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This is a resubmission for the course a-g Chemistry

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* **Course Title:**	a-g Chemistry
* **Transcript Title /Abbreviation:**	**Transcript Title /Abbreviation: Course Code** a-g Chemistry
* **Seeking "Honors" Distinction:**	No
* **Subject Area:**	Laboratory Science
* **Category:**	Chemistry
* **Grade Level for which this course has been designed:**	☐ 9 ☑ 10 ☑ 11 ☑ 12
* **Unit Value:**	1.0 (one year, 2 semesters, or 3 trimesters equiv.)
* **Is this course classified as a Career Technical Education**	N

*** Is this course classified as a Career Technical Education:** No

*** Brief Course Description**

This is a year course looking into the composition, structure, and reactions of matter. This course encourages high-school students to ask questions about things that occur in nature and determine the underlying chemical compositions that compel these reactions. Topics studied include atomic structure, the periodic table, chemical bonding, matter, acids, bases, mixtures, and solutions, stoichiometry, chemical reactions, nuclear chemistry, electrochemistry, organic chemistry, and biochemistry. There will be lab experiments that accompany these topics and help bring deeper understanding as well as help provide inquiry-based exploration.

Pre-Requisites

Geometry with a C or better - Required

Co-Requisites

Algebra 2 - Recommended

Context for Course (optional)

History of Course Development (optional)

Textbooks

TEXTBOOK 1

*** Title:**	Prentice Hall Chemistry
*** Edition:**	California
*** Publication Date:**	2007
*** Publisher:**	Pearson Prentice Hall
*** Author(s):**	Wilbraham, Staley, Matta, Waterman
URL	

Resource:

* **Usage:** Primary Text

Read in entirety or near entirety

Supplemental Instructional Materials

Chemistry Inquiry, Jason Neil, Uncommon Science, Inc., www.chemistryinquiry.com

e2020, inc., Chemistry Course, www.education2020.com

* **Course Purpose**

The purpose of this a-g Chemistry class is to provide students with a comprehensive and challenging introduction to the concepts of chemistry, the scientific method of inquiry, and general laboratory techniques and safety. Students should leave this course fully prepared for university level science courses.

* **Course Outline**

Unit 1 Atomic Structure and the Periodic Table

Introduction to Chemistry

- Chemistry

- Identify five traditional areas of study in chemistry.

- Relate pure chemistry to applied chemistry.

- Identify reasons to study chemistry.

- Chemistry Far and Wide

- Identify some areas affected by chemistry research.

- Describe some examples of research in chemistry.

- Distinguish between macroscopic and microscopic views.

- Thinking Like a Scientist

- Describe how Lavoisier transformed chemistry.

- Identify three steps in the scientific method.

- Explain why collaboration and communication are important in science.

- Problem Solving in Chemistry

- Identify two general steps in problem solving.

- Describe three steps for solving numeric problems.

- Describe two steps for solving conceptual problems.

Measurement in Chemistry

- Units of Measurement

- Define SI base units for time, length, mass, and temperature.

- Explain how adding a prefix changes a unit.

- Compare the derived units for volume and density.

- Scientific Notation and Dimensional Analysis

- Express numbers in scientific notation.

- Use dimensional analysis to convert between units.

- How Reliable are Measurements

- Define and compare accuracy and precision.

- Use significant figures and rounding to reflect the certainty of data.

- Use percent error to describe the accuracy of experimental data.

- Representing Data

- Create graphs to reveal patterns in data.

- Interpret graphs.

Atomic Structure

- Defining the Atom

- Describe Democritus's ideas about atoms.

- Explain Dalton's atomic theory.

- Identify the special instruments necessary to observe individual atoms.

- Models of the Atom

- Identify the inadequacies in the Rutherford atomic model.

-Identify the new proposal in the Bohr model of the atom.

- Describe the energies and positions of electrons according to the quantum mechanical ??model.

- Describe how the shapes of orbitals related to different sub-levels differ.

- Subatomic Particles and the Nuclear Atom

- Distinguish between the subatomic particles in terms of relative charge and mass.

- Describe the structure of the nuclear atom, including the locations of the subatomic particles.

- Electron Arrangement in Atoms

- Describe how to write the electron configuration for an atom.

- Explain why the actual electron configurations for some elements differ from those predicted by the aufbau principle.

