DEPARTMENT: SCIENCE	COURSE TITLE: CHEMISTRY HONORS COURSE NUMBER: 236
GRADE(S): 10 - 12	PRE-REQUISITES (IF ANY): ALGEBRA 2 (HONORS LEVEL)

UNIT	LENGTH	CONTENT	SKILLS	METHODS OF ASSESSMENT	FRAMEWORK STRAND(S) & STANDARD(S)
Matter and Measurement	11 days	• Physical and chemical changes • Physical and chemical properties, including density • Elements, compounds, and mixtures • Metric system units • Unit conversions • Scientific notation • Significant digits • Laboratory safety	Students will: • Measure to the correct degree of precision. • Identify and use laboratory equipment such as graduated cylinders and balances • Making observations and interpret observations • Apply algebra skills to solving word problems. • Develop and test a hypothesis about why an ice cube melts faster in salt water than in fresh. • Design an experiment (to separate a mixture; to test the ice cube hypothesis). • Draw conclusions to experiments. • Write a lab report. • Graph correctly. • Extract information from a video (*Starting with Safety*). • Apply the density concept. • Apply safety rules to lab behavior. • Know the function of each piece of safety equipment.	• Unit conversion quiz • Evaluation of experimental design (Separating a Mixture lab) • Problem set • Test • The Candle lab • Density lab • Ice Cube lab (authentic research) • Metal or Non-metal lab • Separating a Mixture lab (experimental design)	Chemistry 1.1 Using Physical Properties to Identify Substances 1.2 Mixtures and Pure Substances 1.4 Physical and Chemical Changes
Atoms, Molecules, and Ions	11 days	• Dalton's Laws • Atomic structure • Isotopes • Radioactivity • Half-life • Fission and fusion • Molecules and ionic compounds • Types of formulas • Nomenclature	• Apply Dalton's Laws to real situations. • Extract information from a video (*The Nature of Matter*). • Name compounds and write formulas. • Analyze data. • Draw conclusions from experiments. • Develop and test a hypothesis	• Problem set • Test • Nomenclature practice • Conservation of Matter lab • How Circulation Time Affects Pennies lab • Check-in quiz (nomenclature) • Written report on individual elements (due at the end of the first trimester) and oral	Chemistry 2.1 Development of Atomic Theory 2.2 Laws of Conservation, Constant Composition and Multiple Proportions 2.3 Major Components of the Nuclear Atom

		• Periodic Table • Metals, nonmetals, and metalloids	about the composition of pennies. • Design an experiment to test a hypothesis about the composition of pennies. • Conduct element research (working as a group and individual; completing either an illustrated children's book, a poster, or a skit about "family" relationships).	presentations (second trimester). (See unit 6)	2.8 Alpha, Beta, and Gamma Radiation 2.9 Fission and Fusion 2.10 Radioactive Decay 2.11 Half-life 3.1 The Periodic Table and Atomic Structure 3.2 Identify Metals, Nonmetals and Metalloids 4.7 Chemical Formulas for Simple Ionic and Molecular Compounds
Stoichiometry	12 days	• Atomic mass scale • Average atomic mass • Avogadro's number • Mole concept • Percent composition • Simplest formula • Mole/gram conversions • Balancing equations • Moles and equations • Mole ratios • Limiting reactant • Concentration of solutions • Molarity • Reaction types	Students will: • Graph class data on mole ratios. • Analyze and draw conclusions from class data. • Solve multi-step word problems. • Use proportions to solve stoichiometry problems. • Use mole ratios to solve stoichiometry problems. • Analyze graphs to determine the limiting reactant. • Extract information from a computer simulation (Chemland). • Balance equations. • Use scientific notation with large numbers. • Use unit analysis to solve problems.	• Counting atoms activity • Finding the Coefficients of a Chemical equation lab • Formula of a Hydrate lab • Quiz (balancing equations) • Mole check-in quiz • Mole worksheet • Chemland worksheet • Mole Day project • Problem set • Test	Chemistry 5.1Balance Chemical Equations 5.2 Recognize Reaction Types 5.3 Understand the Mole Concept 5.4 Determine Molar Mass, Percent Composition, Empirical Formulas, and Molecular Formulas, 5.5 Calculate Mass and Limiting Reactant for Chemical Reactions 5.6 Calculate Percent Yield
Gases	11 days	• Measurements on gases • Barometers and Manometers • Ideal gas law • Gas stoichiometry • Gas density • Finding the molar mass of a gas • Kinetic molecular model of gases • Temperature and average	Students will: • Observe properties of gases. • Extract information from a computer simulation (Chemland). • Derive the ideal gas law. • Use graphs to determine mathematical relationships. • Apply direct and inverse proportions to solving problems. • Understand the meaning and use	• Chemland worksheets • Gas concept worksheets • Concept map • Problem set • Test • The Ideal Gas Constant lab • Air Bags Lab • Preparation of Hydrogen and Oxygen lab • Estimating the number of air molecules in a room activity	6.1 Using the Kinetic Molecular Theory Explain the Relationship Between Pressure, Volume Temperature and Number of Particles in a Gas Sample 6.2 Relationship Between Temperature and Average Kinetic Energy

