

Standard and when it is taught	Description of Standard	Process Skills/ ACT Quality Core Standards	Activity/Lab/ Lesson	Resources	Assessment
introduction to chemistry Quarter 1 2 week	Students will have and understanding of what chemistry studies as a discipline and how different branches of chemistry are used to answer the two central questions in chemistry	Understanding chemistry as inquiry <ul style="list-style-type: none"> • identify and clarify research and design experiments • design experiments so that variables are controlled and appropriate numbers of trials are used • collect, organize and analyze data accurately and use chemical techniques and equipment appropriately • interpret results and draw conclusion, revising hypothesis as necessary and or formulating additional questions or explanations • write and speak effectively to present and explain scientific results, using appropriate terminology and graphics • safely use laboratory equipment and techniques when conducting scientific investigations • routinely make predictions and estimations • Science in practice explain and apply criteria that scientists use to evaluate the validity of scientific claims and theories • explain why experimental replication and peer review are essential to eliminate as much error and bias as possible in scientific claims • explain the criteria that explanations must meet to be considered scientific (e.g. be consistent with experimental/ observational evidence about nature, be open to critique and modification, use ethical reporting methods and procedures) • explain why all scientific knowledge is subject to change as new evidence becomes available to the scientific community • use a variety of appropriate sources (e.g. internet, scientific journals) to retrieve relevant information; cite references properly) • identify and analyze the advantages and disadvantages of widespread use of and reliance on technology • compare the scientific definitions of fact, law and theory and give examples of each in chemistry 	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes Meditations on first lab a lab about observations	Chapter 1	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit.. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)
Data and Measurement Quarter 1 2 week	Students will have and understanding of how chemists make use of data collection and analysis and observation as well as how to use and apply the SI system of measurement	<ul style="list-style-type: none"> • Mathematics and measurements in science • distinguish between precision and accuracy in respect to experimental data • use appropriate si units for length, mass, time, temperature, quantity of matter, area, volume, and density; describe the relationships among si units prefixes (eg centi- milli- kilo); recognize commonly used non-SI units • use correct number of significant figures in reporting measurements and the results of calculations • use appropriate statistical methods to represent the results of chemical investigations • express numbers in scientific notation when appropriate • solve for unknown quantities by manipulating variables • use graphical mathematical and or statistical models to express patterns and relationships inferred from sets of scientific data b 	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes Sugar in Soda lab	Chapter 2	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit.. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)

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Matter: properties and change Quarter 1 2 weeks	Students will have and understanding of how to recognize physical and chemical changes as well as know how chemistry classifies matter by complexity and by state.	Properties of Matter and Gases Phases of Matter, Phase Changes and Physical Changes <ul style="list-style-type: none"> compare the definition of matter and energy and the laws of conservation of mass and energy describe how matter is classified by state of matter and by composition describe the phase and energy changes associated with boiling/condensing, melting/freezing, and sublimation/crystallization (deposition) explain the differences between chemical and physical changes and demonstrate how these changes can be used to separate mixtures and compounds into their components define chemical and physical properties and compare them by providing examples Microscopic nature of matter Structure of liquids and Solids <ul style="list-style-type: none"> describe differences between solids, liquids and gases at the atomic and molecular levels describe and perform common separation techniques (e.g. filtration, distillation, chromatography) 	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes Sings of chemical reactions lab MgO Lab	Chapter 3	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)
The Atom Quarter 1 2 weeks	Students will have and understanding of how the atomic model arose and has changed over time directly linking our understanding of matter to specific examples of classic experiments. Students will also develop an understanding of the concept of the mole and how it is used to quantify numbers of particles	{ Discovering the language of chemistry Formulas and Equations <ul style="list-style-type: none"> A. Empirical formulas, molecular formulas, and percentage composition <ul style="list-style-type: none"> distinguish between chemical symbols, empirical formulas, molecular formulas and structural formulas interpret the information conveyed by chemical formulas for numbers of atoms of each element represented use the names, formulas and the charges of commonly referenced polyatomic ions provide the interconversion of molecular formulas, structural formulas and names, including common binary and ternary acids determine percent composition experimentally and derive empirical formula from the data (e.g. for hydrates) B. Mole Concept, Molar Mass, Gram Formula Mass, and Molecular Mass <ul style="list-style-type: none"> explain the meaning of mole and Avogadro's number interconvert between mass, moles and number of particles distinguish between formula mass, empirical mass, molecular mass, gram molecular mass and gram formula mass Atomic Structure and Chemical Bonding Atomic Theory (Dalton), Atomic Structure and Quantum Theory <ul style="list-style-type: none"> describe the importance of models for the study of atomic structure describe the crucial contributions of scientists and the critical experiments that led to the development of the modern atomic model 	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes Atom Game lab Readings from E=mc ² and In search of Schrodingers Cat Mole Rocket Lab	Chapter 4 and parts of chapter 11	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)

