

# Chemistry Scope and Sequence

Time	Content Sequence	Text/Chapter	Correlation *
Year-long emphasis	<p><b><u>Standard #1: Investigation and Experimentation</u></b>  <b>Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in the other four strands, students should develop their own questions and perform investigations.</b></p> <p><u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>1. Select and use appropriate tools and technology (such as computer linked probes, spread sheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.</li> <li>2. Identify and communicate sources of unavoidable experimental error.</li> <li>3. Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.</li> <li>4. Formulate explanations using logic and evidence.</li> <li>5. Manipulate formulas and equations to interpret data.</li> <li>6. Distinguish between hypothesis and theory as science terms.</li> <li>7. Recognize the use and limitations of models and theories as scientific representations of reality.</li> <li>8. Analyze the locations, sequences, or time intervals of natural phenomena.</li> <li>9. Recognize the issues of statistical variability and the need for controlled tests.</li> <li>10. Recognize the cumulative nature of scientific evidence.</li> <li>11. Analyze situations and solve problems that require combining and applying concepts from more than one area of science.</li> <li>12. Investigate a science-based societal issue by researching literature, analyzing data, and communicating the findings.</li> <li>13. When an observation does not agree with an accepted scientific theory, sometimes the observation is mistaken or fraudulent.</li> </ol>	Chem-1 & 4 VisMat-1 ModChem-1 & 2 Connect-1	

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1 <sup>st</sup> Quarter	<p><b>Standard #2: Matter and Change</b>  <b>Elements are pure substances that cannot be broken down into new kinds of matter, and compounds are pure substances put together by chemically combining elements.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Classification of matter: elements, compounds, and mixtures.</li> <li>Properties of matter: physical and chemical.</li> </ol> <p><b>Standard #3: Measurement</b>  <b>Measurement describes quantities such as length, mass, or temperature. All measurements are comparisons to some standard.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Measure mass, volume, length, and temperature using the metric system.</li> <li>Evaluate the accuracy of measurement.</li> <li>Use scientific notation.</li> <li>Use conversion factors to solve problems.</li> </ol> <p><b>Standard #4: Atomic and Molecular Structure</b>  <b>The Periodic Table organizes the elements in increasing atomic number and shows how the physical and chemical properties of the elements relates to atomic structure.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Identify the structure of an atom including properties of sub-atomic particles.</li> <li>Use the Periodic Table to determine atomic number, mass, available electrons, and isotopes.</li> </ol> <p>continued</p>	<p>Chem-2  <hr/> VisMat-1, 2  <hr/> ModChem-1  <hr/> Connect-2, 3</p> <p>Chem-3  <hr/> VisMat-1  <hr/> ModChem-2  <hr/> Connect-1</p> <p>Chem-5, 13, 14  <hr/> VisMat-3, 4  <hr/> ModChem-4, 5  <hr/> Connect-4, 5, 6</p>	<p><b>Chemistry:</b>  Atomic and  Molecular  Structure,  Standard 1,  pp. 6-7</p>

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	<p><b>Standard #4 Atomic and Molecular Structure</b> continued:</p> <ol style="list-style-type: none"> <li>Explain the electron arrangement in an atom including orbitals and electron configuration.</li> <li>Explain the organization of the Periodic Table including families, periods, radii, and ionization energy.</li> <li>List names and symbols of common elements.</li> </ol>		
End of 1 <sup>st</sup> Quarter	Benchmark Assessment		
2 <sup>nd</sup> Quarter	<p><b>Standard #5: Chemical Compounds and Bonding</b>  <b>Biological, chemical, and physical properties of matter result from the ability of atoms to form bonds based on forces between electrons and protons, and between atoms and molecules.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Write chemical formulas and names of compounds.</li> <li>Identify molecular and ionic compounds.</li> <li>Determine molar mass, empirical formula, and molecular formula.</li> <li>Diagram using electron Lewis dot structures.</li> <li>Recognize molecular shapes.</li> </ol> <p><b>Standard #6: Chemical Equations</b>  <b>Chemical reactions can be illustrated using symbols and numbers.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Write and balance chemical equations.</li> <li>Identify different types of chemical reactions including: composition, decomposition, replacement, exothermic, and endothermic.</li> </ol>	<p>Chem-6, 15, 16            VisMat-5, 6            ModChem-6, 7            Connect-7, 8</p> <p>Chem-8            VisMat-9            ModChem-8            Connect-9</p>	<p><b>Chemistry:</b>            Chemical Bonds,            Standard 2,            pp. 8-9</p> <p><b>Chemistry:</b>            Conservation of Matter and Stoichiometry,            Standard 3,            pp. 10-11</p>

