Course Description:

Chemistry A covers the basic principles and properties of matter. Students discover how chemistry has evolved, learn about chemical lab equipment, techniques, and safety, and explore the proper way to make measurements to reduce error and uncertainty. Students also explore atomic structure, periodic laws, types of bonding, chemical reactions, and stoichiometry. This course uses a multimedia format that includes text, videos, animations, interactive activities, labs, and group discussions. In self-check activities and quizzes, students practice what they learn and correct misconceptions or uncertainties before taking assessments. Students complete a unit exam and deliver a unit project in each unit. Teacher feedback is provided throughout the course.

Course Objectives:

- Apply scientific processes to conduct investigations with the proper use of lab equipment.
- Define chemistry, identify important chemists and their contributions, and chemistry's effect on society.
- Define chemistry vocabulary terms and explain related concepts.
- Describe and compare the structures of different materials.
- Describe properties of materials and how they interact with each other.
- Use models to represent chemical processes and structures.
- Compare and classify materials based on structures and other properties.
- Solve problems involving chemical formulas and different units of measurement.

Required Materials:

Unit 1

Lessons 2-5: Separating Salt Water

- salt
- bowl or pitcher
- tablespoon
- water
- ceramic or glass container*

*should be able to tolerate boiling temperatures (like a canning jar or coffee mug)

*height should be less than the pot's height

*diameter should be slightly smaller than the pot

- pot with its lid**

**should be tall enough for the container to fit inside of it with the pot's lid forming a secure seal

- stovetop
- oven mitts (or potholders)
- tongs lined with rubber***

***should have a wide enough grip to fit around the container

- fork
- spoon
- plate
- dish soap
- 2 clear bottles with lids

Unit 2
Lesson 6-8: Rare Earth Metals
- presentation software

Unit 3
Lesson 12-15: Identifying Bond Type
- 5 mL (or 1 tsp) butter
- 5 mL (or 1 tsp) table salt
- 5 mL (or 1 tsp) sugar
- 5 mL (or 1 tsp) baking soda
- 6 cm2 (or 4 in2) aluminum foil
- frying pan*

*pan with a large nonstick surface (such as one that is hard anodized or has ceramic coating) will be easier to clean and is preferred over other types of pans
- stove or heating surface
- 5 clear glasses
- 600 mL (or about 2 1/2 cups) distilled water
- measuring spoons
- measuring cup
- 5 stirring spoons
- scissors
- timer**

**cell phones with a timer can be used
- flashlight***

***cell phones with a flashlight can be used
- plastic wrap
- kitchen towel or paper towels
- note paper
- hammer (or another heavy object)

Unit 5
Lesson 22-25: Limiting Reactants
- 6 empty short plastic water bottles
- 6 small round balloons that can fit over the openings of the water bottles
- 300 mL of household vinegar
- a small container of baking soda
- a ruler
- a piece of string that is 30 cm long
- a marker
- measuring spoons and a measuring cup
- funnel*

*if you do not have a funnel, a simple one can be made by cutting the top conical portion off of a water bottle (with an adult's help), inverting it, and taking the cap off

Course Overview:

Unit 1: Methods and Matter

- What Is Chemistry?
- Branches of Chemistry
- Famous Figures in Chemistry
- Using Lab Equipment
- Experimental Error
- Chemical Lab Safety
- SI Units
- Numbers in Science
- Dimensional Analysis
- Classification of Matter
- Physical Properties of Matter
- Separating Mixtures

Unit 2: Atoms, Electrons, and the Periodic Table

- Early Atomic Theory
- Atomic Structure
- Radioactivity
- Types of Radiation
- Electromagnetic Radiation
- How Electrons Behave
- Atomic Orbitals
- Electron Configuration
- Periodic Table Organization
- Periodic Trends

Unit 3: Bonding

- Chemical Bonds
- Structure of Metals
- Properties of Metals
- Ionic Compounds
- Ionic Compound Properties
- Covalent Compounds
- Covalent Bonds and Models
- Covalent Compound Properties
- Bonding Theories
- Molecular Geometry
- Bond Properties

Unit 4: Chemical Nomenclature and Reactions

- Naming Ionic Compounds
- Naming Molecular Compounds
- Modeling Chemical Reactions
- Balancing Reaction Equations
- Signs of Chemical Change
- Displacement Reactions
- Combustion Reactions
- Synthesis Reactions
- Decomposition Reactions

Unit 5: Stoichiometry

- The Mole
- Mole Conversions
- Multistep Conversions
- Determining Mole Ratios
- Solving Stoichiometry Problems
- Comparing Reactants
- Limiting Reactants
- Calculating Percent Yield
- Law of Definite Proportions
- Law of Multiple Proportions
- Chemical Formulas

Unit 6: Chemistry Connections and Review

- Flint's Water Crisis
- Government's Response to Flint's Crisis
- Availability of Nitrogen
- The Chemistry of Teenage Behavior