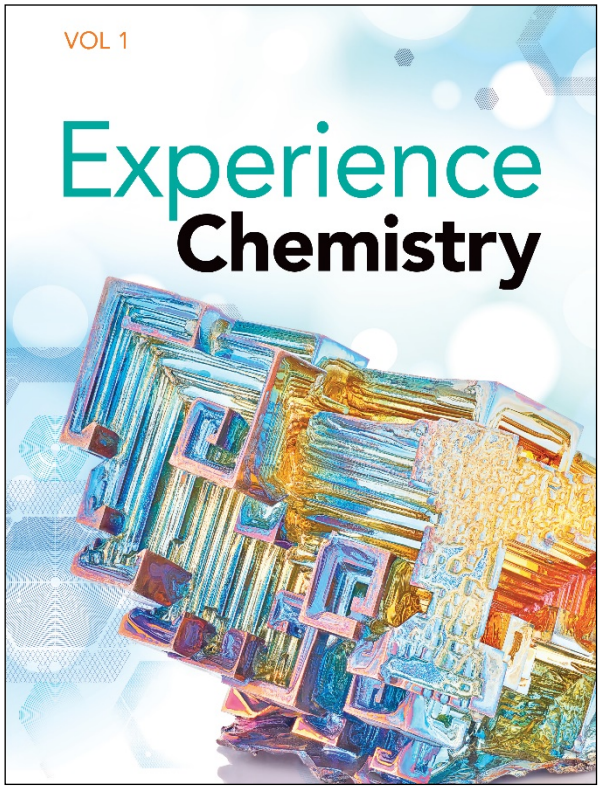
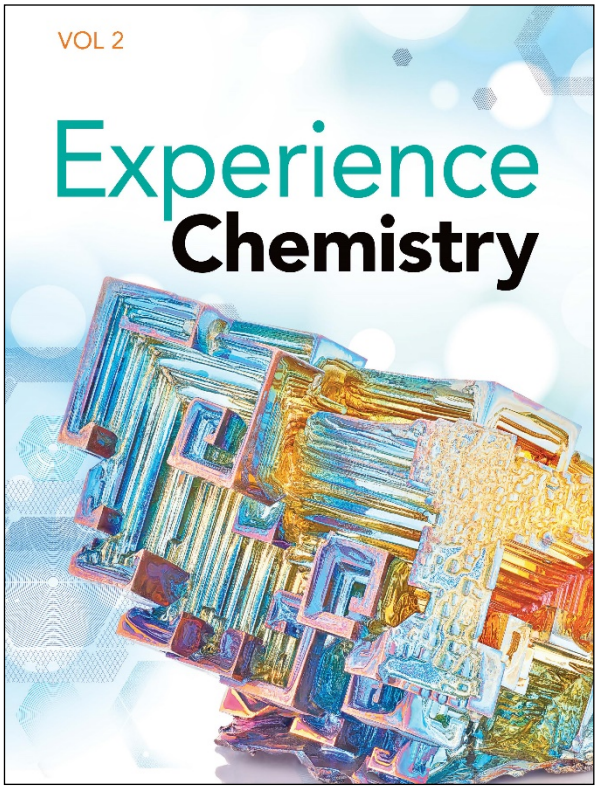
SAVVAS
LEARNING COMPANY

A Correlation of

Experience Chemistry

©2021





To the

Indiana

2016 Academic Standards for Science

High School Chemistry

Prepared by Savvas Learning Company LLC, formerly Pearson K-12 Learning

A Correlation of Experience Chemistry ©2021
To the
Indiana 2016 Academic Standards for Science: High School Chemistry

Introduction

This document demonstrates how ***Experience Chemistry ©2021*** supports Indiana Academic Standards for Science: High School Chemistry. Correlation references include the Experience Notebook (Volumes 1 and 2), Teacher Guide, and online digital assets.

Savvas Learning Company is excited to introduce **Experience Chemistry!** From climate change, water quality, and the newest energy sources, to the foods we grow and eat, your students will experience chemistry like never before. The program uses cool, weird, and amazing phenomena to engage students in 3-D science. Give students an up-close, first-hand experience they'll never forget.

Be the first to *Experience It!*

Storylines are organized around a real-world Anchoring Phenomena that sparks student curiosity, gives a purpose to learning and connects chemistry concepts through a unifying unique occurrence. Students encounter everyday phenomena through Claims-Evidence Reasoning Exercises, Authentic Readings, STEM Projects, and Engineering Performance Tasks.

Explore Phenomena with Flinn Scientific!

