

Chemistry Syllabus

*Honors Chemistry = italics*

Mathematical Foundations

Scientific notation

Significant figures

Metric system

Graphing

Math review

Condensed time schedule

Matter and Change

Matter, chemical & physical properties

pure substance & mixtures

chemical reactions

Condensed time schedule

Atom

development of Atomic Theory and presentation of information –*greater depth, more emphasis on mathematical relationship*

Nomenclature & Formula Writing

IUPAC naming of ionic, covalents and acids

Formula writing

Condensed time schedule

Chemical Quantities

Calculation of moles

Calculation of empirical & molecular formulas –*calculation from real world lab data, i.e. % composition based on the amount of products formed*

Calculation of percent composition

Additional lab experiences with more in depth thought processes and quantitative results

Chemical Reactions & Stoichiometry

Identify and complete types of chemical reactions

Complete general stoichiometric calculations

Theoretical & actual yield

Percent yield

Condensed time schedule & additional lab experiences

States of Matter & Kinetic Theory

States of matter, properties & changes

Kinetic Theory and applications

Phase diagrams

*Greater depth of content, both mathematically and conceptually*

Thermochemistry

Additional topic that will be taught only in Honors Chemistry

Behavior of Gases

Derivation of gas laws through computer interfaced labs

Kinetic theory application to gas laws

*Real vs Ideal gases*

Gas stoichiometry

*Molecular motion: Law of effusion*

Electron Makeup of the Atom

- Electron configuration
- Energy levels, subshells, orbitals
- Orbital notations
- Electron dot notation
- Trends amongst families
- Periodicity (atomic radius, ionic radius, electronegativity, ionization energy, electron affinity)
- *Discussion of DeBroglie, Uncertainty Principle, Quantum effects*

#### Chemical Bonds

- Ionic bonding
- Covalent bonding
- Properties of Ionic vs Covalent Compounds
- Lewis dot bonding structures
- Shapes of molecules
- *Hybridization*
- *Exception to Octet Rule, bonding & shapes*
- *Metallic bonds*
- Intermolecular forces-*greater depth for honors*
- Chemistry of water due to bonds

#### Solutions

- Define
- Solution concentration (molarity, molality, % strength, mole fraction, ppm)
- Solution stoichiometry
- Colligative properties-*greater depth for honors*
- *Phase diagrams for solutions*
- Dissociation & ionization

#### Acids & Bases

- Definitions
- pH
- Acid/Base stoichiometry
- Weak vs Strong -*greater depth for honors, structural relationships*
- *K<sub>a</sub> calculations, K<sub>w</sub> calculations*
- Ionization & dissociation of acids & bases
- Neutralization-*pH of titration problems*
- *Buffers*
- *Hydrolysis of salts, predict if acidic or basic*

## Possible additional topics depending on time

#### Equilibrium & Kinetics

- Collision theory
- Equilibrium
- LeChatelier's Principle
- *Mechanisms*
- *Derivation of Equilibrium equation*

