

Chemistry Curriculum Map

Timeframe	Unit/Concepts	Eligible Content	Assessments	Suggested Resources
Marking Periods 1 & 2	<ul style="list-style-type: none"> • Chemistry Introduction and Problem Solving using the Scientific Method Approach Observations Hypothesis Experiment Control Theory Law	<p>CHEM.A.1.1.2: Classify observations as qualitative and/or quantitative.</p> <p>CHEM.A.1.1.1: Classify physical or chemical changes within a system in terms of matter and/or energy.</p> <p>CHEM3.2.10A6: Compare and contrast scientific theories, identify questions and concerns that guide scientific investigation, and know that both direct and indirect observations are used by scientists to study the natural world and universe. Formulate and revise explanations and models using logic and evidence. Recognize and analyze alternative explanations and models.</p>	Labs Quizzes Unit Exam	WOC Ch1 (text) Articles Videos www.classzones.com

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	<p>Chemical Properties and Changes Pure Substances Diatomic molecules Allotropes</p> <p>Mixtures: Homogeneous (solutions, solute, And solvent) Heterogeneous (suspension, colloid) Alloys</p> <p>Separation Techniques (distillation, filtration, density differences, chromatography, crystallization, charcoal absorption, decanting)</p>	<p>CHEM.A.1.2.2: Differentiate between homogeneous and heterogeneous mixtures (e.g., how such mixtures can be separated).</p> <p>CHEM.A.1.1.4: Relate the physical properties of matter to its atomic or molecular structure</p> <p>CHEM.A.1.2.3: Describe how factors (e.g., temperature, concentration, surface area) can affect solubility.</p> <p>CHEM.A.1.2.4: Describe various ways that concentration can be expressed and calculated (e.g., molarity, percent by mass, percent by volume).</p> <p>CHEM.A.1.2.5: Describe how chemical bonding can affect whether a substance dissolves in a given liquid.</p>		
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	<ul style="list-style-type: none"> • Chemical Foundations <p>Elements and Symbols Dalton's Atomic Theory and its implications The Law of Constant Composition The Law of Definite Proportions The Law of Conservation of Matter Thomson's Experiments Cathode Ray Plum Pudding Model Rutherford's Experiments Alpha Scattering The Gold Foil Experiment The Structure of the Atom Protons, Neutrons, Electrons, Nucleus, Electron Cloud The Bohr Model Modern Atomic Theory Atoms and Molecules The Periodic Table *Families: Alkali, Alkaline Earth, Transition Metal, Inner Transition Metal, Halogens, Noble Gas, Hydrogen, Chalcogen, Metals, NonMetals, SemiMetals. *Trends: Ionization Energy, Atomic Radius, Electron Affinity, Boiling/Melting Points, Periodic Law *Discovery: Mendeleev, Moseley</p> <p>Atomic Mass Atomic Number Isotopes Ions: Cation, Anions, Prediction Charges Ionic Compounds: Forming, Subscripts,</p>	<p>CHEM.A.1.1.4: Relate the physical properties of matter to its atomic or molecular structure</p> <p>CHEM.B.1.3.1: Explain how atoms combine to form compounds through ionic and covalent bonding.</p> <p>CHEM.B.1.2.2: Apply the law of definite proportions to the classification of elements and compounds as pure substances</p> <p>CHEM.A.1.2.1: Compare properties of solutions containing ionic or molecular solutes (e.g., dissolving, dissociating).</p> <p>CHEM.A.2.1.2: Differentiate between the mass number of an isotope and the average atomic mass of an element.</p> <p>CHEM.A.2.3.1: Explain how the periodicity of chemical properties led to the arrangement of elements on the periodic table.</p> <p>CHEM.A.2.2.2: Predict characteristics of an atom or an ion based on its location on the periodic table (e.g., number of valence electrons, potential types of bonds, reactivity).</p>	<p>Labs Family Project Quizzes Unit Exam</p>	<p>WOC Ch3 (text) Articles Videos Internet Simulations POGIL exercises www.classzones.com</p>