Experience Chemistry and Flinn Scientific partner to deliver high-quality inquiry opportunities to chemistry classrooms. Lab Experiments, Engineering Challenges, Performance Tasks, Virtual Reality Simulations, and Lab Videos by Flinn Scientific immerse students in hands-on chemistry.

Hands-On Labs
• Assign student-friendly labs focused on real-world phenomena in every learning experience.
• Customize your lessons with four versions of every lab including Open-Ended, Guided, Shortened, and Advanced.

Lab Videos
• Background videos, demo videos and summary videos engage and connect students to the phenomena, prepare students and instructors for set-up and revisit concepts before assessments.

Design Challenges and Performance Tasks
• Students mimic the real-world activities of engineers as they define and solve problems and design, test and evaluate solutions.
• Students demonstrate mastery of three-dimensional learning at the end of every Investigation with a Performance-Based assessment.

Lab Kits
• Simplify lab set-up and solution preparation with time-saving lab kits.

Virtual Reality
• Immerse your students in 360º simulations that bring chemistry to life.

Table of Contents

(C.1) Properties and States of Matter 4

(C.2) Atomic Structure and the Periodic Table 6

(C.3) Bonding and Molecular Structure 8

(C.4) Reactions and Stoichiometry 10

(C.5) Behavior of Gases 14

(C.6) Thermochemistry 15

(C.7) Solutions 16

(C.8) Acids and Bases 17

A Correlation of Experience Chemistry ©2021
To the
Indiana 2016 Academic Standards for Science: High School Chemistry

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.1) Properties and States of Matter	
(C.1.1) Differentiate between pure substances and mixtures based on physical and chemical properties.	**Experience Notebook, Volume 1:** Atoms and Molecules, 6-8 Colloids and Suspensions, 168-169 **Teacher Guide:** **Inquiry Labs:** Elements: The Building Blocks of Matter **Digital Activities:** Physical Properties of Gaseous Elements
(C.1.2) Use chemical properties, extensive, and intensive physical properties to identify substances.	**Teacher Guide:** **Digital Activities:** Intensive and Extensive Properties
(C.1.3) Recognize observable macroscopic indicators of chemical changes.	**Experience Notebook, Volume 1:** Combination Reactions, 228 Decomposition Reactions, 229 Single-Replacement Reactions, 231 Double-Replacement Reactions, 234 Combustion Reactions, 236 Formation of a Precipitate, 245 Assessment, 249 **Teacher Guide:** **Inquiry Labs:** Elements: The Building Blocks of Matter; Types of Chemical Reactions **Performance Based Assessment:** Identify Evidence of Chemical Reactions
(C.1.4) Describe physical and chemical changes at the particle level.	**Experience Notebook, Volume 1:** Ions and the Octet Rule, 68-69 Ionic Bonds, 70-71 The Octet Rule in Molecules, 82-83 Phase Changes, 125-126 Heating a Liquid, 127 Evaporation and Condensation, 128-129 Heating a Solid, 132 Solution Formation, 161 Energy of Reactions, 223-224 What Causes Reactions?, 225 **Experience Notebook, Volume 2:** Collision Theory – a Review, 163 **Teacher Guide:** **Inquiry Labs:** Collision Theory **Digital Activities:** Formation of Ionic Compounds; Formation of Covalent Bonds; States of Matter; Phase Changes and Intermolecular Forces; Phase Transitions and Particle Motion; Modeling Chemical Reactions; Bonds Breaking and Forming

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.1.5) Describe the characteristics of solids, liquids, and gases and changes in state at the macroscopic and microscopic levels.	**Experience Notebook, Volume 1:** Kinetic Theory and a Model for Gases, 112 Common Gases, 113 Gas Pressure, 114-115 Kinetic Energy and Particle Motion in Solids, Liquids, and Gases, 117 Liquids and Intermolecular Forces, 118-119 Solids and Attractive Force, 120-121 Crystal Structure, 122-123 Revisit Investigative Phenomenon, 125 Phase Changes, 125-126 Heating a Liquid, 127 Evaporation and Condensation, 128-129 Vapor Pressure and Boiling, 130-131 Heating a Solid, 132 Sublimation, 133 Revisit Investigative Phenomenon, 135 **Teacher Guide:** **Inquiry Labs:** Correlate Material Properties and Bond Type **Digital Activities:** States of Matter; Relate Intermolecular Forces to States of Matter; Phase Changes and Intermolecular Forces; Phase Transitions and Particle Motion; Phase Change Graphs
(C.1.6) Demonstrate an understanding of the law of conservation of mass through the use of particle diagrams and mathematical models.	**Experience Notebook, Volume 1:** Balancing Equations, 220-221 What Is Conserved?, 256 **Teacher Guide:** **Inquiry Labs:** Evaluate Chemical Reactions **Engineering Design Challenge:** Build a Film Canister Rocket **Digital Activities:** Track the Mass of Reactants and Products; Put It Together
(C.1.7) Perform calculations involving density and distinguish among materials based on densities.	**Experience Notebook, Volume 1:** Structure Affects Properties of Ice, 152-153 Mass and Density, 190-191 **Teacher Guide:** **Digital Activities:** Intensive and Extensive Properties; Metals and Nonmetals: Data About Their Properties; The Density of Freezing Salt Water