		kinetic energy of gases • Real vs. ideal gases • Partial pressure and Dalton's Law	of proportionality constants. • Make and use a concept map. • Solve multi-step word problems. • Use unit analysis in solving problems. • Distinguish model from observations. • Design an experiment (Air Bags). • Measure pressure, temperature, and volume using appropriate equipment.	• Check-in quiz	6.3 Use the Ideal Gas Law 6.4 Deviations from Ideal Gas Behavior 6.5 Interpret and use Dalton's Law of Partial Pressures
Electronic Structure and the Periodic Table	8 days	• Electro-magnetic spectrum • Relationship between wavelength and frequency • Bohr atom • Quantum-mechanical atom • Electron configuration and its relation to the periodic table • Orbital diagrams • Pauli exclusion principle • Heisenberg Uncertainty Principle • Ionization energy, electronegativity, atomic radius, ionic radius • Trends on the periodic table	Students will: • Extract information from a computer simulation (Chemland). • Use the periodic table to predict electron configuration and the properties of elements. • Apply a simulation of probability to the hydrogen atom. • Graph and analyze laboratory data. • Recognize periodic trends in the properties of elements. • Solve word problems. • Use inverse and direct relationships to derive equations. • Identify elements from properties and trends in properties. • Extract information from a video (*Close-up on Chemistry*). • Interview a scientist (Assigned first trimester, due and graded second trimester. Assigned third trimester for students taking chemistry then.) • Write an expository paper.	• Mystery element identification • Check-in quiz (electron configuration) • Test • Notebook check • Periodic Properties lab • Electron Density Diagrams lab • Interview of a scientist • Element papers and group projects	Chemistry 2.4 Understand that Matter has Properties of Both Particles and Waves 2.5 Use Bohr's Model of the Atom the Hydrogen Atom 2.6, 2.7 Electron Configuration 3.4 Trends on the Periodic Table
Chemical Bonding	5 days	• Covalent bonds • Lewis structures • VSEPR model • Polarity • Molecular shapes	Students will: • Draw Lewis structures. • Building and analyzing molecular models. • Develop rules to predict polarity.	• Check-in quiz (Lewis structures) • Three Dimensional Models of Covalent Molecules lab • Evaluation of rules for	Chemistry 4.1 Ionic and Covalent Bonding 4.2 Lewis Structures 4.4 Molecular Shape

