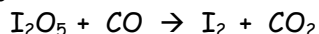


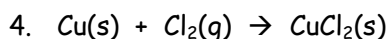
Limiting Reactants and Percent Yield

1. Aluminum metal reacts with chlorine gas in a synthesis reaction.
 - a. Write the balanced equation for this reaction.
 - b. If 15.2 g of aluminum reacts with 39.1g of chlorine, identify the limiting reactant.
 - c. Determine the mass in grams of the product formed.
 - d. Determine the mass in grams of excess reactant remaining when the reaction is complete.
 - e. If you made 50.0g of AlCl_3 in the lab, what is your percent yield?
 - f. If the percent yield were 83.65%, how much could be expected to be made in the experiment?
2. $\text{Fe(s)} + \text{O}_2\text{(g)} \rightarrow \text{Fe}_3\text{O}_4\text{(s)}$
 - a. When 13.54 g of O_2 is mixed with 12.21 g of Fe, which is the limiting reactant?
 - b. What mass in grams of iron oxide is produced?
 - c. What mass in grams of excess reactant remains when the reaction is complete?
 - d. Kelly performed completed this reaction in a lab and made 15.88 g of Fe_3O_4 , what was her percent yield?
3. Diiodine pentoxide is useful in devices such as respirators because it reacts with the dangerous gas carbon monoxide, CO , to produce relatively harmless CO_2 according to the following equation:

AP Chemistry



- a. In testing a respirator, 2.00g of carbon monoxide gas is passed through diiodine pentoxide. Upon analyzing the results, it is found that 3.17g of I_2 was produced. Calculate the percent yield of the reaction.
- b. Assuming that the yield in part a resulted because some of the CO did not react, calculate the mass of CO that passed through.



- a. If 12.5 g Cu reacts with excess chlorine, calculate the theoretical yield of CuCl_2 .

- b. If only 25.4g of CuCl_2 was produced, what is the percent yield?

5. Sodium hyperchlorite, NaClO , the main ingredient in household bleach, is produced by bubbling chlorine gas through a strong lye(sodium hydroxide, NaOH) solution. The following equation shows the reaction that occurs.



- a. What is the percent yield of the reaction if 1.2kg of Cl_2 reacts to form .90kg of NaClO ?

6. The percent yield for the reaction $\text{PCl}_3 + \text{Cl}_2 \rightarrow \text{PCl}_5$ is 83.2%. What mass of PCl_5 is expected from the reaction of 73.7 g of PCl_3 with excess chlorine?

Conservation of Mass Worksheet**Example:**

A compound containing carbon and hydrogen is analyzed. When a 1.2543 gram sample is burned completely in excess oxygen, 3.671 grams of $\text{CO}_2(\text{g})$ is formed. What is the empirical formula of this compound?

- Write a skeleton equation for this reaction. If you do not know the formula for every compound, put information about what you do know in parenthesis.
- How many grams of carbon are in 3.671 g of CO_2 ? Where did all of this carbon come from? How much carbon was in the original sample of the unknown compound?
- What is the percent composition of carbon and hydrogen in the unknown compound?
- Determine the empirical formula of this compound, now that you know the percent composition.
- The molar mass of this compound is determined to be 30.08 g/mol. What is the correct molecular formula of the unknown compound?

ONE

A compound containing carbon and hydrogen is analyzed. Combustion of a 16.81 g sample of this compound produces 38.91 g of $\text{CO}_2(\text{g})$. What is the empirical formula of this compound? What is the molecular formula if the molar mass of the compound is determined to be 38.03 g/mol?

TWO

A compound containing carbon and hydrogen is analyzed. Combustion of a 0.213 g sample of this compound yields 0.2132 g of water. What is the empirical formula of this compound? What is the molecular formula if the molar mass of the compound is 81.15 g/mol?

THREE

A compound containing carbon, hydrogen, and oxygen is analyzed. Combustion of a 3.4 g sample of this compound produces 6.79 g of $\text{CO}_2(\text{g})$ and 2.7843 g of water vapor. What is the empirical formula of this compound? What is the molecular formula if the molar mass of the compound is 44.06 g/mol?

Percent Composition and Molecular Formula Worksheet

1) What's the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen?

2) If the molar mass of the compound in problem 1 is 110 grams/mole, what's the molecular formula?

3) What's the empirical formula of a molecule containing 18.7% lithium, 16.3% carbon, and 65.0% oxygen?

4) If the molar mass of the compound in problem 3 is 73.8 grams/mole, what's the molecular formula?