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.2) Atomic Structure and the Periodic Table	
(C.2.1) Using available experimental data, explain how and why models of atomic structure have changed over time.	**Experience Notebook, Volume 1:** The Bohr Model, 24-25 Bohr Model Representations of Atoms, 26 Revisiting the Atomic Model, 28-29 **Teacher Guide:** **Digital Activities:** Evaluate Atomic Models; The History of Atomic Models
(C.2.2) Determine the number of protons, neutrons, and electrons in isotopes and calculate the average atomic mass from isotopic abundance data.	**Experience Notebook, Volume 1:** Visualizing the Atom, 12 Types of Atoms, 13-14 Mass Number, 15 Isotopes, 16 Atomic Mass, 17-19 Sample Problem: Atomic Mass Estimations, 20-21 **Teacher Guide:** **Inquiry Labs:** Bean Bag Isotopes **Digital Activities:** Explore Atomic Particles; Model Isotopes; Determine Atomic Mass
(C.2.3) Write the full and noble gas electron configuration of an element, determine its valence electrons, and relate this to its position on the periodic table.	**Experience Notebook, Volume 1:** Electron Configurations, 33 Energy and Stability in Electron Configurations, 34-35 Patterns in Electron Configurations, 36 Sample Problem: Electron Configurations, 37-38 Valence Electrons, 39 Revisit Investigative Phenomenon, 40 The Periodic Table as a Predictive Model, 50-51 **Teacher Guide:** **Inquiry Labs:** Model Electron Configuration **Digital Activities:** Patterns in Electron Configurations
(C.2.4) Use the periodic table as a model to predict the relative properties of elements based on the pattern of valence electrons and periodic trends.	**Experience Notebook, Volume 1:** The Periodic Table as a Predictive Model, 50-51 The Shielding Effect and Effective Nuclear Charge, 53-54 Atomic Radius, 56-58 Ionization Energy, 59 Successive Ionization Energies, 60 Electron Affinity, 61 Common Charges in Representative Elements, 62 Connecting the Trends, 63 Assessment, 65

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
Continued: (C.2.4) Use the periodic table as a model to predict the relative properties of elements based on the pattern of valence electrons and periodic trends.	**Continued:** **Teacher Guide:** **Inquiry Labs:** Elemental Metals, Nonmetals, and Metalloids; Periodic Trends and Properties **Performance Based Assessment:** Gravimetric Analysis of Periodic Trends **Digital Activities:** Periodic Properties; Electron Configuration and Element Properties; Predict Reactivity Using Periodic Trends
(C.2.5) Compare and contrast nuclear reactions with chemical reactions.	**Teacher Guide:** **Digital Activities:** Comparing Nuclear and Chemical Reactions
(C.2.6) Describe nuclear changes in matter, including fission, fusion, transmutations, and decays.	**Experience Notebook, Volume 2:** Strong and Weak Nuclear Forces, 361-365 Radioactive Half-Lives, 365-366 Radioactive Decay Chains, 367 Revisit Investigative Phenomenon, 372 Nuclear Fission, 379 Nuclear Fusion, 380 Solar Fusion, 381 Fusion in Large Stars, 382 Nucleosynthesis, 383-384 Revisit Investigative Phenomenon, 386 **Teacher Guide:** **Inquiry Labs:** Radioactive Decay; Nuclear Energy **Performance Based Assessment:** Natural Radiation **Digital Activities:** What Happens When an Atom Decays; Comparing Nuclear and Chemical Reactions
(C.2.7) Perform half-life calculations when given the appropriate information about the isotope.	**Experience Notebook, Volume 2:** Radioactive Half-Lives, 365-366 Radiometric Dating, 368 Sample Problem: Determining Age Using ^{14}C, 369 Carbon-14 Age Dating, 370 Radiometric Dating of Old Materials, 371-372 Revisit Investigative Phenomenon, 372 **Teacher Guide:** **Digital Activities:** Geologic Age and Half-Life

