SILICON VALLEY HIGH SCHOOL

Chemistry Course Syllabus

Course Description:

In Chemistry, students will develop an understanding of the key principles of matter, and the elements and the periodic table, with a focus on the trends and reactivity of the elements. Students will learn about chemical compounds and bonding, as well as the types of chemical reactions, and how they all adhere to the conservation of matter. Students will go on to be able to solve for chemical proportions in compounds, as well as quantities in chemical reactions, including finding the limiting reagent and percent yield. Students will then learn about solutions and solubility, and will move on to the nature and behavior of acids and bases. Students will study gases and will learn the gas laws, as well as be able to comprehend the concept of chemical equilibrium.

Part 1: 5 credit hours

Part 2: 5 credit hours

Course Outline	California Standards
	Chemistry, Part 1
Unit 1: Observing Matter 1.1 Three Great Discoveries in Chemistry 1.2 Physical and Chemical Properties 1.3 Classifying Matter	**In Unit 1 students will learn**: The basics of Chemistry and its role in the natural world. The three great discoveries in Chemistry and the men who made these discoveries possible. The difference between physical and chemical properties, what they are and their classifications. How matter is classified. [1h, 1i, 1j]
Unit 2: Elements and the Periodic Table 2.1 Model of the Atom 2.2 The Periodic Law 2.3 Trends in the Periodic Table 2.4 Valence Electrons	**In Unit 2 students will learn**: The elements and their places on the Periodic Table. About the atom, what it is, its structure and the atomic model. About the Periodic Law and the placement of elements on the periodic table. About Valence Electrons, what they are, and their importance. [1a, 1b, 1c, 1d, 1e, 1f, 1g,]

Unit 3: Chemical Compounds and Bonding

3.1 Properties of Ionic and Covalent Compounds
3.2 Ionic Covalent and Metallic Bonding
3.3 Polar and Nonpolar Molecules
3.4 Writing Chemical Formulas for Ionic Compounds
3.5 Polyatomic Ions
3.6 Writing Chemical Formulas for Molecular Compounds

In Unit 3 students will learn:
The nature of chemical compounds and bonding.
What chemical compounds are, how they are formed and their makeup.
The difference between ionic and covalent compounds, and various types/examples of chemical bonds.
To write balanced chemical formulas.
[2a, 2b, 2c, 2d, 2e, 2f, 2g, 2h, 7a, 7b, 7c, 10a]

Unit 4: Chemical Reactions

4.1 Writing Skeleton Chemical Equations
4.2 Balancing Chemical Equations
4.3 Synthesis and Decomposition Reactions
4.4 Combustion Reactions
4.5 Single Displacement Reactions
4.6 Double Displacement Reactions

In Unit 4 students will learn:
The nature of chemical reactions.
The different types of chemical reactions, including synthesis, decomposition, combustion, single and double displacement reactions.
To write skeleton chemical equations and to balance chemical equations.
[3a, 3b, 3g, 7a, 7b, 7c, 7d, 7e, 7f]

Unit 5: Conservation of Matter

5.1 Isotopes and Average Atomic Mass
5.2 Avogadro's Number and the Mole
5.3 Formula Mass
5.4 Converting Between Mass, Moles and Number of Particles

In Unit 5 students will learn:
The principle of the conservation of matter.
About isotopes, what they are, and their place in the study of chemistry.
About atomic mass and what atomic mass is.
To calculate atomic mass of a molecule.
Avogadro's number and "the Mole," what it is, and how it is used in chemical equations.
Chemical formulas and to balance them.
To convert between mass, moles, and the number of particles.
[3c, 3d, 3e]

Unit 6: Chemical Proportions in Compounds

6.1 Percentage Composition
6.2 Empirical Formula
6.3 Determining Empirical Formula by Experiment
6.4 Molecular Formula

In Unit 6 students will learn:
Chemical proportions in compounds.
Chemical composition and to calculate the percentage of a specific composition.
To understand the empirical formula and learn its importance in the study of chemistry.
To determine and calculate empirical formulas.
To find the molecular formula of a compound.
To determine and calculate molecular structure and chemical equations.
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Course Outline	California Standards
Chemistry Part 2	
Unit 1: Quantities in Chemical Reactions 1.1 Stoichiometry 1.2 The Limiting Reagent 1.3 Percentage Yield	**In Unit 1 students will learn**: The significance of coefficients in a balanced equation, molar ratios, mole-mole calculations, mass-mass calculations and other stoichiometric calculations. To solve Limiting Reactant stoichiometry problems as well as how to determine the excess reactant. The difference between actual, theoretical and percent yields with examples of how to calculate theoretical and percent yields. [3f]
Unit 2: Solutions and Solubility 2.1 Water and Life 2.2 Properties of Solutions 2.3 The Dissolving Process 2.4 Solubility and Saturation 2.5 Dilutions 2.6 Colligative Properties	**In Unit 2 students will learn**: The concepts of solutions and solubility. The chemical structure of water, and why water is so important for life. How and why water acts as a wonderful solvent and provides a medium for metabolism. The various factors that affect how well a solid-liquid solute dissolves, including Particle Size, Temperature, Agitation and the Chemical Nature of the solute, particularly polarity (Like dissolves like.) To interpret solubility curves and read solubility curves. To identify and understand saturated, unsaturated and supersaturated solutions. Colligative properties, freezing point depression and boiling point elevation. The relationship between amount of solute and degree of freezing point depression-boiling point elevation. [2h, 6a, 6b, 6c, 6d, 6e, 6f]
Unit 3: Acids and Bases 3.1 Properties of Acids and Bases and the Arrhenius Theory 3.2 Bronsted-Lowry Theory of Acids and Bases 3.3 Strong and Weak Acids and Bases 3.4 The pH Scale 3.5 Acid-Base Titration	**In Unit 3 students will learn**: The general properties of acids and bases. The Arrhenius definitions for acids and bases. Bronsted and Lowry's theory of acids and bases. To distinguish between strong and weak acids and bases in terms of the extent of dissociation, reaction with water and electrical conductivity.

The pH scale and to consider the effects of acid deposition on limestone buildings and living things.
To understand the nature of a strong acid and a strong base.
To solve acid-base titration math problems.
[5a, 5b, 5c, 5d, 5e, 5f, 5g]

Unit 4: Gases

4.1 Kinetic Molecular Theory of Gases
4.2 Pressure Volume Temperature
4.3 Ideal Gas Law
4.4 Ideal Gas Law Problems
4.5 Gas Law Stoichiometry

In Unit 4 students will learn:
The nature of gases as related to the study of Chemistry.
The assumptions behind the Kinetic Molecular Theory and some general properties of gases from a molecular perspective.
Avogadro's Law, Boyle's Law, Lussac's Law and Charles' law.
How the ideal gas equation allows one to find the pressure, volume, temperature and/or number of moles in a certain situation.
[4a, 4b, 4c, 4d, 4e. 4f, 4g, 4h, 4i]

Unit 5: Chemical Equilibrium

5.1 Rates of Reactions
5.2 Equilibrium Constant
5.3 LeChatelier's Principle

In Unit 5 students will learn:
To measure and consider the rate of a reaction.
The connection between concentration and reaction rate in terms of the Law of Mass Action and Rate Laws.
The equilibrium constant (K,) and how it can be calculated in various reversible reactions.
Le Chatelier's Principle and how it predicts changes in concentration when "stressing" reactions at equilibrium.
[8a, 8b, 8c, 8d, 9a, 9b, 9c]