

FRANKLIN-SIMPSON HIGH SCHOOL

Course Name: AP Chemistry

Unit Name: Stoichiometry

Days: 12

AP Chemistry Objectives:

I. Structure of Matter (20%)

A. Atomic theory and atomic structure

- 1. Evidence for the atomic theory**
- 2. Atomic masses; determination by chemical and physical means**
- 3. Atomic number and mass number; isotopes**
- 4. Electron energy levels: atomic spectra, quantum numbers, atomic orbitals**
- 5. Periodic relationships including, for example, atomic radii, ionization energies, electron affinities, oxidation states**

B. Chemical bonding

1. Bonding forces

- a. Types: ionic, covalent, metallic, hydrogen bonding, van der Waals (including London dispersion forces)**
- b. Relationships to states, structure, and properties of matter**
- c. Polarity of bonds, electronegativities**

2. Molecular models

- a. Lewis structures**
- b. Valence bond: hybridization of orbitals, resonance, sigma and pi bonds**
- c. VSEPR**

- 3. Geometry of molecules and ions, structural isomerism of simple organic molecules and coordination complexes; dipole moments of molecules; relation of properties to structure**

C. Nuclear chemistry: nuclear equations, half-lives, and radioactivity; chemical applications

III. Reactions (35–40%)

A. Reaction types

2. Precipitation reactions

B. Stoichiometry

- 1. Ionic and molecular species present in chemical systems: net ionic equations**

2. Balancing of equations, including those for redox reactions

3. Mass and volume relations with emphasis on the mole concept, including empirical formulas and limiting reactants

V. Laboratory (5–10%)

The differences between college chemistry and the usual secondary school chemistry course are especially evident in the laboratory work.

The AP Chemistry Exam includes some questions based on experiences and skills students acquire in the laboratory:

- making observations of chemical reactions and substances
- recording data
- calculating and interpreting results based on the quantitative data obtained
- communicating effectively the results of experimental work

Purpose of the Unit:

Students have just completed this unit as their summer assignment. This unit may actually be greatly abbreviated depending on students' comprehension of the material covered. The main goal is to get students reviewed and refreshed on the material covered in first year chemistry and up to speed on the pace that we will keep throughout the year. Students will also start out with two familiar lab topics to get them oriented to the AP laboratory set up.

Prerequisites:

Students will need an understanding of:

- Nomenclature
- Stoichiometry
- Empirical formulas
- Laboratory procedures

Daily Lesson Guide

Day	Lesson Content and Objectives	Focus Questions	Critical Thinking (High Yield / Literacy /LTF/etc.)	Engagement	Assessment and/or Accommodations
1	Foundations/ Lab Safety Intro I.A.1, 2, 3, 4, 5 I.B.1, 2, 3 I.C V.	* What are the “basics” that I need to know before starting AP Chemsitry?	* Summarizing and note taking * I Do – We Do – You Do * Analysis/ Application * Learning with others	* ACT bell ringer * Take notes on modeled notes * Solve problems within notes solo and in small groups (formative)	* Evaluate student sample problems for understanding
2-3	Nomenclature I.B.1, 2, 3	* How are the different kinds of compounds named systematically?	* Summarizing and note taking * I Do – We Do – You Do * Analysis/ Application * Learning with others	* ACT bell ringer * Take notes on modeled notes * Solve problems within notes solo and in small groups (formative)	* Evaluate student sample problems for understanding
3-4	Stoichiometry III.A.2 III.B.1, 2, 3	* What do I need to remember and be able to apply about stoichiometry for AP chemistry?	* Summarizing and note taking * I Do – We Do – You Do * Analysis/ Application * Learning with others	* ACT bell ringer * Take notes on modeled notes * Solve problems within notes solo and in small groups (formative)	* Evaluate student sample problems for understanding

5-6	Laboratory: AP required lab 09: Determination of Mole Relationships in a Chemical Reaction I.A.1, 2, 3, 4, 5 I.B.1, 2, 3 I.C. III.A.2 III.B.1, 2, 3 V.	* How can I experimentally determine: the mole ratio of products and reactants in a chemical reaction?	* Learning with Others * Generating and testing Hypotheses * Authenticity * Novelty and Variety * Analysis/ Applications/ Synthesis	* ACT bell ringer * Work in small lab groups to solve a lab problem * Use data collected to determine mole ratio of reaction (summative)	* Evaluate lab reports * Students can check themselves by verifying their results among other lab groups
7-8	Stoichiometry FRQs and MC questions I.A.1, 2, 3, 4, 5 I.B.1, 2, 3 I.C. III.A.2 III.B.1, 2, 3 V.	* How will I be tested over stoichiometry on the AP Chemistry Exam? * How does everything I just learned fit together with what I already know?	* Learning with others * Choice * Clickers	* ACT bell ringer * Work independently, then in small groups, then as whole class to solve and grade FRQ's with AP rubrics * Use clickers and Turning Point to answers MC Questions from retired AP exams (summative)	* Evaluate student responses and provide immediate feedback on FRQ's and MC's with rubrics and keys

9-10	Laboratory: AP required lab 01, 02 & 16: Determination of Percent Water in a Compound and Empirical Formula I.A.1, 2, 3, 4, 5 I.B.1, 2, 3 I.C. III.A.2 III.B.1, 2, 3 V.	* How can I experimentally determine: the percentage of water in a compound and its empirical formula?	* Learning with Others * Generating and testing Hypotheses * Authenticity * Novelty and Variety * Analysis/ Applications/ Synthesis	* ACT bell ringer * Work in small lab groups to solve a lab problem * Use data collected to calculate empirical formula (summative)	* Evaluate lab reports * Students can check themselves by verifying their results among other lab groups
11-12	Unit Exam I.A.1, 2, 3, 4, 5 I.B.1, 2, 3 I.C. III.A.2 III.B.1, 2, 3 V.	* Can I use my knowledge to take an AP-like exam covering stoichiometry?	* Evaluation * Analysis * Application * Synthesis * Authenticity	* ACT bell ringer * Solve retired AP Chemistry MC and FR Questions * Graded by AP standards and rubrics (summative)	* Evaluate exam