- Distinguishing Among Atoms

- Explain what makes elements and isotopes different from each other.

- Calculate the number of neutrons in an atom.

- Calculate the atomic mass of an element.

Periodic Table

- Where did the Elements Come From?

- Describe how the naturally occurring elements form.

- Explain how a transmutation changes one element into another.

- Describe how particle accelerators are used to create synthetic elements.

- Development of the Modern Periodic Table.

- Trace the development and identify key features of the periodic table.

- Elements and Compounds

- Explain the difference between an element and a compound.

- Distinguish between a substance and a mixture.

- Identify the chemical symbols of elements, and name elements, given their symbols.

- Classification of the Elements

- Explain why elements in the same group have similar properties.

- Identify the four blocks of the periodic table based on electron configuration.

- Periodic Trends

- Describe trends among the elements for atomic size.

- Explain how ions form.

- Describe periodic trends for first ionization energy, ionic size, and electronegativity.

The Elements

- Properties of the s-Block Elements.

- Explain how elements in a given group are both similar and different.

- Discuss the properties of hydrogen.

- Describe and compare the properties of alkali metals and alkaline earth metals.

- Properties of the p-Block Elements.

- Describe and compare properties of p-block elements.

-??Define allotropes and provide examples.

- Explain the importance to organisms of selected p-block elements.

- Properties of the d-Block and f-Block Elements.

- Compare the electron configurations of transition and inner transition metals.

- Describe the properties of transition elements.

- Explain why some transition metals form compounds with color and some have magnetic?? properties.

Unit 2 Chemical Bonding

Basic Bonds

- Forming Chemical Bonds

- Define chemical bond.

- Relate chemical bond formation to electron configuration.

- Describe the formation of positive and negative ions.

- The Formation and Nature of Ionic Bonds

- Describe the formation of ionic bonds.

- Account for many of the physical properties of an ionic compound.

- Discuss the energy involved in the formation of an ionic bond.

- The Nature of Covalent Bonds

- Describe how electrons are shared to form covalent bonds and identify exceptions to the ??octet rule.

- Demonstrate how electron dot structures represent shared electrons.

- Describe how atoms form double or triple covalent bonds.

- Distinguish between a covalent bond and a coordinate covalent bond and describe how the ??strength of a covalent bond is related to its bond dissociation energy.

- Describe how oxygen atoms are bonded in ozone.

Other Chemical Bonds

- Metallic Bonds and Properties of Metal

- Describe a metallic bond.

- Explain the physical properties of metals in terms of metallic bonds.

- Define and describe alloys.

- Polar Bonds and Molecules

- Describe how electronegativity values determine the distribution of charge in a polar ??molecule.

- Describe what happens to polar molecules when they are placed between oppositely ??charged metal plated.

- Evaluate the strength of intermolecular attractions compared with the strength of ionic and ??covalent bonds.

- Identify the reason why network solids have melting points.

- Bonding Theories

- Describe the relationship between atomic and molecular orbitals.

- Describe how VSEPR theory helps predict the shapes of molecules.

- Identify ways in which orbital hybridization is useful in describing molecules.

Chemical Formulas

- Molecular Compounds

- Distinguish between the melting points and boiling points of molecular compounds and ionic ??compounds.

- Describe the information a molecular formula provides.

- Empirical and Molecular Formulas

- Explain what is meant by the percent composition of a compound.

- Determine the empirical and molecular formulas for a compound from mass percent and ??actual mass data.

- Names and Formulas for Ionic Compounds

- Write formulas for ionic compounds and oxyanions.

- Name ionic compounds and oxyanions.

- The Formula for a Hydrate

- Explain what a hydrate is and how its name reflects its composition.

- Determine the formula for a hydrate from laboratory data

- Determine the formula for a hydrate from laboratory data.

Unit 3 Matter

Matter and its Properties

- Properties of Matter

- Identify the characteristics of a substance.

- Distinguish between physical and chemical properties.

- Differentiate among the physical states of matter.

- Density

- Calculate the density of a material from experimental data.

- Describe how density varies with temperature.

- Changes in Matter

- Describe what happens during a chemical change.

- Identify four possible clues that a chemical change has taken place.

- Apply the law of conservation of mass to chemical reactions.

- States and State Changes

- Relate the properties of a state to the energy content and particle arrangement of that ??state of matter.

- Explain forces and energy changes involved in changes of state.