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	<p>Formula Writing, Characteristics Molecular Compounds: Identifying, Formula Writing, Characteristics</p>	<p>CHEM.A.2.3.2: Compare and/or predict the properties (e.g., electron affinity, ionization energy, chemical reactivity, electronegativity, atomic radius) of selected elements by using their locations on the periodic table and known trends.</p> <p>CHEM.A.2.1.1: Describe the evolution of atomic theory leading to the current model of the atom based on the works of Dalton, Thomson, Rutherford, and Bohr.</p> <p>CHEM.B.1.2.3: Relate the percent composition and mass of each element present in a compound.</p> <p>CHEM.B.1.2.1: Determine the empirical and molecular formulas of compounds.</p>		
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	<ul style="list-style-type: none"> • Nomenclature <p>Naming Compounds: Metal/Nonmetal Transition Metal/ NonMetal Metal/ Polyatomic Ion Nonmetal/Nonmetal Polyatomic Ions, Oxyanions Acids Formulas From Names</p>	<p>CHEM.A.1.1.5: Apply a systematic set of rules (IUPAC) for naming compounds and writing chemical formulas (e.g., binary covalent, binary ionic, ionic compounds containing polyatomic ions).</p> <p>CHEM.A.1.2.1: Compare properties of solutions containing ionic or molecular solutes (e.g., dissolving, dissociating).</p> <p>CHEM.A.2.3.1: Explain how the periodicity of chemical properties led to the arrangement of elements on the periodic table.</p> <p>CHEM.A.2.3.2: Compare and/or predict the properties (e.g., electron affinity, ionization energy, chemical reactivity, electronegativity, atomic radius) of selected elements by using their locations on the periodic table and known trends.</p>	<p>Labs Practice with dice Quizzes Unit Exams</p>	<p>WOC Ch4 (text) Articles Videos Internet Simulations POGIL resources www.classzones.com</p>
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	<ul style="list-style-type: none"> • Chemical Composition <p>Counting by Weighing Average Atomic Mass Formula Weight The Mole Concept, Avogadro's Number Molar Mass Conversions: Mole/Mole, Mole/Mass, Mole/Particle, Mole/Volume, Mass/Particle, Mass/Volume.</p> <p>Percent Composition Calculations Mass Percent Compound Formulas Calculating Empirical Formulas Calculating Molecular Formulas</p>	<p>CHEM.B.1.1.1: Apply the mole concept to representative particles (e.g., counting, determining mass of atoms, ions, molecules, and/or formula units).</p> <p>CHEM.B.2.2.2: Predict the amounts of reactants and products involved in a chemical reaction using molar volume of a gas at STP.</p> <p>CHEM.A.1.1.3: Utilize significant figures to communicate the uncertainty in a quantitative observation.</p> <p>CHEM.A.1.1.5: Apply a systematic set of rules (IUPAC) for naming compounds and writing chemical formulas (e.g., binary covalent, binary ionic, ionic compounds containing polyatomic ions).</p> <p>CHEM.A.1.2.4: Describe various ways that concentration can be expressed and calculated (e.g., molarity, percent by mass, percent by volume).</p> <p>CHEM.B.1.2.1: Determine the empirical and molecular formulas of compounds</p>	<p>Labs Quizzes Unit Exam</p>	<p>WOC Ch.6 (text) Cartoons Articles Videos Internet Simulations POGIL resources www.classzones.com</p>
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<p>Marking Periods 3 & 4</p>	<ul style="list-style-type: none"> • Chemical Reactions <p>Chemical Reaction Evidence of a Chemical Reaction Chemical Equation: Reactants and Products Law of Conservation of Matter Balancing Chemical Equations Physical States Coefficients</p>	<p>CHEM.A.1.1.4: Relate the physical properties of matter to its atomic or molecular structure</p> <p>CHEM.B.2.1.5: Balance chemical equations by applying the Law of Conservation of Matter.</p> <p>CHEM.A.1.2.5: Describe how chemical bonding can affect whether a substance dissolves in a given liquid.