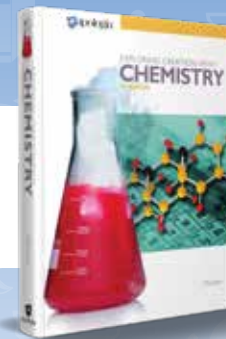


# Scope & Sequence

## Exploring Creation with Chemistry, 3rd Edition



**GRADE LEVEL:** 10th

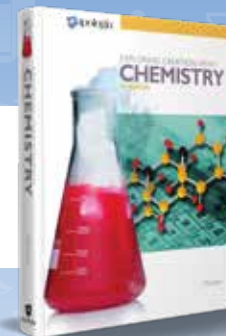
**TEXT SUMMARY:** Chemistry is not just elements on a chart or dots around a symbol. Chemistry is the substance of life on Earth. Exploring Creation with Chemistry 3rd edition introduces the student to the concepts of chemistry and provides the strong foundation necessary to further understand many of the other sciences including biology, physics, astronomy, and countless others. Exploring Creation with Chemistry 3rd edition will bring students one step closer to understanding their surroundings while strengthening their faith that the Creator has designed a magnificent and purposeful world. The material covered in this text lay the ground work for college level classes and will provide the student with the confidence needed to advance to more in-depth study and research.

### SEMESTER I: QUARTER 1

Module & Major Themes	Timeline/Summary	Main Themes	Supporting Experiments
<b>MODULE 1</b> <i>Measurement, Units, and the Scientific Method</i>	<b>2 WEEKS</b> Module 1 provides an introduction to matter and how matter is measured. It provides a foundation of using units and converting units. Module 1 also introduces the scientific method.	<ul style="list-style-type: none"> <li>• Units of Measurement</li> <li>• The Metric System</li> <li>• Manipulating Units</li> <li>• Converting Between Units and Unit Systems</li> <li>• More Complex Unit Conversions and Problem Solving</li> <li>• Derived Units</li> <li>• Making Measurements</li> <li>• Accuracy, Precision, and Significant Figures</li> <li>• Scientific Notation</li> <li>• Using Significant Figures in Mathematical Problems</li> <li>• Measuring Temperature</li> <li>• The Nature of a Scientific Law</li> <li>• Experimentation and Scientific Method</li> </ul>	<ul style="list-style-type: none"> <li>• Determining If Air Has Mass</li> <li>• Determining If Air Takes Up Space</li> <li>• Comparing Conversions to Measurements</li> </ul>

# Scope & Sequence

## Exploring Creation with Chemistry, 3rd Edition

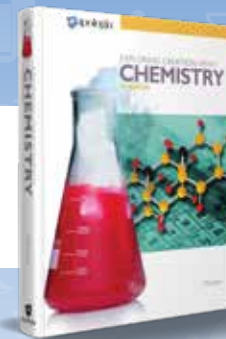


### SEMESTER I: QUARTER 1, continued

Module & Major Themes	Timeline/Summary	Main Themes	Supporting Experiments
<b>MODULE 2</b> <i>Atoms and Molecules</i>	<b>2 WEEKS</b> Module 2 introduces elements and compounds. It also provides an understanding of how to name compounds and classify matter.	<ul style="list-style-type: none"> <li>• Early Attempts to Understand Matter</li> <li>• The Law of Mass Conservation</li> <li>• Elements: The Basic Building Blocks of Matter</li> <li>• Compounds</li> <li>• The Law of Multiple Proportions</li> <li>• Dalton's Atomic Theory</li> <li>• Molecules: The Basic Building Blocks of Compounds</li> <li>• Abbreviating and Classifying Compounds</li> <li>• Classifying Matter as Ionic or Covalent</li> <li>• Naming Compounds</li> <li>• Classifying Matter</li> </ul>	<ul style="list-style-type: none"> <li>• Conservation of Mass</li> <li>• Electrical Conductivity of Compounds Dissolved in Water</li> <li>• Separating a Mixture of Sand and Salt</li> </ul>
<b>MODULE 3</b> <i>Atomic Structure</i>	<b>2 WEEKS</b> Module 3 provides an in-depth look at the structure of atoms. Module 3 also teaches about the properties of light.	<ul style="list-style-type: none"> <li>• Historical Overview</li> <li>• Electrical Charge and Atomic Structure</li> <li>• Determining the Number of Protons, Electrons and Neutrons in an Atom</li> <li>• Isotopes and Nuclear Bombs</li> <li>• Atomic Structure in More Detail</li> <li>• The Nature of Light</li> <li>• The Electromagnetic Spectrum</li> <li>• The Relationship Between Frequency and Energy</li> <li>• How the Eye Detects Color</li> <li>• The Bohr Model of the Atom</li> <li>• The Quantum Mechanical Model of the Atom</li> <li>• Electron Configurations</li> <li>• The Amazing Design of Atoms</li> </ul>	<ul style="list-style-type: none"> <li>• Investigating Electrical Charge</li> <li>• How Our Eyes Detect Color</li> </ul>

