

## Chemistry HP

Ms. Sarah Lipetz

### Topics:

I. Safety and Scientific Measurement  
II. Matter and Change  
III. Atomic Structure  
IV. Chemical Compounds  
V. The Mole  
VI. Chemical Reactions  
VII. Stoichiometry  
VIII. Nuclear Chemistry

IX. Gases  
X. Solutions  
XI. Acids and Bases  
XII. Light and Quantum Chemistry  
XIII. Periodic Trends and Bonding  
XIV. Organic Chemistry  
XV. Thermochemistry

### Grading Policy:

#### Grading Distribution

Tests	45%
Quizzes	15%
Labs	25%
Assignments	15%

#### Grading Scale

A	93-100%	C	73-76%
A-	90-92%	C-	70-72%
B+	87-89%	D+	67-69%
B	83-86%	D	63-66%
B-	80-82%	D-	60-62%
C+	77-79%	F	59% or less

### Expectations of Students:

#### *(1) Be on Time*

**Be seated in your desk with the required handouts by the time the bell rings.** Students who are late three times will be given a warning and the advisor and parent/guardian will be notified. Students who are late four times will be assigned a Saturday School.

#### *(2) Come Prepared*

Come to class with the necessary materials. This includes your **notebook**, a **pen/pencil**, and a **calculator**. Have homework assignments/labs completed and be ready to write quizzes and tests.

#### *(3) Work On-Task*

Use class time wisely to complete the work that has been assigned. **Remain at your desk from the beginning of class until the bell rings** unless the teacher has directed you to move or you have asked permission to use the washroom.

#### *(4) Act Respectfully*

Respect the teacher, other students in the class, and the classroom. **Cell phones must be turned off and out of sight** during class time or they will be confiscated.

#### *(5) Follow the Safety Rules*

Read the safety rules and act accordingly at all times. Ensure that these rules have been reviewed and signed by both you and your parent/guardian.

### Classroom Policy:

#### Quizzes/ Tests

Students will be told of upcoming tests one week before they are written and of upcoming quizzes one day before they are written. In the case of an absence on the day of a quiz or test, students will be required to write the missed exam at lunch, after school, or during class on the day of their return. Extended absences will be considered on an individual basis.

#### Labs

Students will be given one day to prepare for labs. For safety reasons, all lab preparations must be completed before students are allowed to begin an activity or experiment. All lab reports must be handed in at the beginning of the following class. In the case of an absence on the day of a lab, students will be required to make up the lab at lunch or after school on the day of their return.

#### Homework Assignments

Homework will be assigned daily. All homework is considered important and is expected to be completed. Review should take place on a regular basis. Students are strongly encouraged to ask for help if they are struggling with concepts.

Twenty percent will be deducted if an assignment/lab is handed in late. Assignments/Labs will only be accepted one day late.

### Contacting Me:

I am available in room S103 after school and at lunch. I can be emailed (preferred method) at [sarah.lipetz@smmusd.org](mailto:sarah.lipetz@smmusd.org) or called at (310) 395-3204 ext 123.

### Website:

All course materials can be downloaded from the website below.

<http://teachers.yourhomework.com/Lipetz>

## Chemistry HP Topics

### (1) Scientific Measurement

- convert between scientific notation and standard form of a number
- convert from one metric unit to another using conversion factors
- convert between imperial and metric units using conversion factors
- convert squared and cubed terms to different units
- convert rate expressions from one set of units to another
- convert temperature between **Fahrenheit, Celsius, and Kelvin**
- read metric scales to the correct number of significant figures
- report values and round numbers to the correct number of significant figures
- report sums, differences, products, and quotients to the correct number of significant figures

Lab: Reading Scales and Conversions

### (2) Matter and Change

- define **matter**
- distinguish between a **pure substance** and a **mixture**; an **element** and a **compound**; a **homogeneous mixture** and a **heterogeneous mixture** (by definition and with examples)
- distinguish between **qualitative** and **quantitative** properties; **intensive** and **extensive** properties; **chemical** and **physical** properties (by definition and with examples).
- compare **chemical** and **physical** changes (by definition and with examples)
- compare the three phases of matter (solid, liquid, and gas)
- define **evaporation/boiling, condensation, melting, freezing, sublimation, and deposition**
- define **density**
- perform calculations involving density
- discuss the early discovery of elements (Empedocles, Democritus, Brandt, Boyle, Priestly, Cavendish, Lavoisier)
- identify elements by both name and chemical symbol

Labs: Observing Changes in Matter, Thickness of Aluminum Foil

### (3) Atomic Structure

- discuss the development of atomic models (Dalton, Thomson, Rutherford, Chadwick, Bohr)
- compare **protons, electrons, and neutrons** in terms of charge, mass, and location in an atom
- give the number of protons, electrons, neutrons, and atomic mass for a given element
- define **isotope**
- calculate average atomic mass from the relative abundance and individual masses of each isotope
- define **ion**
- define **cation** and **anion**
- define **valence electrons**
- determine the number of valence electrons for an atom
- locate **rows/periods** and **groups/families** on the periodic table
- draw Bohr diagrams for atoms and ions

Lab: Drawing Bohr diagrams

### (4) Chemical Compounds

- draw electron dot diagrams for atoms
- draw **Lewis structures** for ionic and covalent compounds
- compare **metals, non metals, and metalloids** in terms of properties and location on the periodic table
- predict the charges of metal and non metal ions
- name and write formulas for ionic compounds including compounds with multivalent ions and those with polyatomic ions
- name and write formulas for acids
- name and write formulas for covalent compounds
- identify diatomic elements
- compare covalent and ionic compounds

