AP Chemistry

3 – Stoichiometry

STUDY GUIDE

I can:

Chemical Equations

- Give examples of **products** and **reactants** in a chemical equation.
- State that Antoine Lavoisier introduced the **law of conservation of matter**.

Combustion

- State that **combustion** is another name for **burning**.
- Write an equation for a combustion reaction given only the **fuel** that is burned.
- Correctly label substances in an equation as solid (*s*) , gas (*g*), liquid (*l*), or aqueous (*aq*)

Balancing Equations

- **Balance** equations by adding **coefficients**.
- **Recognize** when an equation is balanced.
- State that the **formulas** of reactants and products **should not be changed** in order to balance equations.

Stoichiometry Problems

- Use the **stoichiometric factor** (heart of the problem) to convert from moles of one substance to moles of a different substance. (i.e. In the equation: $N_2 + 3H_2 \rightarrow 2NH_3$, $3 \text{ mol } H_2 \approx 2 \text{ mol } NH_3$)
- **Convert** between the quantities of mass, volume, molecules and moles using dimensional analysis(i.e. use 1 mol = 22.4 L, 1 mol = 6.02×10^{23} molecules, and 1 mol = gram molecular mass)
- Show the **units** of molar mass as grams/mol or $g\text{-}mol^{-1}$.

Limiting Reactant Problems

- Recognize that a problem with two "given values" is a **limiting reactant** problem.
- Determine the **limiting reactant** and **excess reactant** in a problem.
- Solve problems involving Limiting Reactants
- Calculate how much **excess chemical** is **left over** after a reaction.

Percent Yield Problems

- Use stoichiometry to calculate the **theoretical yield** (mass of a product) in a problem.
- State that **actual yields** are usually given in a problem.
- Use the **theoretical yield** and **actual yield** to calculate the **percent yield**.

Chemical Analysis Problems

- Calculate the mass of each element in a given compound given data such as the masses of CO_2 and H_2O formed in a combustion reaction.
- Use mass and mole information to calculate the **empirical formula** of an unknown substance.
- Use **percent composition** to **equalize** mass and mole information derived from **different samples**.

Continuous Variation Data

- Use "**continuous variation**" laboratory data to determine the correct mole ratio of an equation. (Micro Mole Rockets Lab)