States of Matter and Intermolecular Forces

- Energy and State Changes

- Define the molar enthalpy of fusion and the molar enthalpy of vaporization, and identify ??them for a substance by using a heating curve.

- Describe how enthalpy and entropy of a substance relate to state.

- Predict whether a state change will take place by using Gibbs energy.

- Calculate melting and boiling points by using enthalpy and entropy.

- Explain how pressure affects the entropy of a gas and affects changes between the liquid ??and vapor states.

- Intermolecular Forces

- Contrast ionic and molecular substances in terms of their physical characteristics and the ??types of forces that govern their behavior.

- Describe dipole-dipole forces.

- Explain how a hydrogen bond is different from other dipole-dipole forces and how it is ??responsible for many of water's properties.

- Describe London dispersion forces, and relate their strength to other types of attractions.

- Phase Equilibrium

- Phase Equilibrium

- Identify systems that have multiple phases, and determine whether they are at equilibrium.

- Understand the role of vapor pressure in changes of state between a liquid and a gas.

- Interpret a phase diagram to identify melting points and boiling points.

Gases

- Properties of Gases

- Explain why gases are easier to compress than solids or liquids are.

- Describe the three factors that affect gas pressure.

- The Gas Laws

- State Boyle's law, and use it to solve problems involving pressure and volume.

- State Charles's law, and use it to solve problems involving volume and temperature.

- State Gay-Lussac's law, and use it to solve problems involving pressure and temperature.

- State Avogadro's law, and explain its importance in determining the formulas of chemical compounds.

- The Ideal Gas Law

- Relate the amount of gas present to its pressure, temperature, and volume by

- Relate the amount of gas present to its pressure, temperature, and volume by using the ideal gas law.

- Compare the properties of real and ideal gases.

Unit 4 Acids, Bases, Mixtures, and Solutions

Mixtures

- Mixtures in Matter

- Contrast mixtures and substances.

- Classify mixtures as homogeneous or heterogeneous.

- List and describe several techniques used to separate mixtures.

- Heterogeneous Mixtures

- Identify the properties of suspensions and colloids.

- Describe different types of colloids.

- Explain the electrostatic forces in colloids.

Solutions

- What Are Solutions?

- Describe the characteristics of solutions and identify the various types.

- Relate the intermolecular forces and the process of solvation.

- Define solubility and identify factors affecting it.

- Physical Properties of Solutions

- Distinguish between nonelectrolytes, weak electrolytes, and strong electrolytes.

- Describe how a solute affects the freezing point and boiling point of a solution.

- Explain how a surfactant stabilizes oil-in-water emulsions.

- Colligative Properties of Solutions

- Explain the nature of colligative properties.

- Describe four colligative properties of solutions.

- Calculate the boiling point elevation and the freezing point depression of a solution.

- Solution Concentration

- State the concentrations of solutions in different ways.

- Calculate the concentrations of solutions.

Acids and Bases

- What Are Acids and Bases?

- Describe the distinctive properties of strong and weak acids, and relate their properties to ??the Arrhenius definition of an acid.

- Describe the distinctive properties of strong and weak bases, and relate their properties to ??the Arrhenius definition of a base.

- Compare the Bronsted-Lowry definitions of acids and bases with the Arrhenius definitions of acids and bases.

- Identify conjugate acid-base pairs.

- Write chemical equations that show how an amphoteric species can behave as either an acid or a base.

- Acidity, Basicity, and pH

- Use K_w in calculations.

- Explain the relationship between pH and H_3O^+ concentration.

- Perform calculations using pH, $[H_3O^+]$, [OH??}, and K_w.

- Describe two methods of measuring pH.

- Neutralization and Titrations

- Predict the product of an acid-base reaction.

- Describe the conditions at the equivalence point in a titration.

- Explain how you would select an indicator for an acid-based titration.

- Describe the procedure for carrying out a titration to determine the concentration of an acid ??or base solution.

Unit 5 Stoichiometry

The Mole

- Measuring Matter

- Describe how a mole is used in chemistry.

- Relate a mole to common counting units.

- Convert moles to number of representative particles and number of representative particles ??to moles.

- Mass and the Mole

- Relate the mass of an atom to the mass of a mole of atoms.

- Calculate the number of moles in a given mass of an element and the mass of a given number of moles of an element.

- Calculate the number of moles of an element when given the number of atoms of the element.