Lab: Flame Test

(5) The Mole

- state **Avagadro's number**
- determine the number of atoms of each element in a given compound
- determine molar mass for a given element/compound
- convert between moles, mass, and atoms/molecules
- name and write formulas for hydrates
- determine the **percent composition** for a compound
- determine the **empirical formula** and **molecular formula** for a compound

Labs: Mole Calculations, Empirical Formula of a Hydrate

(6) Chemical Reactions

- identify the reactants and products in a chemical equation
- balance chemical equations
- classify reaction as **synthesis, decomposition, single replacement, double replacement, neutralization, or combustion**
- predict the products of a reaction given the reactants
- describe the factors that affect the rate of a chemical reaction including **concentration, temperature, surface area, and catalyst**

Lab: Types of Reactions, Reaction Rate

(7) Stoichiometry

- define **stoichiometry**
- determine **mole ratios**
- perform stoichiometric calculations involving mass of a reactant or product
- determine **percent yield** of a reaction given the actual yield/ actual yield given percent yield
- perform stoichiometric calculations involving **limiting and excess** reactants

Lab: Calculations involving reactions

(8) Nuclear Chemistry

- write **nuclide symbols** for a given isotope
- compare **alpha, beta, and gamma** radiation
- complete nuclear reactions
- define **half-life**
- perform calculations involving half-life

Lab: Half-Life of "Popcornium"

(9) Gases

- define **pressure**
- perform calculations involving pressure
- describe how pressure is measured using a **barometer**
- convert pressures between the units of atm, Pascals, and mm Hg
- perform calculations involving **Boyle's Law, Charles' Law, and Gay-Lussac's Law**
- solve **combined law** problems
- state the conditions of **STP**
- state the volume of one mole of gas at STP
- perform calculations involving gases at STP
- perform calculations involving the **Ideal Gas Law**
- perform stoichiometric calculations involving volume of gases
- discuss the kinetic molecular theory as it relates to ideal and real gases

Labs: Testing for Gases, Gas Stoichiometry

(10) Solutions

- define **solution**
- define **solute** and **solvent**
- compare **unsaturated** and **saturated** solutions
- define **molarity**
- perform calculations involving molarity
- perform calculations involving solution dilution
- define **dissociation**
- write dissociation equations for ionic compounds
- calculate the concentration of ions in a solution
- calculate the concentration of ions resulting from mixing two solutions
- determine if a compound is **soluble** or **insoluble** in water
- define **precipitate**
- write the formula equations, complete ionic equation, and net ionic equation for a precipitation reaction
- perform stoichiometric calculations involving concentration of solutions

Labs: Solution Concentration and Spectrophotometry, Solubility

(11) Acids and Bases

- define and give examples of **acids** and **bases**
- give the properties of acids and bases
- calculate pH, pOH,  $[H^+]$ , and  $[OH^-]$  for strong acids and bases
- perform stoichiometric calculations involving pH and pOH

Labs: Acids and Bases, Acid Base Stoichiometry

(12) Light and Quantum Chemistry

- define and give examples of **electromagnetic radiation**
- define **wavelength** and **frequency**
- perform calculations involving wavelength, frequency, and energy
- discuss the development of quantum theory (Planck, Einstein, Heisenberg, Schrodinger)
- describe the photoelectric effect
- discuss the quantum numbers: **principal quantum number**, **angular momentum quantum number**, **magnetic quantum number**, and **spin quantum number** and the orbital properties they define
- give **orbital notation** for a given element by applying **Aufbau Principal**, **Hund's Rule**, and **Pauli Exclusion Principal**
- write **electronic configuration** for a given element
- write **noble gas configuration** for a given element

Lab: Atomic Spectra of Elements

### (13) Periodic Trends and Bonding

- discuss the development of the periodic table (Mendeleev)
- locate and give properties of main families including the **alkali metals, alkaline earth metals, transition metals, halogens, nobles gases, lanthanides, actinides, and hydrogen**
- define **atomic radius** and **ionic radius** and explain periodic trends in these properties
- define **ionization energy** and explain periodic trends in this property
- define **electronegativity** and explain periodic trends in this property
- draw Lewis dot structures
- assign **bond orders**
- draw Lewis Structures for polyatomic ions
- assign **formal charges** to atoms in polyatomic ions
- draw **resonance structures** for polyatomic ions
- classify bonds as ionic or covalent and as polar or non-polar using electronegativity
- assign shapes to molecules using **VSEPR Theory**
- classify molecules as polar or non-polar using shape
- compare **miscible** and **immiscible** (by definition and with example)
- determine if two substances will be miscible based on polarity

Lab: Periodic Trends, VSEPR Model Building, Polarity and Bonding

### (14) Organic Chemistry

- name and draw hydrocarbons including **alkanes, cycloalkanes, alkenes, and alkynes**
- name and draw **structural isomers** for alkanes
- name and draw **stereoisomers** for alkenes
- name and draw molecules with functional groups including **alkyl halides, alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amines, and amides**
- complete **condensation reactions**

Lab: Ester Synthesis

### (15) Thermochemistry

- define **temperature** and **heat**
- describe and graph the temperature changes for a heating or cooling curve
- define **heat of vaporization** and **heat of fusion**
- perform calculations involving heat of vaporization and heat of fusion
- define **specific heat capacity**
- perform calculations involving specific heat capacity
- define **heat of reaction**
- define **exothermic** and **endothermic**
- calculate the heat of a reaction from bond energies
- calculate the heat of a reaction from heats of formation
- calculate the heat of a reaction from Hess' Law

Labs: Heat of Reaction