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	<p><b><u>Standard #7: Chemical Quantities</u></b>  <b>Relationships involving the mole, such as molar mass and Avogadro's number, are used constantly to measure amounts involved in chemical changes.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Convert using the mole between unit (grams, moles, and Avogadro's number).</li> <li>Determine percent (%) composition.</li> </ol> <p><b><u>Standard #8: Stoichiometry</u></b>  <b>The conservation of atoms in chemical reactions leads to the principle of conservation of matter and the ability to calculate the mass of products and reactants..</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Solve stoichiometric calculations including mass, mole relationships and mass, mass relationships.</li> <li>Identify limiting reactants.</li> <li>Determine percent (%) yield.</li> </ol>	<hr/> Chem-7 <hr/> VisMat-8 <hr/> ModChem-3 <hr/> Connect-10  <hr/> Chem-9 <hr/> VisMat-10 <hr/> ModChem-9 <hr/> Connect-11	<p><b>Chemistry:</b>            Conservation of Matter and Stoichiometry, Standard 3, pp. 10-11</p> <p><b>Chemistry:</b>            Conservation of Matter and Stoichiometry, Standard 3, pp. 10-11</p>
End of 2 <sup>nd</sup> Quarter	Benchmark Assessment		
3 <sup>rd</sup> Quarter	<p><b><u>Standard #9: Gases</u></b>  <b>The Kinetic Molecular theory describes the motion of atoms and molecules and properties of gases.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Explain behavior of gases using the Kinetic Molecular theory.</li> <li>The application and development of the Gas Laws. (STP, Kelvin, Boyle's, Charles', and Ideal Gas Laws)</li> </ol>	<hr/> Chem-12 <hr/> VisMat-12 <hr/> ModChem-10, 11 <hr/> Connect-13	<p><b>Chemistry:</b>            Gases and Their Properties, Standard 4, pp. 12-13</p>

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	<p><b>Standard #10: Properties of Matter</b>  <b>Properties of matter can be used to identify matter.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Develop an understanding of properties of liquids and solids.</li> <li>Develop an understanding of intermolecular forces in solids and liquids.</li> </ol> <p><b>Standard #11: Solutions</b>  <b>Solutions are mixtures of two or more substances.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Identify types of solutions and methods of determining concentrations.</li> <li>Develop an understanding of suspensions and solutions.</li> <li>Develop an understanding of colligative properties.</li> </ol> <p><b>Standard #12: Acids and Bases</b>  <b>Acids and bases and salts make up three groups of substances that can be categorized by their physical and chemical properties.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Distinguish between acidic and basic solutions.</li> <li>Convert hydrogen concentrations of pH.</li> <li>Relate dissociation to acid/base strength.</li> </ol>	<p>Chem-10  VisMat-2, 11  ModChem-12  Connect-14</p> <p>Chem-18  VisMat-13  ModChem-13, 14  Connect-15</p> <p>Chem-20, 21  VisMat-15  ModChem-15, 16  Connect-18, 19</p>	<p>Chemistry:  Solutions,  Standard 6,  pp. 16-17</p> <p>Chemistry:  Acids and  Bases,  Standard 5,  pp. 14-15</p>
End of 3 <sup>rd</sup> Quarter	Benchmark Assessment		

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4 <sup>th</sup> Quarter	<p><b><u>Standard #13: Reaction Rates</u></b>  <b>Chemical reaction rates depend on factors that influence the frequency of collision of the molecules.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Describe factors that affect reaction rates.</li> <li>Develop an understanding of reversible reactions as they lead to chemical equilibrium.</li> </ol> <p><b><u>Standard #14: Organic Chemistry</u></b>  <b>The bonding characteristics of carbon lead to many different molecules with varied sizes, shapes, and chemical properties.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Identify the molecular and structural formulas of organic compounds.</li> </ol> <p><b><u>Standard #15: Nuclear Reaction</u></b>  <b>Nuclear processes are those in which an atomic nucleus changes, including radioactive decay of naturally occurring and man-made isotopes, nuclear fission, and nuclear fusion.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>Describe how the strong nuclear forces act among the sub-atomic particles.</li> <li>Describe the characteristics of alpha, beta, and gamma radiation and their effects.</li> <li>Explain the processes of radioactivity and radioactivity decay.</li> <li>Explain the relationship between energy and mass in a fission or fusion reaction.</li> </ol>	<p>Chem-19            VisMat-14, 16            ModChem-8            Connect-16, 22</p> <p>Chem-26, 27            VisMat-7            ModChem-20, 21            Connect-25, 26, 27</p> <p>Chem-28            VisMat-18            ModChem-22            Connect-24</p>	<p><b>Chemistry:</b>            Reaction Rates,            Standard 8,            pp. 22-25</p> <p><b>Chemistry:</b>            Organic and            Biochemistry,            Standard 10,            pp. 32-33</p> <p><b>Chemistry:</b>            Nuclear            Processes,            Standard 11,            pp. 34-35</p>

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	<p><b>Standard #16: Chemical Thermodynamics</b>  <b>Energy is exchanged or transformed in all chemical reactions and physical changes of matter.</b>  <u>As a basis for understanding this concept, students know/are able to:</u></p> <ol style="list-style-type: none"> <li>1. How to describe temperature and heat flow in terms of the motion of molecules or atoms.</li> <li>2. Chemical processes can either release or absorb heat.</li> <li>3. Energy is released when a material condenses or freezes and absorbed when a material evaporates or melts.</li> <li>4. How to solve problems involving heat flow and temperature changes.</li> </ol>	Chem-11 VisMat-11 ModChem-17 Connect-12, 23	<b>Chemistry:</b> Chemical Thermo- dynamics, Standard 7, pp. 18-21
End of 4 <sup>th</sup> Quarter	Benchmark Assessment		

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