- Calculate the number of atoms of an element when given the number of moles of the element.

- Moles of Compounds

- Recognize the mole relationships shown by a chemical formula.

- Calculate the molar mass of a compound.

- Calculate the number of moles of a compound from a given mass of the compound, and the mass of a compound from a given number of moles of the compound.

- Determine the number of atoms or ions in a mass of a compound.

Stoichiometry

- Balancing Chemical Equations

- Relate the conservation of mass to the rearrangement of atoms in a chemical reaction

- Write and interpret a balanced chemical equation for a reaction, and relate conservation of mass to the balanced equation

- The Arithmetic of Equations

- Explain how balanced equations apply to both chemistry and everyday life.

- Interpret balanced chemical equations in terms of moles, representative particles, mass, and gas volume at STP.

- Identify the quantities that are always conserved in chemical reactions.

- Chemical Calculations

- Construct mole ratios from balance chemical equations and apply these ratios in stoichiometric calculations.

- Calculate stoichiometric quantities from balanced chemical equations using units of mole, mass, representative particles, and volumes of gases at STP.

- Limiting Reagent and Percent Yield

- Identify and use the limiting reagent in a reaction to calculate the maximum amount of product(s) produced and the amount of excess reagent that remains unreacted.

- Calculate theoretical yield, actual yield, or percent yield given appropriate information.

- Gas Stoichiometry

- Determine volume ratios for gaseous reactants and products by using coefficients from a chemical equation.

- Calculate amounts of gaseous reactants and products in a chemical reaction using the gas laws.

Unit 6 Chemical Reactions

Types of Reactions

- Classifying Chemical Reactions

- Identify combustion reactions, and write chemical equations that predict the products

- Identify synthesis reactions, and write chemical equations that predict the products

- Identify decomposition reactions, and write chemical equations that predict the products

- Identify displacement reactions, and use the activity series to write chemical equations that predict the products

- Identify double-displacement reactions, and write chemical equations that predict the products

- Oxidation-Reduction Reactions

- Identify atoms that are oxidized or reduced through electron transfer.

- Assign oxidation numbers to atoms in compounds and ions.

- Identify redox reactions by analyzing changes in oxidation numbers for different atoms in the reaction.

- Balance equations for oxidation-reduction reactions through the half-reaction method.

- Write Net Ionic Equations

- Write total ionic equations for reactions in aqueous solutions.

- Identify spectator ions and write net ionic equations for reactions in aqueous solutions.

Reaction Rates and Equilibrium

- Rates of Reactions

- Describe how to express the rate of a chemical reaction.

- Identify four factors that influence the rate of a chemical reaction.

- Reaction Spontaneity

- Differentiate between spontaneous and nonspontaneous processes.

- Explain how changes in entropy and free energy determine the spontaneity of chemical reactions and other processes.

- Equilibrium: A State of Dynamic Balance

- Recognize the characteristics of chemical equilibrium.

- Write equilibrium expressions for systems that are at equilibrium.

- Calculate equilibrium constants from concentration data.

- Factors Affecting Chemical Equilibrium

- Describe how various factors affect chemical equilibrium.

- Explain how Le Ch??telier's principal applies to equilibrium system.

Chemical Equilibrium

- Using Equilibrium Constants

- Determine equilibrium concentrations of reactants and products.

- Calculate the solubility of a compound from its solubility product constant.

- Explain the common ion effect.

- Reversible Reactions and Equilibrium

- Describe how the amounts of reactants and products change in a chemical system at equilibrium.

- Identify three stresses that can change the equilibrium position of a chemical system.

- Explain what the value of Keq indicates about the position of equilibrium.

- Equilibria of Weak Acids and Bases

- Write an equilibrium equation that shows how a weak acid is in equilibrium with its ??conjugate base.

- Calculate Ka from the hydronium ion concentration of a weak acid solution.

- Describe the components of a buffer solution, and explain how a buffer solution resists changes in pH.

- Solubility Equilibrium

- Describe the relationship between the solubility product constant and the solubility of a compound.

- Predict whether precipitation will occur when two salt solutions are mixed.

Energy and Chemical Change

- Energy

- Explain what energy is and distinguish between potential and kinetic energy.

- Relate chemical potential energy to the heat lost or gained in chemical reactions.

- Calculate the amount of heat absorbed or released by a substance as its temperature changes.