# Scope & Sequence

## Exploring Creation with Chemistry, 3rd Edition



### SEMESTER I: QUARTER 1, continued

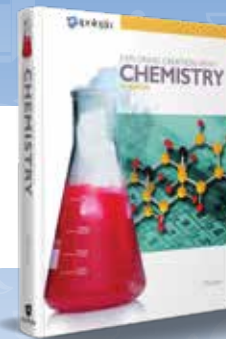
Module & Major Themes	Timeline/Summary	Main Themes	Supporting Experiments
<b>MODULE 4</b> <i>Molecular Structure</i>	<b>2 WEEKS</b> Module 4 introduces the student to the periodic table and the structures of compounds. Lewis Structures and the application of Lewis Structures is also covered in this module.	<ul style="list-style-type: none"> <li>• Electron Configurations and the Periodic Table</li> <li>• Lewis Structures</li> <li>• Lewis Structures for Ionic Compounds</li> <li>• Handling the Exceptions in Ionic Compounds</li> <li>• Ionization Energy and Periodic Properties</li> <li>• Electronegativity</li> <li>• Atomic Radius</li> <li>• Lewis Structures of Covalent Compounds</li> <li>• Complicated Lewis Structures</li> <li>• An Application of Lewis Structures</li> </ul>	This module contains no experiments.

### SEMESTER I: QUARTER 2

Module & Major Themes	Timeline/Summary	Main Themes	Supporting Experiments
<b>MODULE 5</b> <i>Polyatomic Ions and Molecular Geometry</i>	<b>2 WEEKS</b> Module 5 introduces molecular bonds and the VSEPR Theory. It discusses nonpolar covalent and polar covalent bonds and molecules.	<ul style="list-style-type: none"> <li>• Polyatomic Ions</li> <li>• Molecular Geometry: The VSEPR Theory</li> <li>• Nonpolar Covalent and Polar Covalent Bonds</li> <li>• Nonpolar Covalent and Polar Covalent Molecules</li> <li>• The Practical Consequence of Whether or Not a Molecule Is Polar Covalent</li> </ul>	<ul style="list-style-type: none"> <li>• Comparing Polar Covalent and Nonpolar Covalent Compounds</li> <li>• Comparing Solubility of Ionic Compounds in Polar Covalent and Nonpolar Covalent Compounds</li> </ul>

