

## Stoichiometric Conversions

### Review: Mole-to-Mole Conversions

1. Given the following equation, how many moles of oxygen can be produced by letting 12.00 moles of  $\text{KClO}_3$  react?



2. Consider the following reaction:



- a. How many moles of nitric acid ( $\text{HNO}_3$ ) are required to completely react with 2.25 mol Zn?
- b. How many moles of  $\text{Zn}(\text{NO}_2)_3$  form when 3.5 mol  $\text{HNO}_3$  reacts?
- c. How many moles of  $\text{N}_2\text{O}$  form when 4.7 moles of  $\text{H}_2\text{O}$  form?
- d. How many moles of zinc metal are required to produce 1.50 mol of  $\text{N}_2\text{O}$ ?

## Mole and Mass Conversions

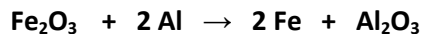
3. Complete the following tables with the missing information. Find any masses or moles from the amount that you are given.

	Mercury (II) oxide	→		+	Oxygen
Equation:		→	Hg	+	
Mass (g):	5.23 g	→		+	
Moles:		→		+	

	Hydrogen peroxide	→	Oxygen	+	Water
Equation:	H <sub>2</sub> O <sub>2</sub>	→		+	
Mass (g):		→		+	
Moles:		→		+	1.042 mol

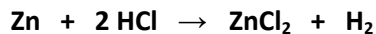
	Hydrogen	+	Oxygen	→	Water
Equation:		+		→	
Mass (g):	10.24 g	+		→	
Moles:		+		→	

4. A thermite reaction is a very violent reaction between aluminum metal and iron (III) oxide. Use the equation for this reaction to answer the following questions.



- a. How many moles of iron (III) oxide are needed to react with 52.0 g of aluminum?
  - b. How many grams of  $\text{Al}_2\text{O}_3$  are produced when 6.00 moles of aluminum are used?
  - c. When 90.0 g of iron are produced, how many moles of aluminum oxide are produced?
  - d. How many grams of  $\text{Fe}_2\text{O}_3$  are needed to produce 0.850 mol of Fe?
  - e. If  $4.60 \times 10^5$  g of aluminum are used, how many moles of iron (III) oxide reacted?
5. Sodium chloride is decomposed by means of electricity. How many grams of chlorine gas can be obtained from 3.18 mol NaCl?
6. In automobiles, one of the reactions common in air bags is the decomposition of sodium azide ( $\text{NaN}_3$ ) into sodium and nitrogen.
- a. Write and balance the equation of this reaction.
  - b. Determine the mass of nitrogen produced if 100.0 g of  $\text{NaN}_3$  is decomposed.

7. If 20.0 g of zinc react with excess hydrochloric acid, how many grams of zinc chloride are produced?



8. Calcium chloride reacts with sodium phosphate to produce calcium phosphate and sodium chloride.
- Write a balanced chemical equation for this reaction.
  - How many moles of calcium chloride are necessary to prepare 94.0 g of calcium phosphate?
  - 5.23 g of calcium chloride will produce how many grams of calcium phosphate?
  - If you use 8.922 mol of sodium phosphate, how many grams of sodium chloride will you produce?
  - 392 g of calcium phosphate can be produced from how many grams of calcium chloride?
  - How many moles of sodium phosphate are needed to produce 5.29 g of calcium phosphate?
9. Joseph Priestly is credited for the discovery of oxygen. He produced oxygen by decomposing mercury (II) oxide into its elements. How many moles of oxygen could priestly produce if he decomposed 517.84 g of mercury (II) oxide?
10. Liquids are measured in units of volume, not mass. How can you convert mass to volume?