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.3) Bonding and Molecular Structure	
(C.3.1) Investigate the observable characteristics of elements, ionic, and covalent compounds.	**Experience Notebook, Volume 1:** Ionic Compounds, 72-73 Properties of Ionic Compounds, 74-75 Properties of Molecular Substances, 94-95 Solids and Attractive Force, 120-121 Properties of Ionic and Molecular Compounds, 138 Covalent Network Solids, 139-140 Revisit Investigative Phenomenon, 140 **Teacher Guide:** **Inquiry Labs:** Elements: The Building Blocks of Matter; Characteristics of Ionic Bonds; Characteristics of Covalent Bonds; Correlate Material Properties and Bond Type; Melt Ionic and Covalent Compounds **Performance Based Assessment:** Qualitative Analysis of Chemical Bonding **Digital Activities:** Physical Properties of Gaseous Elements; Describe Ionic Bonding and Properties; Compare Covalent and Ionic Bonds and Their Substances; Tough Tools
(C.3.2) Compare and contrast how ionic and covalent compounds form.	**Experience Notebook, Volume 1:** Ions and the Octet Rule, 68-69 Ionic Bonds, 70-71 Molecular Compounds, 81 The Octet Rule in Molecules, 82-83 Determining Compound Type, 137 **Teacher Guide:** **Digital Activities:** Formation of Ionic Compounds; Formation of Covalent Bonds; Predicting Bond Type
(C.3.3) Draw structural formulas for simple molecules and determine their molecular shape.	**Experience Notebook, Volume 1:** Geometry and Polar Molecules, 88-90 **Teacher Guide:** **Digital Activities:** Electron Dot Structures for Molecular Substances; Investigate Molecule Polarity

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.3.4) Write chemical formulas for ionic compounds and covalent compounds given their names and vice versa.	**Experience Notebook, Volume 1:** Names of Ionic Compounds, 99 Formulas for Ionic Compounds, 100 Compounds With Polyatomic Ions, 101 Sample Problem: Identifying Ionic Compounds, 102 Names of Molecular Compounds, 103 Formulas for Molecular Compounds, 104 Sample Problem: Identifying Molecular Compounds, 105 Revisit Investigative Phenomenon, 106 **Teacher Guide:** **Inquiry Labs:** Chemical Names and Formulas
(C.3.5) Use laboratory observations and data to compare and contrast ionic, covalent, network, metallic, polar, and non-polar substances with respect to constituent particles, strength of bonds, melting, and boiling points and conductivity; provide examples of each type.	**Experience Notebook, Volume 1:** Ionic Compounds, 72-73 Properties of Ionic Compounds, 74-75 Revisit Investigative Phenomenon, 76 Sea of Electrons Model, 77 Properties of Metals, 78-79 Electronegativity and Bonding, 86-87 Revisit Investigative Phenomenon, 90 Properties of Molecular Substances, 94-95 Revisit Investigative Phenomenon, 96 Solids and Attractive Force, 120-121 Properties of Ionic and Molecular Compounds, 138 Covalent Network Solids, 139-140 Revisit Investigative Phenomenon, 140 Conductivity and Luster, 143 Crystalline Structure and Properties of Metals, 144 Hydrogen Bonding and Boiling Point, 151 Electrolytes and Nonelectrolytes, 156-157 **Teacher Guide:** **Inquiry Labs:** Characteristics of Ionic Bonds; Investigate Metallic Bonds; Characteristics of Covalent Bonds; Correlate Material Properties and Bond Type; Melt Ionic and Covalent Compounds **Digital Activities:** Ions and Electroplating; Describe Ionic Bonding and Properties; Patterns in Melting Points of Metals; Compare Metallic and Ionic Substances; Tough Tools; Discuss Melting Materials