# Scope & Sequence

## Exploring Creation with Chemistry, 3rd Edition

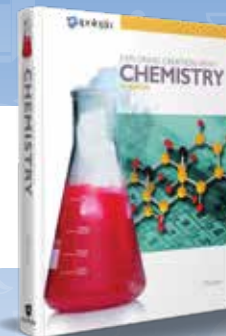


### SEMESTER I: QUARTER 2, continued

Module & Major Themes	Timeline/Summary	Main Themes	Supporting Experiments
<b>MODULE 6</b> <i>Changes in Matter and Chemical Reactions</i>	<b>2 WEEKS</b> Module 6 provides an in-depth look at changes that occur in matter and illustrates this through chemical equations. The concept of balancing equations is also introduced.	<ul style="list-style-type: none"> <li>• Classifying Changes That Occur in Matter</li> <li>• Phase Changes</li> <li>• The Kinetic Theory of Matter</li> <li>• Density</li> <li>• Phase Changes in Water</li> <li>• Chemical Reactions and Chemical Equations</li> <li>• Determining Whether or Not a Chemical Equation Is Balanced</li> <li>• Balancing Chemical Equations</li> </ul>	<ul style="list-style-type: none"> <li>• Distinguishing Between Chemical and Physical Change</li> <li>• Condensing Steam</li> <li>• The Relation Between the Speed and Temperature of Molecules</li> <li>• Comparing the Density of Liquids</li> </ul>
<b>MODULE 7</b> <i>Describing Chemical Reactions</i>	<b>2 WEEKS</b> Module 7 reviews different types of chemical reactions and introduces the mole concept.	<ul style="list-style-type: none"> <li>• Three Basic Types of Chemical Reactions</li> <li>• Decomposition Reactions</li> <li>• Formation Reactions</li> <li>• Combustion Reactions</li> <li>• Combustion of Metals</li> <li>• Complete Combustion Reactions</li> <li>• Incomplete Combustion Reactions</li> <li>• Atomic Mass</li> <li>• Molecular Mass</li> <li>• The Mole Concept</li> <li>• Using the Mole Concept in Chemical Equations</li> </ul>	<ul style="list-style-type: none"> <li>• Measuring the Width of a Molecule</li> </ul>

# Scope & Sequence

## Exploring Creation with Chemistry, 3rd Edition

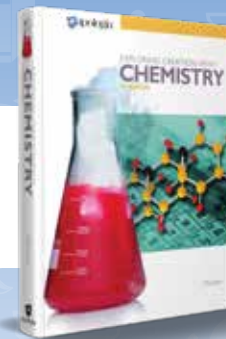


### SEMESTER I: QUARTER 2, continued

Module & Major Themes	Timeline/Summary	Main Themes	Supporting Experiments
<p style="text-align: center;"><b>MODULE 8</b> <i>Stoichiometry</i></p>	<p style="text-align: center;"><b>2 WEEKS</b></p> <p>Module 8 teaches the student how to analyze chemical equations and use them to determine relationships and formulas.</p>	<ul style="list-style-type: none"> <li>• Mole Relationships in Chemical Equations</li> <li>• Limiting Reactants and Excess Components</li> <li>• Fully Analyzing Chemical Equations</li> <li>• Relating Products to Reactants in Chemical Equations</li> <li>• Using Chemical Equations When the Limiting Reactant Is Identified</li> <li>• Volume Relationships for Gases in Chemical Equations</li> <li>• Mass Relationships in Chemical Equations</li> <li>• Using Stoichiometry to Determine Chemical Formulas</li> <li>• Empirical and Molecular Formulas</li> <li>• Complicated Experiments for Determining Chemical Formulas</li> </ul>	<ul style="list-style-type: none"> <li>• Determining Which Reactant Is the Limiting Reactant</li> </ul>