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Electrons & The Atom Quarter 2 4 weeks	Students will have and understanding of the quantum mechanical model of the atom and electron configuration, and be able to relate these two concepts directly to the periodic table of the elements	Atomic Structure and Chemical Bonding Atomic Theory (Dalton), Atomic Structure and Quantum Theory <ul style="list-style-type: none"> • describe the importance of models for the study of atomic structure • describe the crucial contributions of scientists and the critical experiments that led to the development of the modern atomic model • describe characteristics of wave, such as wavelength, frequency, energy and speed • describe the role of probability in orbital theory • describe atomic orbitals (s, p, d, f) and their basic shapes • apply Hund's rule, and the Aufbau process to specify the electron configurations of the elements 	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes Perimeter Inst. Film on Quantum Reality Atomic Emission Spectra Lab Flame Test Lab Dual Slit lab	Chapter 5	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)
Periodic Table and the Elements Quarter 2 2 weeks	Students will have and understanding of how the periodic table of the elements is used, constructed, and the trends that can be observed in its structure.	Periodic Table and Periodicity <ul style="list-style-type: none"> • describe the historical development of the modern periodic table, including work by Medeleev and then Moseley • describe and explain the organization of elements into periods and groups in the periodic table • use the periodic table to determine the atomic number, atomic mass, mass number, and the number of protons, electrons and neutrons in isotopes of elements • calculate the average atomic mass of an element from isotopic abundance, given the atomic mass of each contributor • identify regions (e.g. groups, families, series) of the periodic table and describe the chemical characteristics of each • compare the periodic properties of the elements (e.g. metal, nonmetal, metalloid behavior, electrical/ heat conductivity, electronegativity and electron affinity, ionization energy, atomic/ covalent/ ionic radius) and how they relate to the position in the periodic table • use the periodic table to predict and explain the valence electron configurations of the elements, to identify members of configuration families and to predict the common valence of the elements 	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes All in the family Lab Periodic Trend posters Periodic Table Card Lab	Chapter 6	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)

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Chemical Bonding (4) Quarter 2 2 weeks	Students will have and understanding of strong bonding (ionic and covalent) as well as how these bonds effect substances physical and chemical properties. Students will also develop an understanding of simple hydrocarbon chemistry. (Organic)	<p>Intermolecular Forces and Types of Bonds</p> <ul style="list-style-type: none"> describe the characteristics of ionic and covalent bonding explain ionic stability, recognize typical ionic configurations, and predict ionic configurations for elements (e.g. electron configurations, lewis dot models) describe the nature of the chemical bond with respect to valence electrons in bonding atoms explain how ionic and covalent bonds differ describe the unique features of bonding in carbon compounds 	<p>Lecture on central content and theories</p> <p>Appropriate practice problems for calculations</p> <p>World of Chemistry Video segments (Annenberg Foundation Video on Demand)</p> <p>Youtube videos of chemical processes</p> <p>Marshmallow Model Lab</p> <p>Tie-Dye Lab</p> <p>Metallic Bonding Lab</p> <p>Hydrocarbon Functional Group Model Building Lab</p>	Chapters 8,9 and 22	<p>In formative and summative students will be asked to demonstrate mastery of the standards and skills by:</p> <p>Graphing, collecting and analyzing data related to the concepts taught in the unit,.</p> <p>Solving problems using appropriate values in central equations.</p> <p>Relating conceptual ideas related to the standard in writing to novel scenarios</p> <p>Student work will be assessed using a 4 point scale</p> <p>4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)</p>
Chemical Change and Reactions (4) Quarter 3 2 weeks	Students will have and understanding of classic chemical reaction categories, as well as being able to describe these reactions using balanced chemical formulas.	<p>Chemical Equations and Stoichiometry</p> <ul style="list-style-type: none"> explain how conservation laws form the basis from balancing chemical reactions and know what quantities are conserved in physical, chemical and nuclear changes write and balance chemical equations, given the names of reactants and products describe what is represented, on a molecular and molar lever, by chemical equations 	<p>Lecture on central content and theories</p> <p>Appropriate practice problems for calculations</p> <p>World of Chemistry Video segments (Annenberg Foundation Video on Demand)</p> <p>Youtube videos of chemical processes</p> <p>Classes of Chemical Reactions Lab</p> <p>Double Replacement (precipitation) Lab</p> <p>1st Grade Demonstration Day</p>	Chapter 10	<p>In formative and summative students will be asked to demonstrate mastery of the standards and skills by:</p> <p>Graphing, collecting and analyzing data related to the concepts taught in the unit,.</p> <p>Solving problems using appropriate values in central equations.</p> <p>Relating conceptual ideas related to the standard in writing to novel scenarios</p> <p>Student work will be assessed using a 4 point scale</p> <p>4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)</p>

