

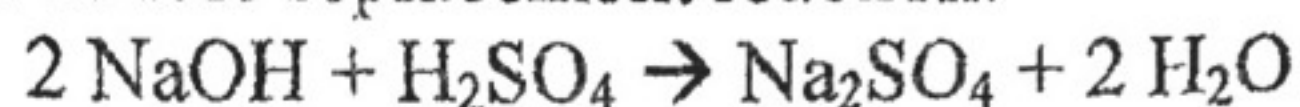
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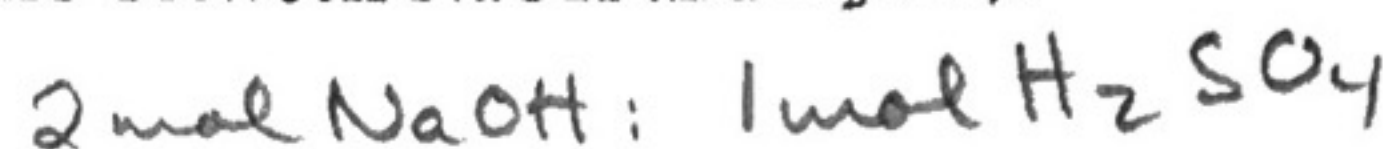
Stoichiometry Practice

**Mole Ratios**

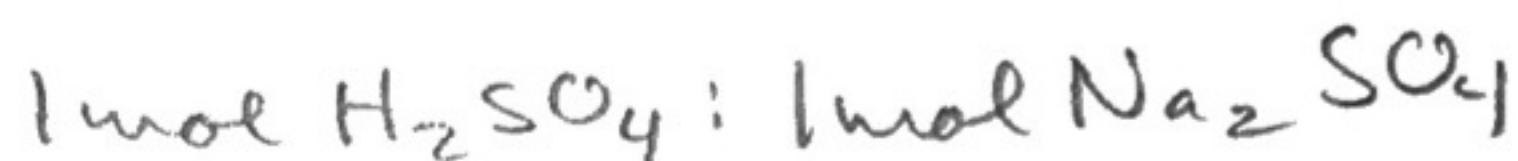
Look at the following balanced double replacement reaction:



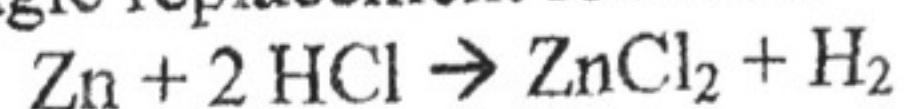
1. What is the mole ratio between NaOH and H<sub>2</sub>SO<sub>4</sub>?



2. What is the mole ratio between H<sub>2</sub>SO<sub>4</sub> and Na<sub>2</sub>SO<sub>4</sub>?



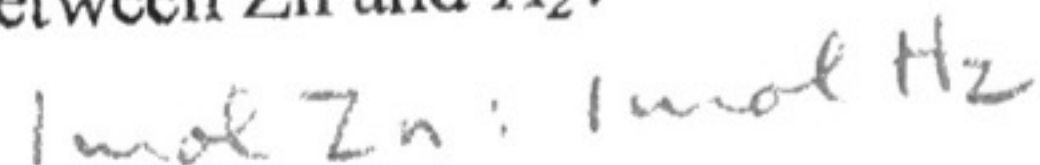
Look at the following balanced single replacement reaction:



3. What is the mole ratio between HCl and H<sub>2</sub>?

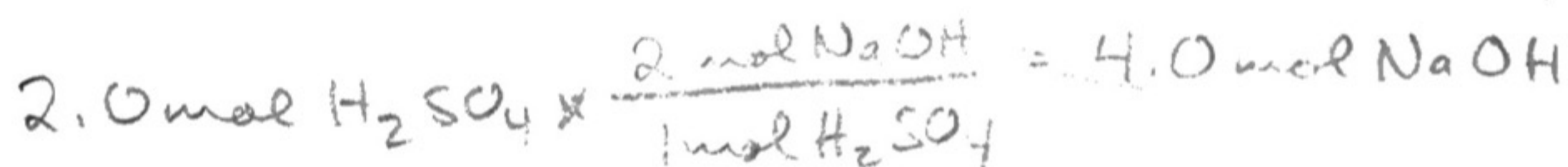
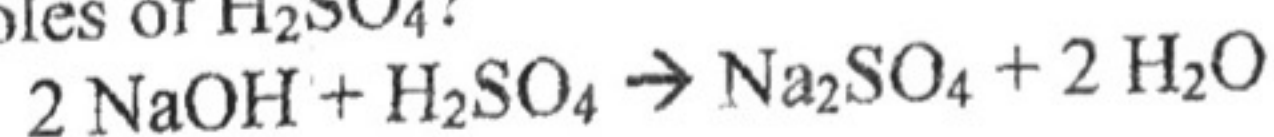