# Scope & Sequence

## Exploring Creation with Chemistry, 3rd Edition

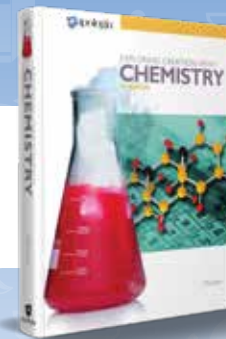


### SEMESTER II: QUARTER 3

Module & Major Themes	Timeline/Summary	Main Themes	Supporting Experiments
<b>MODULE 9</b> <i>Acid-Base Chemistry</i>	<b>2 WEEKS</b> Module 9 introduces acids and bases to the student. It provides a detailed look at the reactions between the two and the importance of concentration.	<ul style="list-style-type: none"> <li>• Acids and Bases</li> <li>• The Chemical Definitions of Acids and Bases</li> <li>• The Behavior of Ionic Compounds in Aqueous Solutions</li> <li>• Identifying Acids and Bases in Chemical Reactions</li> <li>• Recognizing Acids and Bases from Their Chemical Formulas</li> <li>• Predicting the Reactions That Occur Between Acids and Bases</li> <li>• The Reactions Between Acids and Covalent Bases</li> <li>• Molarity</li> <li>• The Dilution Equation</li> <li>• The Importance of Concentration in Chemistry</li> <li>• Using Concentration in Stoichiometry</li> <li>• Acid-Base Titrations</li> </ul>	<ul style="list-style-type: none"> <li>• Common Household Examples of Acids and Bases</li> <li>• Determining the Concentration of Ammonia</li> </ul>
<b>MODULE 10</b> <i>The Chemistry of Solutions</i>	<b>2 WEEKS</b> Module 10 provides a closer look at solutions and the energy changes within solutions. It also teaches the student how to apply stoichiometry to solutions.	<ul style="list-style-type: none"> <li>• How Solutes Dissolve in Solvents</li> <li>• Solubility</li> <li>• Energy Changes That Occur When Making a Solution</li> <li>• Applying Stoichiometry to Solutions</li> <li>• Molality</li> <li>• Freezing-Point Depression</li> <li>• Boiling-Point Elevation</li> </ul>	<ul style="list-style-type: none"> <li>• Determining the Effect of Temperature on the Solubility of Solid Solutes</li> <li>• Determining the Effect of Temperature on the Solubility of a Gas</li> <li>• Investigating a Solute That Releases Heat When Dissolved</li> <li>• Measuring Freezing-Point Depression</li> </ul>

# Scope & Sequence

## Exploring Creation with Chemistry, 3rd Edition



### SEMESTER II: QUARTER 3, continued

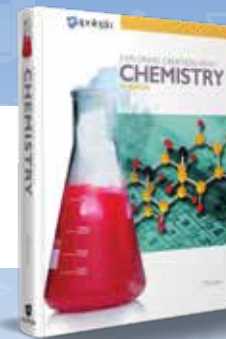
Module & Major Themes	Timeline/Summary	Main Themes	Supporting Experiments
<b>MODULE 11</b> <i>The Gas Phase</i>	<b>2 WEEKS</b> Module 11 introduces the laws associated with pressure and gas. It also provides practice in using the Ideal Gas Law in stoichiometry.	<ul style="list-style-type: none"> <li>• The Definition of Pressure</li> <li>• Boyle's Law</li> <li>• Charles's Law</li> <li>• The Combined Gas Law</li> <li>• Ideal Gases</li> <li>• Dalton's Law of Partial Pressures</li> <li>• Vapor Pressure</li> <li>• An Alternative Statement of Dalton's Law</li> <li>• The Ideal Gas Law</li> <li>• Using the Ideal Gas Law in Stoichiometry</li> </ul>	<ul style="list-style-type: none"> <li>• Determining the Ideal Gas Constant</li> <li>• Using the Ideal Gas Equation to Determine the Amount of Acid in Vinegar</li> </ul>
<b>MODULE 12</b> <i>Energy, Heat and Temperature</i>	<b>2 WEEKS</b> Module 12 takes a look at energy and heat and its measurement. It also introduces the First Law of Thermodynamics.	<ul style="list-style-type: none"> <li>• Energy and Heat</li> <li>• The First Law of Thermodynamics</li> <li>• Units for Measuring Heat and Energy</li> <li>• The Calorie Unit</li> <li>• Measuring Heat</li> <li>• Calorimetry</li> </ul>	<ul style="list-style-type: none"> <li>• Thermometer Calibration and Confirmation of Boiling and Freezing Temperatures of Water</li> <li>• Measuring the Specific Heat of a Metal</li> </ul>