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Stoichiometry (5) Quarter 3 4 weeks	Students will have and understanding how to combine the concept of the mole with a balanced chemical reaction to predict amounts of substances needed or produced in reactions.	Chemical Equations and Stoichiometry <ul style="list-style-type: none"> • explain how conservation laws form the basis from balancing chemical reactions and know what quantities are conserved in physical, chemical and nuclear changes • write and balance chemical equations, given the names of reactants and products • describe what is represented, on a molecular and molar level, by chemical equations • use the appropriate symbols for state (i.e. solid, liquid, gaseous, aqueous, and reaction direction when writing chemical equations • classify chemical reactions as being synthesis, decomposition, single replacement or double replacement reactions • predict the products of synthesis, combining and decomposition reactions and write balanced equations for these reactions • predict the products of single replacements reactions using the activity series and write balanced equations for these reactions • predict the products of double replacement reactions using solubility charts to identify precipitates and write balanced equations for these reactions • use chemical equations to perform basic mole-mole, mass-mass and mass mole computations for solution and gas-phase reactions • identify limiting reagents and use this information when solving reactions stoichiometry problems • compute theoretical yield, actual (experimental) yield and percent yield • write ionic equations, identifying spectator ions and the net ionic equation 	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes Formula of a hydrate lab MgO Lab Formula of a compound lab (mole ration lab) Molar Mass of a gas lab	Chapter 11 and 12	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit.. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)
Solutions (5) Quarter 3 2 weeks	Students will have and understanding solubility and how concentration is noted in solutions.	Solutions <ul style="list-style-type: none"> • Types of solutions, concentration and solubility • define solution, solute and solvent • compare properties of suspensions, colloids and true solutions • define the terms saturated, unsaturated, supersaturated, dilute and concentrated as they pertain to solutions • give examples of solid, liquid or gas medium solutions • define and calculate the molarity of a solution • define and calculate the percent composition of a solution • describe the preparation and properties of solutions • solve stoichiometry calculations based on reactions involving aqueous solutions • describe the relationship between solvent character and solute character and explain miscibility 	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes Making a solution of known concentration lab Dilution is the solution lab Killer Koolaid Lab Solubility lab	Chapter 15	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit.. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)

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Acid and Base chemistry Quarter 4 4 weeks	Students will have and understanding of the three theories of acids and bases, and how they relate to aqueous solutions of strong acids and bases. As well as be able to apply the concepts of pH and neutralization	<ol style="list-style-type: none"> 1. Acid/Base Theories <ul style="list-style-type: none"> • describe the nature and interactions of acids and bases • describe the hydronium ion and the concept of amphoterism • describe Arrhenius and Bronste-Lowry acids and bases; identify conjugate acids and bases in reactions • relate solvent interaction to the formation of acidic and basic solutions • define the water constant , Kw and the pH scale • describe characteristics of strong and weak acids and bases, ad identify common examples of both 2. Acid/Base constants and pH; Titration; Buffers <ul style="list-style-type: none"> • write and balance a simple equation for a neutralization reaction • calculate hydrogen ion concentration, hydroxide ion concentration, pH and pOH for acidic or basic solutions • explain how acid-base indicators work • define percent ionization, Ka and Kb and explain how they relate to acid/ base strength • conduct a titration experiment in order to determine the concentration of an acid or base solution 	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes Taste and Touch of acids and bases lab Indicator Lab Measuring pH and Making a solution of known pH Lab Titration Lab Water Quality Research Project	Chapters 18, 19	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit.. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)
Redox and Electrochemistry Quarter 4 4 weeks	Students will have and understanding of how many chemical processes can be explained using the idea of gain and loss of electrons.	<ol style="list-style-type: none"> A. REDOX Reactions and electrochemistry <ul style="list-style-type: none"> • define REDOX reaction, oxidation, reduction, oxidizing agent, and reducing agent • assign oxidation numbers (states) to reaction species; identify the species oxidized and reduced, and the oxidizing agent and reducing agent, in a REDOX reaction 	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes Reaction Series of Metals Lab Simple Cell Lab Electroplating lab Electrolysis Lab	Chapters 20	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit.. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)

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Chemistry a deeper look (all quarters)	Students will develop a deeper understanding of what chemistry studies as a discipline and how different branches of chemistry are used to answer the two central questions in chemistry	N/A	Lecture on central content and theories Appropriate practice problems for calculations World of Chemistry Video segments (Annenberg Foundation Video on Demand) Youtube videos of chemical processes	External Sources	In formative and summative students will be asked to demonstrate mastery of the standards and skills by: Graphing, collecting and analyzing data related to the concepts taught in the unit.. Solving problems using appropriate values in central equations. Relating conceptual ideas related to the standard in writing to novel scenarios Student work will be assessed using a 4 point scale 4 Advanced 3 Proficient 2 Partially Proficient 1 MNA (Mastery not achieved)