</p> <p>CHEM.A.1.1.5: Apply a systematic set of rules (IUPAC) for naming compounds and writing chemical formulas (e.g., binary covalent, binary ionic, ionic compounds containing polyatomic ions).</p> <p>CHEM.A.2.3.2: Compare and/or predict the properties (e.g., electron affinity, ionization energy, chemical reactivity, electronegativity, atomic radius) of selected elements by using their locations on the periodic table and known trends.</p> <p>CHEM.A.2.3.1: Explain how the periodicity of chemical properties led to the arrangement of elements on the periodic table.</p>	<p>Labs Quizzes Unit Exam</p>	<p>WOC Ch.7 (text) Articles Videos Internet Simulations POGIL resources www.classzones.com</p>
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	<ul style="list-style-type: none"> • Reactions and Aqueous Solutions <p>Understanding the Importance of Water as a Solvent</p> <p>Water, a Polar Molecule</p> <p>Electrolytes: Strong, Weak, Non</p> <p>Predicting Reactions</p> <p>Classifying Reactions: 5 basic types Synthesis or Direct Combination Decomposition Single Replacement Double Replacement Combustion</p> <p>Precipitate Reactions: Double Replacement Soluble vs Insoluble Solubility Rules Complete Molecular Equation Complete Ionic Equation Net Ionic Equation Spectator Ions</p> <p>Reduction/Oxidation Reactions Synthesis, Single Replacement, Decomposition Half Reactions Electrochemistry</p>	<p>CHEM.A.1.2.3: Describe how factors (e.g., temperature, concentration, surface area) can affect solubility.</p> <p>CHEM.A.1.1.4: Relate the physical properties of matter to its atomic or molecular structure</p> <p>CHEM.B.1.3.1: Explain how atoms combine to form compounds through ionic and covalent bonding.</p> <p>CHEM.B.2.1.3: Classify reactions as synthesis, decomposition, single replacement, double replacement, or combustion.</p> <p>CHEM.B.2.1.4: Predict products of simple chemical reactions (e.g., synthesis, decomposition, single replacement, double replacement, combustion).</p> <p>CHEM.A.1.2.5: Describe how chemical bonding can affect whether a substance dissolves in a given liquid.</p>	<p>Labs Quizzes Stoichiometry Project Unit Exam</p>	<p>WOC Ch.8, 16 and 18 (text) Articles Videos Internet Simulations POGIL resources www.classzones.com</p>
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	<p>Acid Base Reactions Double Replacement Reactions, Acid and Base strength</p> <p>Neutralization Reactions Salt</p>	<p>CHEM.A.1.2.1: Compare properties of solutions containing ionic or molecular solutes (e.g., dissolving, dissociating).</p> <p>CHEM.A.1.1.5: Apply a systematic set of rules (IUPAC) for naming compounds and writing chemical formulas (e.g., binary covalent, binary ionic, ionic compounds containing polyatomic ions).</p> <p>CHEM.A.2.3.2: Compare and/or predict the properties (e.g., electron affinity, ionization energy, chemical reactivity, electronegativity, atomic radius) of selected elements by using their locations on the periodic table and known trends.</p> <p>CHEM.B.2.1.5: Balance chemical equations by applying the Law of Conservation of Matter</p>		
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	<ul style="list-style-type: none"> • Chemical Quantities <p>The Chemical Equation Molecular Information Mass Information Stoichiometry Mole/Mole Relationships Meaning of Coefficients Mole Ratio Mass Relationships Mass Calculations from a Balanced Eqn.</p> <p>The Concept of Limiting Reactant Calculations involving Limiting Reactant and Excess Reactant. Calculations involved in Percent Yield.</p>	<p>CHEM.B.2.1.2: Use stoichiometric relationships to calculate the amounts of reactants and products involved in a chemical reaction.</p> <p>CHEM.B.2.1.1: Describe the roles of limiting and excess reactants in chemical reactions.</p> <p>CHEM.A.1.1.3: Utilize significant figures to communicate the uncertainty in a quantitative observation.</p> <p>CHEM.A.1.2.4: Describe various ways that concentration can be expressed and calculated (e.g., molarity, percent by mass, percent by volume).</p> <p>CHEM.B.2.2.2: Predict the amounts of reactants and products involved in a chemical reaction using molar volume of a gas at STP.</p>	<p>Labs Quizzes Unit Exam</p>	<p>WOC Ch.9 (text) Articles Videos Internet Simulations POGIL resources www.classzones.com</p>
