulfuric acid solution.



$$\frac{45.00 \times 10^{-3} \text{ L}}{1} \times \frac{1 \text{ mol H}_2\text{SO}_4}{2 \text{ mol NaOH}} \times \frac{0.2308 \text{ mol NaOH}}{1000 \text{ mL}} = 0.0929 \text{ mol/L H}_2\text{SO}_4$$

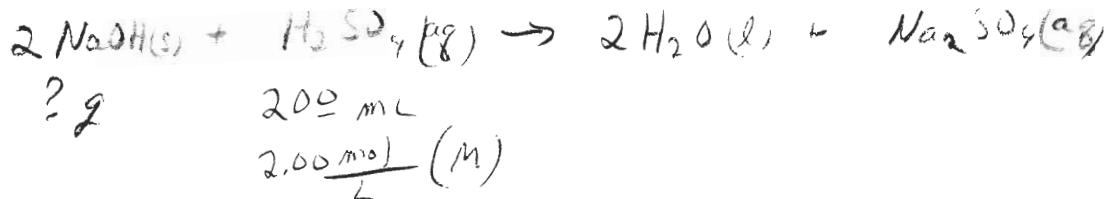
4. (4 Pts) How many mL of 0.60 M HCl solution are needed to prepare 400 mL of 0.15 M HCl solution?

$$M_1 V_1 = M_2 V_2$$

$$V_1 = \frac{M_2 V_2}{M_1} = \frac{(0.15 \text{ M})(400 \text{ mL})}{0.60 \text{ M}} = 100 \text{ mL}$$

$M_1 = 0.60 \text{ M}$
 $V_1 = ? \text{ mL}$
 $M_2 = 0.15 \text{ M}$
 $V_2 = 400 \text{ mL}$

5. (6 Pts) How many grams of NaOH are needed to neutralize 200 mL of 2.00 M H_2SO_4 solution?



$$\frac{200 \text{ mL}}{1000 \text{ mL}} \times 2.00 \text{ mol/L} \times \frac{2 \text{ mol NaOH}}{1 \text{ mol H}_2\text{SO}_4} \times 40.00 \text{ g/mol} = 32.0 \text{ g NaOH}$$