Chapter 3 & 4: Reaction Stoichiometry part 1

**Read:** BLB 3.6–3.7
**HW:** BLB 3:57, 64, 73, 79
Supplemental: Rxns 3–5

**Know:**
- Problem Solving with Chemical Reactions
- Limiting Reactants (Ch. 3)
- Solution Reactions (Ch. 4)
- Gas phase Reactions (Ch. 10)

**Bonus deadline for SCT #10:** ____________
**FINAL SCT DEADLINE:** ______________

Missed Exam 1, 2 or 3 due to an excused absence?
**Make-up Exam:** Covers material from Exams 1–3, multiple choice. You must sign up by completing the request form & giving it to me (download)

**Need help?? Get help!!** TAs in CRC (211 Whitmore), SI Sessions, Look at "Help Available"

**Final Exam:** ________________

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**Practice Problems:**

What is the driving force for the reaction between NaOH and HClO₄?

- a. formation of a precipitate
- b. formation of a weak or non-electrolyte (neutralization)
- c. formation of a gas
- d. no driving force: no reaction occurs

What are the spectator ions when KCl and NaNO₃ react?

- a. Na⁺(aq) and Cl⁻(aq)
- b. Na⁺(aq) and NO₃⁻(aq)
- c. K⁺(aq) and Cl⁻(aq)
- d. K⁺(aq) and NO₃⁻(aq)
- e. Na⁺(aq), K⁺(aq) and NO₃⁻(aq)
- f. K⁺(aq), Cl⁻(aq) and NO₃⁻(aq)
- g. K⁺(aq), Na⁺(aq), Cl⁻(aq) and NO₃⁻(aq)
IMPORTANT CONNECTIONS

- **Avogadro’s number**
  - Connects molecules (or atoms) to ?
  - Connects microscopic properties to ?

- **Conservation of Mass**
  - Mass of Products = Mass of ?
  - Balance the reaction

- **Balanced Chemical Equation**
  - Connects moles (molecules) of reactants with moles (molecules) of ?
  - Related to conservation of Mass

- **Formula weight**
  - Connects mass to ?
  - Connects a property that can be measured (determined) experimentally to moles (or molecules) of substance given in the balanced reaction.

- **Empirical Formula**
  - Tells relative number of what in a molecule?
  - Obtained from % mass or molecular formula

Problem Solving Process

1. Write balanced chemical equation
2. Make a table:
   - Fill in given information
3. Note connections between measured quantities and moles
   - Mass \[?\] \rightarrow moles
   - Volume \[?\] \rightarrow moles (solutions)
   - \[P, V, T\] \[?\] \rightarrow moles (gases)
4. Fill in table until you are able to solve the problem
5. Make sure your answer is REASONABLE
6. TRY different things!
**EXAMPLE:** Methane reacts with water to produce hydrogen gas and carbon monoxide. If 8.0 g of methane reacts with 9.0 g of water, how many grams of hydrogen gas will be produced?

**Example:**

If 36.6 g of C₂H₅OH reacts with 63.8 g of O₂, how many grams of CO₂ will be produced?

A) 26.0 g  
B) 43.2 g  
C) 58.5 g  
D) 70.4 g  
E) 100.4 g
**Limiting reagent**

- **Reactant** that is used up first
- Determines the amount of product
- **Must start with a balanced reaction**

BE SURE TO TEST BOTH REACTANTS

\[
\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}
\]

0.800 moles 2.00 moles