- Heat in Chemical Reactions and Processes

- Describe how a calorimeter is used to measure energy absorbed or released.

- Explain the meaning of enthalpy and enthalpy change in chemical reactions and processes.

- Thermochemical Reactions

- Write thermochemical equations for chemical reactions and other processes.

- Describe how energy is lost or gained during changes of state.

- Calculate the heat absorbed or released in a chemical reaction.

- Calculating Enthalpy Change

- Use Hess's law of summation of enthalpies of reaction to calculate the enthalpy change for a reaction.

- Explain the basis for the table of standard enthalpies of formation.

- Calculate the reaction using thermochemical equations.

- Determine the enthalpy change for a reaction using standard enthalpies of formation data.

Unit 7 Nuclear and Electrochemistry

Radioactivity

- Nuclear Radiation

- List the founding scientists in the study of radioactivity and state their discoveries.

- Identify alpha, beta, and gamma radiation in terms of composition and key properties.

- Unstable Nuclei and Radioactive Decay

- Explain the relationship between unstable nuclei and radioactive decay.

- Characterize alpha, beta, and gamma radiation in terms of mass and charge.

- Radioactive Decay

- Explain why certain nuclei are radioactive.

- Apply your knowledge of radioactive decay to write balanced nuclear equations.

Nuclear Chemistry

- Transmutation

- Describe how induced transmutation is used to produce a transuranium element.

- Solve problems involving radioactive decay rates.

- Fission and Fusion of Atomic Nuclei

- Compare and contrast nuclear fission and nuclear fusion

- Compare and contrast nuclear fission and nuclear fusion.

- Explain the process by which nuclear reactors generate electricity.

- Applications and Effects of Nuclear Reactions

- Describe several methods used to detect and measure radiation.

- Explain an application of radiation used in the treatment of disease.

- Describe some of the damaging effects of radiation of biological systems.

Electrochemistry

- Introduction to Electrochemistry

- Describe the relationship between voltage and the movement of electrons.

- Identify the parts of an electrochemical cell and their functions.

- Write electrode reactions for cathodes and anodes.

- Galvanic Cells

- Describe the operation of galvanic cells, including dry cells, lead-acid batteries, and fuel cells.

- Identify conditions that lead to corrosion and ways to prevent it.

- Calculate cell voltage from a table of standard electrode potentials.

- Electrolytic Cells

- Describe how electrolytic cells work.

- Describe the process of electrolysis in the decomposition of water and in the production of metals.

- Describe the process of electroplating.

Unit 8 Organic and Biochemistry

Hydrocarbons

- Alkanes

- Describe the structures of alkanes.

- Name an alkane by examining its structure.

- Draw the structure of an alkane given its name.

- Cyclic Alkanes and Alkane Properties

- Name a cyclic alkane by examining its structure.

- Draw the structure of a cyclic alkane given its name.Objective 3Describe the properties of alkanes.

- Distinguish between saturated and unsaturated hydrocarbons.

- Alkenes and Alkynes

- Compare the properties of alkenes and alkynes with those of alkanes.

- Describe the molecular structures of alkenes and alkynes.

- Name an alkene or alkyne by examining its structure.

- Draw the structure of an alkene or alkyne by analyzing its name.

- Isomers

- Distinguish between the two main categories of isomers, structural isomers and stereoisomers.

- Differentiate between cis- and trans- geometric isomers.

- Recognize different structural isomers given a structural formula.

- Describe the structural variation in molecules that results in optical isomers.

- Aromatic Hydrocarbons and Petroleum

- Compare and contrast the properties of aromatic and aliphatic hydrocarbons.

- Explain what a carcinogen is and list some examples.

- Describe the process used to separate petroleum into fractions and to balance each fraction's output with market demands.

- Identify the fractions into which petroleum can be separated.

Substituted Hydrocarbons and Their Reaction

- Functional Groups

- Describe a functional group and give examples.

- Name and draw alkyl and aryl halide structures.

- Discuss the chemical and physical properties of organic halides.

- Describe how substitution reactions form alkyl and aryl halides.

- Alcohols, Ethers, and Amines

- Identify the functional groups that characterize alcohols, ethers, and amines.

- Draw the structures of alcohols, ethers, and amines.

- Discuss the properties and uses of alcohols, ethers, and amines.

