



## Scope & Sequence

### **Lesson 1: Introduction to Chemistry**

What is chemistry?  
The five branches of chemistry  
The scientific method

### **Lesson 2: Matter, Measurements, and Unit Conversions**

SI Unit system: base units and prefixes  
Qualitative and quantitative measurements  
Matter, mass, and weight  
Unit conversions using the factor-label method  
Conversions between atoms, moles, and grams  
Units of temperature and conversion

### **Lesson 3: Accurate and Precise Measurements in Science**

Accuracy and precision  
Understanding and using significant digits  
Scientific notation  
Calculating density

### **Lesson 4: The Amazing Atom**

Scientific models  
The history of atomic models and influential scientists  
Electron orbitals  
Physical and chemical properties and changes

### **Lesson 5: Introduction to the Elements**

History of the periodic table  
Elements and their symbols  
Comparing pure substances and mixtures

### **Lesson 6: The Periodic Table — what's trending?**

Using the periodic table: chemical symbols, mass numbers, atomic numbers, and element names  
Identifying periods, families, and unique trends on the Periodic Table  
Isotopes

### **Lesson 7: Electrifying Electrons**

Electron dot diagrams  
Writing electron configurations  
Noble gas notation  
Orbital notation

### **Lesson 8: Exam 1**

### **Lesson 9: Chemical Bonds**

Types of bonds: ionic, covalent, metallic  
Octet rule  
Drawing and analyzing Lewis structures  
Intermolecular forces

### **Lesson 10: Introduction to Chemical Formulas**

How to read a chemical formula  
Law of definite proportions  
Writing ionic and molecular formulas from names

### **Lesson 11: What's in a Name?**

Naming ionic and molecular compounds  
Writing formulas for and naming acids

### **Lesson 12: Math and Chemical Formulas**

Assigning oxidation numbers  
Percentage composition  
Calculating empirical formulas  
Calculating molecular formulas

### **Lesson 13: Balancing Chemical Equations**

How to balance chemical equations  
Writing chemical equations

**Lesson 14: Types of Reactions**

Identifying types of reactions: synthesis, decomposition, single replacement, double replacement, and combustion  
Completing reactions given reactants

**Lesson 15: Exam #2****Lesson 16: How Chemicals React**

Stoichiometry  
Limiting reactants, theoretical/percent yield

**Lesson 17: Kinetic-Molecular Theory Part I**

KMT and the properties of matter  
Real vs. ideal gases  
Changes in state  
Heat of fusion and heat of vaporization

**Lesson 18: Kinetic-Molecular Theory Part II**

Phase diagrams  
Le Chatelier's principle  
Unique properties of water

**Lesson 19: Gas Laws Part I**

STP  
Dalton's law of partial pressure  
Water displacement  
Boyle's, Charles, and Gay-Lussac's laws

**Lesson 20: Gas Laws Part II**

Combined gas law  
Ideal gas law  
Graham's law

### **Lesson 21: Solubility Part I**

Review of pure substances and mixtures  
Types of solutions  
Electrolytes vs. nonelectrolytes  
Rules/Laws governing solubility  
Solubility Curves

### **Lesson 22: Solubility Part II**

Calculating molarity  
Review of writing equations  
Dissociation vs. ionization  
Ionic equations

### **Lesson 23: Acids and Bases Part I**

Properties of acids and bases  
Types of acids and bases  
Ionization and dissociation of acids and bases  
Conjugate acid-base pairs

### **Lesson 24: Acids and Bases Part II**

pH and the math of acids and bases  
Neutralization reactions  
Titrations and finding unknown molarity

### **Lesson 25: Exam #3**

### **Lesson 26: Thermochemistry Part I**

Temperature and specific heat  
Thermochemical equations  
Calculating enthalpy change  
Hess's law

### **Lesson 27: Thermochemistry Part II**

Driving forces of reactions  
Entropy  
Calculating Gibbs free energy  
Spontaneous vs. nonspontaneous reactions

### **Lesson 28: Thermochemistry Part III**

Collision theory  
Rate influencing factors  
Potential energy diagrams

### **Lesson 29: Equilibrium Part I**

Reversible reactions and chemical equilibrium  
Equilibrium constant and expressions  
Le Chatelier's principle review  
Factors that affect equilibrium

### **Lesson 30: Equilibrium Part II**

Acid ionization constant and equilibrium expression  
Buffers and equilibrium  
Solubility product constant and equilibrium

### **Lesson 31: Redox Reactions**

Review assigning oxidation numbers  
Balancing redox reactions using the half-reaction method  
Determining if a reaction is redox or not

### **Lesson 32: Electrochemistry**

Electrochemical cells  
Redox reactions and electrochemistry

### **Lesson 33: Nuclear Stability**

Nuclides and nucleons  
 $E=mc^2$   
Calculating mass defect

### **Lesson 34: Radioactive Decay**

What causes radioactive decay  
Alpha, beta, gamma, and positron emissions, electron capture  
Calculating half-life of radioactive elements

### **Lesson 35: Exam #4**