			• Predicting shapes and polarity. • Use computer models to analyze molecular structure.	determining polarity • Problem set • Unit quiz	and Polarity
Thermochemistry	7 days	• Conservation of energy • Exothermic and endothermic processes • Difference between heat and temperature • Energy diagrams • Calorimetry • Rules of thermochemistry • ΔH and the mole • Bond energy • Hess's Law	Students will: • Analyze energy relationships in chemical and physical changes. • Analyze energy diagrams. • Drawing energy diagrams from data. • Solve multi-step word problems. • Extract information from a computer simulation (Chemland). • Extract information from a video (*Kaboom*).	• The Preparation of *Sterno* lab • Energy in Physical and Chemical Changes lab • Specific Heat of a Metal lab • Hess's Law lab • Test • Problem set • Check-in quiz (exothermic and endothermic reactions)	Chemistry 10.1 Conservation of Energy 10.3 Calorimetry 10.4 Hess's Law
Liquids and Solids	10 days	• Intermolecular forces • Types of solids • Kinetic molecular model of liquids and solids • Vapor pressure • Boiling point • Dynamic equilibrium • Phase diagrams • Heating and cooling curves • Changes of state	Students will: • Extract information from and write a short paper based on a video (*Race to Catch a Buckyball*) • Extract information from a computer simulation (Chemland). • Analyze vapor pressure curves. • Draw and analyze heating and cooling curves. • Draw and interpret phase diagrams. • Classify and compare solids. • Do Internet research (*Kevlar*).	• Constructing a Heating Curve for Water lab • Test • Problem set • Chemical detective worksheet • *Kevla*r paper • Writing assignment on the *Buckyball* video • Check-in quiz (classification of solids) • Check-in quiz (vapor pressure and boiling point)	Chemistry 1.3 Three States of Matter 4.5 Intermolecular Forces
Solutions	8 days	• Solution process • Factors that affect solubility • Electrolytes • Concentration units – molarity, molality, mass percent, parts per million, mole fraction • Solubility and saturation • Solubility curves • Solubility of gases • LeChatelier's Principle • Colligative properties	Students will: • Solve multi-step word problems. • Graph solubility data. • Analyze solubility graphs. • Use unit analysis to solve problems. • Classify solutes. • Classify solutions .	• Concentration of a Solution lab • The Solubility of a Salt lab • The Solubility of a Gas lab • Check-in quiz (electrolytes) • Check-in quiz (concentration units) • Problem set • Test	Chemistry 7.1 Solution Process 7.2 Factors Affecting Rate of Dissolving 7.3 Saturated Solutions and Dynamic Equilibrium 7.4 Calculate Solution Concentration 7.5 Solubility Curves 7.6 Freezing Point Depression and Boiling Point

					Elevation
Kinetics and Equilibrium	11 days	• Factors that influence reaction rate • Activation energy • Energy diagrams • Catalysts • The meaning of equilibrium • Equilibrium constant expressions • The meaning of equilibrium constants • Optimum conditions for industrial processes • LeChatelier's Principle	Students will: • Analyze energy diagrams. • Draw energy diagrams. • Use graphs of experimental data to determine how concentration and temperature affect reaction rate. • Use graphs to recognize when a system comes to equilibrium. • Analyze data to determine if a system is at equilibrium. • Extract information from an equilibrium simulation. • Develop analogies to help understand LeChatelier's Principle. • Extract information from a video (*Close-up on Chemsitry*).	• Factor affecting Reaction Rate lab • Le Chatelier's Principle lab • Check-in quiz (LeChatelier's Principle) • Test • Problem set	Chemistry 9.1 Equilibrium Constants 9.2 LeChatelier's Principle 9.3 Factors that Affect Reaction Rate and Equilibrium Position 9.4 Collision Theory 9.5 Activation Energy
Acids and Bases	13 days	• Net ionic equations for acid-base reactions • Dissociation of water • pH and pOH • Bronsted-Lowry model of acids and bases • pH of acid, base, and salt solutions • Titration • Titration curves • Indicators	Students will: • Use logarithms. • Solve multi-step word problems • Demonstrate understanding of graphing. • Analyze graphs. • Extract information from a computer simulation (Chemland). • Use a burette. • Apply alternative models to acids/base reactions. • Choose the appropriate model of an acid/base reaction. • Choose the appropriate indicator for a titration.	• Strong and Weak Acid lab • Acid-Base Titration lab • pH of Salt Solutions lab • Titration of Vinegar lab • pH of Common substances lab • Check-in quiz (net ionic equations) • Check-in quiz (pH) • Check-in quiz (Bronsted-Lowry acids and bases) • Test • Problem set • Titration curve • Notebook check	Chemistry 8.1Acids, Bases, and pH 8.2 Compare Acids 8.4 Acid-Base indicators 8.5 Titration 8.6 pH and pOH