4. What is the mole ratio between Zn and H<sub>2</sub>?

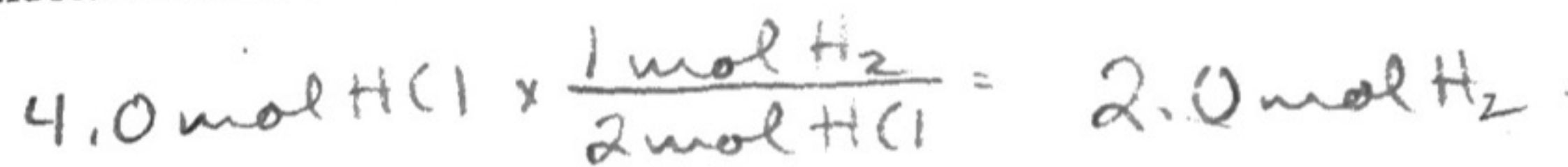


**Mole-Mole Stoichiometry**

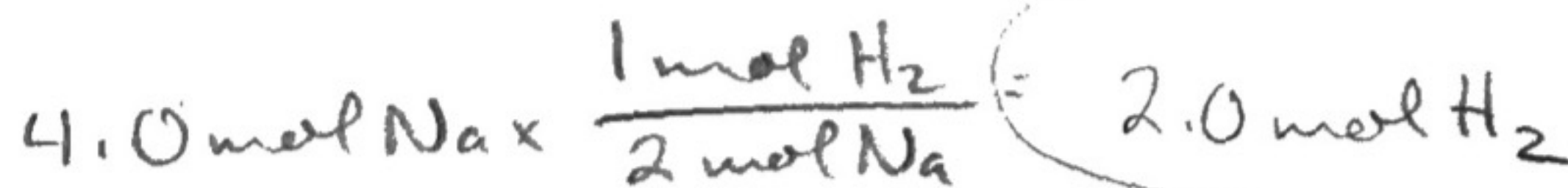
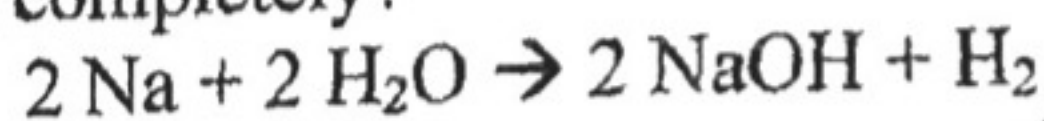
5. Given the reaction below, what is the total number of moles of NaOH needed to react completely with 2.0 moles of H<sub>2</sub>SO<sub>4</sub>?



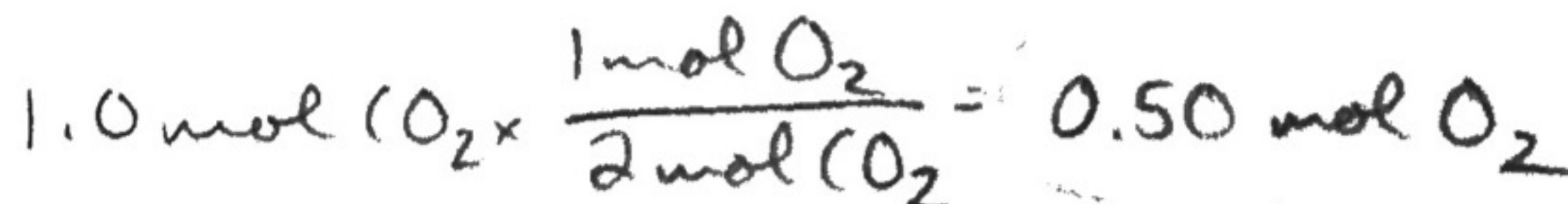
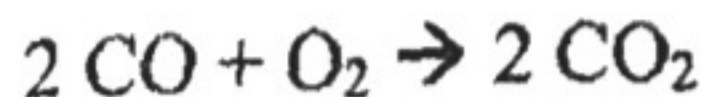
6. In the reaction  $\text{Zn} + 2 \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$ , how many moles of hydrogen will be formed when 4.0 moles of HCl are consumed?



