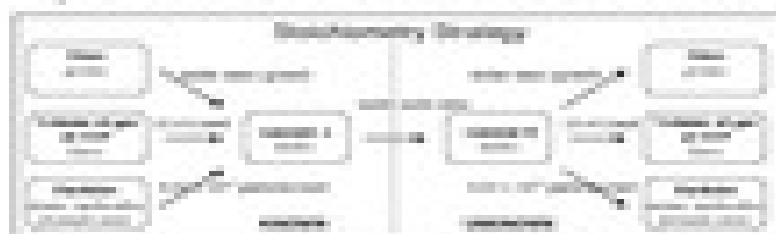


Stoichiometry Problems

Chem Worksheet 12-2

Name _____

Write a balanced equation for a reaction to calculate the amount of required product or reactant for a reaction. The products and the substances formed in a chemical reaction and these are listed on the right side of the reaction arrow.



The reactants and the substances required in a chemical reaction and these are written on the left side of the arrow. Using the molar mass or molar concentration and the strategy outlined in the left, grams of mass, volume of liquid or particles of a substance. It is possible to determine the mass, volume, or particles of another.

Example:

How many molecules of oxygen are required to react with 100 g of carbon monoxide?

Given: 100 g of carbon monoxide

Wanted: molecules of oxygen

Conversion: 100 g of carbon monoxide to moles of carbon monoxide

Relationship and conversion: 1 mole of carbon monoxide reacts with 1 mole of oxygen

Calculation: 100 g of carbon monoxide \times $\frac{1 \text{ mole of carbon monoxide}}{28 \text{ g of carbon monoxide}}$ = 3.57 moles of carbon monoxide

Answer: 3.57 moles of carbon monoxide \times $\frac{1 \text{ mole of oxygen}}{1 \text{ mole of carbon monoxide}}$ = 3.57 moles of oxygen

Final Step: 3.57 moles of oxygen \times $\frac{6.02 \times 10^{23} \text{ molecules of oxygen}}{1 \text{ mole of oxygen}}$ = 2.15 $\times 10^{24}$ molecules of oxygen

Solve the following equations. Solve the stoichiometry problems.

- How many molecules of oxygen are required to react with 100 g of carbon monoxide?
 $\frac{100 \text{ g}}{28 \text{ g}} \times \frac{1 \text{ mole}}{1 \text{ mole}} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mole}}$
- How many liters of oxygen at STP are required for the combustion of 1.0 g of hydrogen?
 $\frac{1 \text{ g}}{2 \text{ g}} \times \frac{1 \text{ mole}}{1 \text{ mole}} \times \frac{22.4 \text{ L}}{1 \text{ mole}}$
- What mass of hydrogen peroxide must decompose to produce volume of water?
 $\frac{10 \text{ L}}{22.4 \text{ L}} \times \frac{1 \text{ mole}}{1 \text{ mole}} \times \frac{34 \text{ g}}{1 \text{ mole}}$
- How many liters of oxygen at STP are needed to react with 1.0 mole of hydrogen sulfide?
 $\frac{1 \text{ mole}}{1 \text{ mole}} \times \frac{1 \text{ mole}}{1 \text{ mole}} \times \frac{22.4 \text{ L}}{1 \text{ mole}}$
- What mass of chlorine gas is necessary to synthesize 100 g of hydrogen chloride at STP?
 $\frac{100 \text{ g}}{36.5 \text{ g}} \times \frac{1 \text{ mole}}{1 \text{ mole}} \times \frac{71 \text{ g}}{1 \text{ mole}}$
- How many liters of oxygen at STP are produced from 100 g of potassium chlorate?
 $\frac{100 \text{ g}}{122.5 \text{ g}} \times \frac{1 \text{ mole}}{1 \text{ mole}} \times \frac{22.4 \text{ L}}{1 \text{ mole}}$
- What volume of nitrogen gas at STP is produced when 10.0 g of potassium nitrate decomposes?
 $\frac{10 \text{ g}}{101 \text{ g}} \times \frac{1 \text{ mole}}{1 \text{ mole}} \times \frac{22.4 \text{ L}}{1 \text{ mole}}$
- What mass of carbon dioxide is produced when 1.0 mole of propane, C₃H₈, is burned in oxygen?
 $\frac{1 \text{ mole}}{1 \text{ mole}} \times \frac{1 \text{ mole}}{1 \text{ mole}} \times \frac{44 \text{ g}}{1 \text{ mole}}$