- Carbonyl Compounds

- Draw and identify the structures of carbonyl compounds including aldehydes, ketones, carboxylic acids, esters, and amides.

- Discuss the properties and uses of compounds containing the carbonyl group.

- Other Reactions of Organic Compounds

- Classify an organic reaction into one of five categories: substitution, addition, elimination, oxidation-reduction, or condensation.

- Use structural formulas to write equations for reactions of organic compounds.

- Predict the products of common types of organic reactions.

- Polymers

- Describe the relationship between a polymer and the monomers from which it forms.

- Classify polymerization reactions as addition or condensation.

- Predict polymer properties based on their molecular structures and the presence of functional groups.

The Chemistry of Life

- A Strategy for Life

- Identify the two major cell types that occur in nature.

- Describe the chemical changes that occur during photosynthesis.

- Carbohydrates

- Describe how two simple sugars can be linked.

- Identify where glucose is found in nature.

- Amino Acids and Their Polymers

- Diagram the structure of an amino acid.

- Describe how peptide bonds from and identify what determines the properties of peptides and proteins.

- Describe how enzymes affect biochemical reactions.

- Lipids

- Identify the physical property that distinguishes lipids from other biological molecules.

- Describe the structure of a lipid bilayer.

- Nucleic Acids

- Identify the functions of DNA and RNA.

- Describe how information is sorted in genetic material and how it can mutate.

- Describe how DNA fingerprinting and recombinant DNA technology are used.

* **Laboratory Activities**

The following labs will provide sufficient hands-on laboratory and field experiences to:

Engage students in open-ended, investigative processes by using scientific problem solving.

Provide application of concepts students have seen in their study materials, which reinforce and clarify scientific principles and concepts.

Involve multiple senses in three-dimensional rather than two-dimensional learning??experiences that are important for greater retention of concepts and for accommodation of different learning styles.

Stimulate students to understand the nature of science including its unpredictability and complexity

unpredictability and complexity.

Provide opportunities to engage in collaborative work and to model scientific attitudes and behavior.

Develop mastery of techniques and skills needed for potential science, engineering, and technology careers.

Lab Notes/Reports:

Students will compile two basic records during and from scientific experimentation. The first record will be **Lab Notes** which students will record as experiments are performed. Entries in the students lab notebook will be the basis for the second record, the **Lab Report**. The Lab Report formally summarizes the activities and findings of the experiment and is submitted for grading.

Labs:

1. Laboratory Techniques and Measurements

Students will learn about the International System of Units (SI) system and how it relates??to measurements in mass, length, temperature, volume, and time. Students will learn about the common techniques and laboratory equipment used to make SI measurements. Students will use the laboratory equipment to make measurements such as temperature and density, prepare dilutions, and calculate the concentrations of the dilutions using the M1V1 = M2V2 equation.

2. Separation of a Mixture of Solids

Students will have the opportunity to become familiar with the separation of mixtures of solids. They will learn separation techniques based on the chemical properties of a substance.

3. Properties of Gases

Students will have the opportunity to explore some physical and chemical properties of gases and use these properties to identify gases when they are?? present.

4. Physical and Chemical Properties

Students will have the opportunity to investigate the physical and chemical properties of pure chemical substances.

5. Ionic Reactions

Students will have the opportunity to study the nature of ionic reactions and write net ionic equations for precipitation reactions. They will identify spectator ions, precipitation reactions, and solubilities of different compounds.

6. Stoichiometry of a Precipitation Reaction

Students will have the opportunity to calculate the theoretical, actual, and percent yield of the product from a precipitation reaction. They will learn concepts of solubility and the formation of a precipitate.

7. Caloric Content of Food

Students will have the opportunity to measure the energy content of a variety of foods by burning a portion of food and capturing the heat released to a known mass of water in a calorimeter. They will identify units of measuring heat such as calories and joules.

8. Colligative Properties & Osmotic Pressure

Students will have the opportunity to explore the colligative properties of freezing

point depression and osmotic pressure in solutions. They will define colligative

properties as well as discuss membrane permeability and osmotic pressure.

9. Le Chateliers Principle

Students will have the opportunity to determine the effect of a change on a system at equilibrium and correlate this with Le Chateliers Principle. They will define the concept of equilibrium and its relation to Le Chateliers principle.