7. Given the reaction below, what is the total number of moles of hydrogen produced when 4.0 moles of sodium react completely?



8. Given the reaction below, what is the minimum number of moles of O<sub>2</sub> required to produce 1.0 mole of CO<sub>2</sub>?

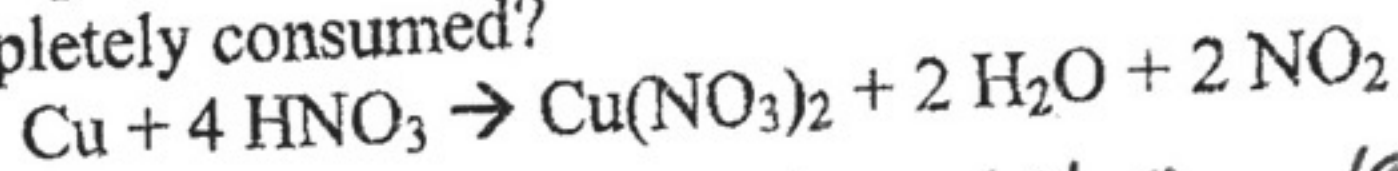


### Mass - Mass Stoichiometry

9. In the reaction  $\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$ , how many grams of  $\text{H}_2$  are needed to produce exactly 1.0 mole of ammonia?

$$1.0 \text{ mol NH}_3 \times \frac{3 \text{ mol H}_2}{2 \text{ mol NH}_3} \times \frac{2.02 \text{ g H}_2}{1 \text{ mol H}_2} = 3.0 \text{ g H}_2$$

10. Given the balanced equation below, what is the total mass of  $\text{H}_2\text{O}$  produced when 32.00 grams of Cu is completely consumed?

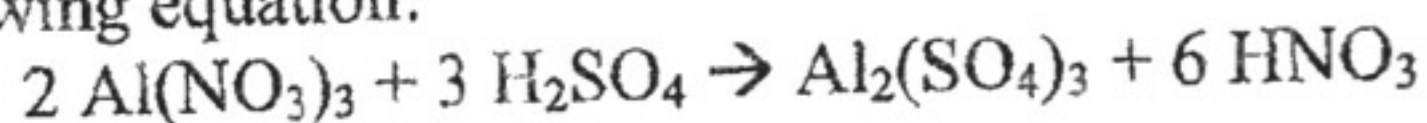


$$32.00 \text{ g Cu} \times \frac{1 \text{ mol Cu}}{63.54 \text{ g Cu}} \times \frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol Cu}} \times \frac{18.02 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 18.15 \text{ g H}_2\text{O}$$

11. Given the reaction  $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$ , what is the total number of grams of  $\text{O}_2$  needed to produce 54.00 grams of water?

$$54.00 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18.02 \text{ g H}_2\text{O}} \times \frac{1 \text{ mol O}_2}{2 \text{ mol H}_2\text{O}} \times \frac{32.00 \text{ g O}_2}{1 \text{ mol O}_2} = 47.95 \text{ g O}_2$$

According to the following equation:



12. How many moles of nitric acid will be produced if 6.00 moles of aluminum nitrate reacted?

$$6.00 \text{ mol Al}(\text{NO}_3)_3 \times \frac{6 \text{ mol HNO}_3}{2 \text{ mol Al}(\text{NO}_3)_3} = 18.0 \text{ mol HNO}_3$$

13. What mass of aluminum nitrate would be needed to produce 10.00 g of nitric acid?

$$10.00 \text{ g HNO}_3 \times \frac{1 \text{ mol HNO}_3}{63.02 \text{ g HNO}_3} \times \frac{2 \text{ mol Al}(\text{NO}_3)_3}{6 \text{ mol HNO}_3} \times \frac{213.01 \text{ g Al}(\text{NO}_3)_3}{1 \text{ mol Al}(\text{NO}_3)_3} = 11.27 \text{ g Al}(\text{NO}_3)_3$$

14. How many grams of aluminum sulfate will be produced if 3.56 grams of sulfuric acid reacted?

$$3.56 \text{ g H}_2\text{SO}_4 \times \frac{1 \text{ mol H}_2\text{SO}_4}{98.09 \text{ g H}_2\text{SO}_4} \times \frac{1 \text{ mol Al}_2(\text{SO}_4)_3}{3 \text{ mol H}_2\text{SO}_4} \times \frac{342.17 \text{ g Al}_2(\text{SO}_4)_3}{1 \text{ mol Al}_2(\text{SO}_4)_3} = 4.14 \text{ g Al}_2(\text{SO}_4)_3$$