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	<ul style="list-style-type: none"> • Energy <p>Properties of Energy Concepts of Temperature and Heat Exothermic and Endothermic Processes Thermodynamics Measuring Energy Changes ThermoChemistry (Enthalpy) Hess Law Entropy Energy as a Driving Force Energy and Light Emission of Energy by Atoms The Wave Mechanical Model and its development from the Bohr model Quantized Energy Electronic Configuration Electronic Configuration as it relates to the Periodic Table. Periodic Table Trends Chemical bonding <ul style="list-style-type: none"> Ionic Bonding Covalent Bonding Lewis Structures VSEPR model </p>	<p>CHEM.A.2.2.1: Predict the ground state electronic configuration and/or orbital diagram for a given atom or ion.</p> <p>CHEM.A.2.2.2: Predict characteristics of an atom or an ion based on its location on the periodic table (e.g., number of valence electrons, potential types of bonds, reactivity).</p> <p>CHEM.A.2.2.4: Relate the existence of quantized energy levels to atomic emission spectra</p> <p>CHEM.B.1.4.2: Utilize Lewis dot structures to predict the structure and bonding in simple compounds</p> <p>CHEM.B.1.4.1: Recognize and describe different types of models that can be used to illustrate the bonds that hold atoms together in a compound (e.g., computer models, ball-and-stick models, graphical models, solid-sphere models, structural formulas, skeletal formulas, Lewis dot structures).</p> <p>CHEM.B.1.3.3: Use illustrations to predict the polarity of a molecule.</p>	<p>Labs Computer Lab (2) Quizzes Unit Exam</p>	<p>WOC Ch.10, 11 and 12 (text) Articles Videos Internet Simulations POGIL resources www.classzones.com</p>
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		<p>CHEM.B.1.3.2: Classify a bond as being polar covalent, non-polar covalent, or ionic</p> <p>CHEM.A.2.3.2: Compare and/or predict the properties (e.g., electron affinity, ionization energy, chemical reactivity, electronegativity, atomic radius) of selected elements by using their locations on the periodic table and known trends.</p> <p>CHEM.A.2.3.1: Explain how the periodicity of chemical properties led to the arrangement of elements on the periodic table.</p> <p>CHEM.A.2.2.3: Explain the relationship between the electron configuration and the atomic structure of a given atom or ion (e.g., energy levels and/or orbitals with electrons, distribution of electrons in orbitals, shapes of orbitals).</p> <p>CHEM.A.1.1.4: Relate the physical properties of matter to its atomic or molecular structure</p> <p>CHEM.A.1.2.5: Describe how chemical bonding can affect whether a substance dissolves in a given liquid.</p> <p>CHEM.B.2.1.2: Use stoichiometric relationships to calculate the amounts of reactants and products involved in a chemical reaction.</p>		
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	<ul style="list-style-type: none"> • Gases <p>Understand Atmospheric Pressure Gas Laws:</p> <p>Boyles Law: Being able to relate pressure and volume.</p> <p>Charles Law: Being able to relate Volume and Temperature</p> <p>Avogadros Law: Being able to relate volume and Moles</p> <p>Guy-Lussacs Law: Being able to relate Pressure and Temperature</p> <p>The Combined Gas Law The Ideal Gas Law Daltons Law of Partial Pressure</p> <p>The Kinetic Molecular Theory of Gases and its implications.</p> <p>Real Gases (Non-Ideal)</p> <p>Gas Stoichiometry</p>	<p>CHEM.A.1.2.3: Describe how factors (e.g., temperature, concentration, surface area) can affect solubility.</p> <p>CHEM.A.1.1.3: Utilize significant figures to communicate the uncertainty in a quantitative observation.