10. Beers Law & Colorimetry

Find the concentration of an unknown using Beers Law; find the concentration of Blue Dye #1 in a commercial drink using visual colorimetry; and find the concentration of Blue Dye #1 in a commercial drink using a simple colorimeter.?? Define electrochemical radiation, spectroscopy in relation to Beers Law.

11. Chromatography of Food Dyes

Students will have the opportunity to learn how mixtures of compounds can be separated and determine what food dyes are found in certain foods by using paper chromatography. They will learn how solubility is affected by polarity.

12.Titration for Acetic Acid in Vinegar

Students will have the opportunity to use titration techniques to determine the concentration of an acetic acid solution. They will define molarity, normality, and weight percent.

13. Using Buffers

Students will have the opportunity to explore how a buffer works and withstands changes in pH when solutions of acids or bases are added. They will learn titration techniques to determine the concentration of acetic acid.

14. Qualitative Anion Tests

Students will have the opportunity to identify commonly occurring anions and study some of the reactions used for their identification. They will use precipitation reaction and evolution of gas to identify anions.

15. Qualitative Anion Tests

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* **Key Assignments**

In addition to labs students will:

Vocabulary Practice:

Students will listen to the words and their definitions being read, they will write the names and definitions, and they will read them.

Text Reading and Written Practice:

Students will respond to questions and solve problems based on the reading of text on the topic for each section in order to reinforce concepts learned.

Direct Instruction Videos and Web Responses:

Students will watch direct instruction videos and respond to prompts based on the content of these videos. Students will also respond to journal questions based on pre-picked content that they will read.

Laboratory Notebooks:

Students will organize and maintain a lab notebook, which will include all of the lab activities and experiments performed in class. Students will work with pre-set lab procedures and activities as well as create their own from inquiry-based activities.

Lab Reports:

During each semester students will turn in a typed full lab write up including a Title Page, Abstract, Purpose/Hypothesis, Procedures, Data/Observations, Results/Analysis, and Conclusion. This will be graded based on a rubric that the students will receive at the beginning of the semester.

Chemistry Research Paper:

Each semester students will research and submit a 3-5 page typed research paper on a topic approved by the teacher. This research is to highlight the significance of Chemistry in everyday modern life and demonstrate how knowledge discovered in this course applies to those areas of life. Students will present the research paper orally - using visuals (PowerPoint, etc).

Possible topics for the research paper include:

Research possible career options in the chemistry field along with the requirements necessary to enter that field and how the knowledge they learned in class could prepare them.

Research the chemistry behind hybrid vehicles, research how chemistry creates or alleviates environmental issues, research the chemistry of water and how it relates to water pollution.

Research chemistry in global climate change, research the effects of pesticides runoff on aquatic systems like here in Chico.

Research the chemistry of Crime Scene Investigation (CSI).

Research alternatives to petroleum and how chemistry is involved.

Oral Presentations:

Each semester students will be given opportunities to give oral reports (individually or group) on various topics. ??The focus will be on hypothesis, conclusion, data and error analysis.

Projects:

Students will create projects based on the periodic table and present visually and orally.

* Instructional Methods and/or Strategies

College Model of Education: Personalized Learning Model emphasizes independent study while attending classes wo/three times weekly.

Student will use the text as a primary resource.

Direct Instruction

Project group work

Independent Study

Interactive online instruction

Lab assignments/experiments

Lecture, laboratory experiments, group projects, individual and group research, oral and written presentation will be used to reinforce learning.

Students will summarize each unit and answer questions about each unit, and respond to critical thinking challenges.

Students will write 2 well-developed essays that indicate mastery of topics/concepts and to demonstrate college preparatory writing ability.

Student will take comprehensive midterms and finals.

* Assessment Methods and/or Tools

Exams, homework assignments, discussions, oral presentations, and writing assignments, projects, lab notes/reports are used to assess student progress.

Attendance at Resource Center Lab Class two/three times a week.

Written assignments evaluated by providing writing rubrics

Oral presentations evaluated by providing rubric

Discussions: classroom participation and small group work.

Weekly homework assignments

Chapter/Unit tests -??Exams for each unit consist of short essay format or extensive essay which emphasizes critical thinking and demonstrates analysis and synthesis of ideas/concepts.

Comprehensive midterm/final

Assessment tools may also include the following:

Participation lab activity

Student demonstrations

Research Projects (individual/group)

Projects

Lab Notebook/Lab Reports

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