### SEMESTER II: QUARTER 4

Module & Major Themes	Timeline/Summary	Main Themes	Supporting Experiments
<b>MODULE 13</b> <i>Thermodynamics</i>	<b>2 WEEKS</b> In this module the student learns more about how energy is transferred during chemical reactions. Almost all chemical reactions either release or absorb energy. The universe runs on energy and since energy cannot be created or destroyed it is important to know how to keep a detailed accounting of what happens to the energy in order to fully understand the world around us.	<ul style="list-style-type: none"> <li>• Enthalpy and determining <math>\Delta H</math> of a chemical reaction</li> <li>• Hess's law</li> <li>• Applying enthalpy to stoichiometry</li> <li>• Energy diagrams</li> <li>• Second Law of Thermodynamics</li> <li>• Gibbs free energy</li> </ul>	<ul style="list-style-type: none"> <li>• Determining the Change in H of a Chemical Reaction</li> </ul>

# Scope & Sequence

## Exploring Creation with Chemistry, 3rd Edition



### SEMESTER II: QUARTER 4, continued

Module & Major Themes	Timeline/Summary	Main Themes	Supporting Experiments
<b>MODULE 14</b> <i>Kinetics</i>	<b>2 WEEKS</b> Module 14 provides an introduction to kinetics and rate equations. Module 14 also provides an overview of catalysts and their role in the kinetics of chemical reactions.	<ul style="list-style-type: none"> <li>• Reaction Kinetics</li> <li>• Factors that Affect the Kinetics of a Chemical Reaction</li> <li>• The Rate Equation</li> <li>• Using Experiments to Determine the Details of the Rate Equation</li> <li>• Rate Orders</li> <li>• Using Rate Equations</li> <li>• Temperature Dependence in the Rate Equation</li> <li>• Catalysts and Reaction Rate</li> </ul>	<ul style="list-style-type: none"> <li>• How Concentration and Temperature Affect Chemical Reaction Rates</li> <li>• The Effect of a Catalyst on the Decomposition of Hydrogen Peroxide</li> </ul>
<b>MODULE 15</b> <i>Chemical Equilibrium</i>	<b>2 WEEKS</b> Module 15 provides an introduction to the concept of chemical equilibrium, the equilibrium constant and the use of the equilibrium constant in predicting the progress of a reaction.	<ul style="list-style-type: none"> <li>• Chemical Equilibrium</li> <li>• The Equilibrium Constant</li> <li>• Using the Equilibrium Constant to Predict the Progress of a Reaction</li> <li>• Le Chatelier's Principle</li> <li>• Pressure and Le Chatelier's Principle</li> <li>• Temperature and Le Chatelier's Principle</li> <li>• Acid/Base Equilibria</li> <li>• The pH Scale</li> <li>• Acid Rain</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstration of Equilibrium</li> <li>• Temperature Effects on Reactions and Le Chatelier's Principle</li> </ul>
<b>MODULE 16</b> <i>Reduction/Oxidation Reactions</i>	<b>2 WEEKS</b> Module 16 provides an introduction to reduction/oxidation reactions including key concepts such as determining the oxidation number of an atom and recognizing a reduction/oxidation reaction. Module 16 also provides insight to how batteries work.	<ul style="list-style-type: none"> <li>• Oxidation Numbers</li> <li>• Oxidation and Reduction</li> <li>• Recognizing Reduction-Oxidation Reactions</li> <li>• An Important Characteristic of Reduction-Oxidation Reactions</li> <li>• How Batteries Work</li> <li>• Real Batteries</li> <li>• Corrosion</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrating an Oxidation-Reduction Reaction</li> <li>• Creating a Galvanic Cell from Lemons</li> </ul>

**ADDITIONAL INFORMATION:** This text also includes Review Questions at the end of each module, which serves to guide a student in studying for the provided module tests. Additional study tools are the Practice Problems and the Extra Practice Problems for each module. These are to be solved after each module and serve to give the student review and practice of the important quantitative skills just covered. A password is included so that the student can access a book extras website for more in-depth study.

Answers for the Review Questions, Practice Problems, Extra Practice Problems, the tests, and test solutions are provided for the parent/teacher in a separate Solutions Manual.