</p> <p>CHEM.B.2.2.1: Utilize mathematical relationships to predict changes in the number of particles, the temperature, the pressure, and the volume in a gaseous system (i.e., Boyle's law, Charles's law, Dalton's law of partial pressures, the combined gas law, and the ideal gas law).</p> <p>CHEM.B.2.2.2: Predict the amounts of reactants and products involved in a chemical reaction using molar volume of a gas at STP.</p> <p>CHEM.A.1.1.4: Relate the physical properties of matter to its atomic or molecular structure</p> <p>CHEM.A.1.2.4: Describe various ways that concentration can be expressed and calculated (e.g., molarity, percent by mass, percent by volume).</p>	<p>Labs Computer Lab (3) Quizzes Unit Exam</p>	<p>WOC Ch.13 (text) Articles Videos Internet Simulations POGIL resources www.classzones.com</p>
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	<ul style="list-style-type: none"> • Liquids and Solids <p>Intermolecular Forces: Di-pole attractions, hydrogen bonding, London Dispersion forces.</p> <p>Energy and Change of State Heat of Fusion Heat of Vaporization</p> <p>Phase Diagrams</p>	<p>CHEM.B.2.1.2: Use stoichiometric relationships to calculate the amounts of reactants and products involved in a chemical reaction.</p> <p>CHEM.A.1.2.3: Describe how factors (e.g., temperature, concentration, surface area) can affect solubility.</p> <p>CHEM.A.1.1.4: Relate the physical properties of matter to its atomic or molecular structure</p> <p>CHEM.A.1.2.5: Describe how chemical bonding can affect whether a substance dissolves in a given liquid.</p> <p>CHEM.A.1.2.1: Compare properties of solutions containing ionic or molecular solutes (e.g., dissolving, dissociating).</p>	<p>Labs Quizzes Unit Exam</p>	<p>WOC Ch.14 (text) Articles Videos Internet Simulations POGIL resources www.classzones.com</p>
	<ul style="list-style-type: none"> • Solutions 			

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	<p>Solubility The Process of dissolving Solubility Curve Concentration Mass Percent Molarity Normality Dilution Factors affecting Dissolution Solution Stoichiometry</p>	<p>CHEM.A.1.1.3: Utilize significant figures to communicate the uncertainty in a quantitative observation.</p> <p>CHEM.A.1.2.5: Describe how chemical bonding can affect whether a substance dissolves in a given liquid.</p> <p>CHEM.A.1.2.4: Describe various ways that concentration can be expressed and calculated (e.g., molarity, percent by mass, percent by volume).</p> <p>CHEM.A.1.2.3: Describe how factors (e.g., temperature, concentration, surface area) can affect solubility.</p> <p>CHEM.A.1.2.1: Compare properties of solutions containing ionic or molecular solutes (e.g., dissolving, dissociating).</p> <p>CHEM.A.1.1.4: Relate the physical properties of matter to its atomic or molecular structure</p>	<p>Labs Quizzes Unit Exam</p>	<p>WOC Ch.15 (text) Articles Videos Internet Simulations POGIL resources www.classzones.com</p>
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	<ul style="list-style-type: none"> • Equilibrium/Kinetics <p>The Collision Model Conditions that Affect Reaction Rates: Concentration Temperature Nature of the Reactants State of Matter Catalyst/Inhibitor</p> <p>Reaction Pathway Graphs Activation Energy Activated Complex Transition State Intermediates</p> <p>Mechanisms Chemical Equilibrium K_{eq}, Q Le Chateliers Principal</p>			
		<p>CHEM.A.1.2.3: Describe how factors (e.g., temperature, concentration, surface area) can affect solubility</p> <p>CHEM.A.1.1.4: Relate the physical properties of matter to its atomic or molecular structure</p> <p>CHEM.A.1.2.5: Describe how chemical bonding can affect whether a substance dissolves in a given liquid.</p>	Labs Demonstrations Quizzes Unit Exam	WOC Ch.17 (text) Articles Videos Internet Simulations POGIL resources www.classzones.com

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