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.3.6) Use structural formulas of hydrocarbons to illustrate carbon's ability to form single and multiple bonds within a molecule.	**Experience Notebook, Volume 2:** Representing Hydrocarbons, 313 Hydrocarbon Structures, 314 Alkanes, 315 Drawing Alkane Structures, 316 Sample Problem: Drawing Structural Formulas of Alkanes, 317 Alkenes and Alkynes, 318 Cyclic Hydrocarbons, 322-323 **Teacher Guide:** **Inquiry Labs:** Investigate Different Hydrocarbons **Digital Activities:** Structure and Properties of Hydrocarbons
(C.4) Reactions and Stoichiometry	
(C.4.1) Describe, classify, and give examples of various kinds of reactions: synthesis (i.e., combination), decomposition, single displacement, double displacement, acid/base, and combustion.	**Experience Notebook, Volume 1:** Types of Reactions, 227 Combination Reactions, 228 Decomposition Reactions, 229 Single-Replacement Reactions, 231 Double-Replacement Reactions, 234 Combustion Reactions, 236 Revisit Investigative Phenomenon, 240 **Experience Notebook, Volume 2:** Acid-Base Neutralization Reactions, 212-213 Redox vs. Non-redox Reactions, 284 Revisit Investigative Phenomenon, 287 Single-Replacement Reactions, 288-289 Combination and Decomposition Redox Reactions, 290 Combustion Reactions, 291 **Teacher Guide:** **Inquiry Labs:** Types of Chemical Reactions **Performance Based Assessment:** Identify Evidence of Chemical Reactions **Digital Activities:** Classify Reactions and Their Products; Redox and Non-redox Reactions

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.4.2) Predict products of simple reactions as listed in C.4.1.	**Experience Notebook, Volume 1:** Predicting the Products of Reactions, 238-239 Revisit Investigative Phenomenon, 240 Predicting the Formation of a Precipitate, 246 **Teacher Guide:** **Inquiry Labs:** Predict Chemical Reactions **Performance Based Assessment:** Identify Evidence of Chemical Reactions **Digital Activities:** Reaction Reasoning; Classify Reactions and Predict Their Products; Predict Whether a Precipitate Will Form
(C.4.3) Balance chemical equations and use the law of conservation of mass to explain why this must be true.	**Experience Notebook, Volume 1:** Balancing Equations, 220-221 Sample Problem: Balancing a Chemical Equation, 222 Sample Problem: Writing Chemical Equations for Combination and Decomposition Reactions, 230 Sample Problem: Writing Chemical Equations for Single-Replacement Reactions, 233 Sample Problem: Writing Chemical Equations for Double-Replacement Reactions, 235 Sample Problem: Writing Chemical Equations for Combustion Reactions, 237 Sample Problem: Writing and Balancing Net Ionic Equations, 243 What Is Conserved?, 256 **Experience Notebook, Volume 2:** Balancing by the Oxidation-Number-Change Method, 292 Sample Problem: Balancing Redox Equations by Change in Oxidation Number, 293 Balancing by the Half-reaction Method, 294-295 **Teacher Guide:** **Inquiry Labs:** Evaluate Chemical Reactions; Types of Chemical Reactions; Metal Activity **Performance Based Assessment:** Identify Evidence of Chemical Reactions **Digital Activities:** Balance Combustion Equations; Track Electrons in Redox Reactions

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.4.4) Apply the mole concept to determine the mass, moles, number of particles, or volume of a gas at STP, in any given sample, for an element or compound.	**Experience Notebook, Volume 1:** The Mole Roadmap, 183 The Mole-Mass Relationship, 184 Sample Problem: Converting Moles to Mass, 185 Sample Problem: Converting Mass to Moles, 186 Avogadro's Hypothesis, 187 The Mole-Volume Relationship, 188 Sample Problem: Calculating Gas Quantities at STP, 189 **Teacher Guide:** **Inquiry Labs:** Mole Ratios **Digital Activities:** Mole Road Map
(C.4.5) Use a balanced chemical equation to calculate the quantities of reactants needed and products made in a chemical reaction that goes to completion.	**Experience Notebook, Volume 1:** Interpreting Chemical Equations, 254 Sample Problem: Interpreting a Balanced Chemical Equation, 255 Mole-Mole Calculations, 260 Sample Problem: Calculating Moles of a Product, 261 Mass-Mass Calculations, 262 Sample Problem: Calculating the Mass of a Product, 263 Volume-Volume Calculations, 264 Sample Problem: Calculating the Volume of a Product, 265 A Roadmap for Solving Stoichiometric Problems, 266 Sample Problem: Calculating Molecules of a Product, 267 Revisit Investigative Phenomenon, 268 Limiting and Excess Reagents, 270 Mass of Products and Reactants, 271 Sample Problem: Using the Limiting Reagent to Find the Quantity of a Product, 273 **Teacher Guide:** **Inquiry Labs:** Determination of Reaction Output; Formation of Barium Iodate **Engineering Design Challenge:** Build a Film Canister Rocket **Performance Based Assessment:** The Stoichiometry of Filling a Balloon **Digital Activities:** Proportional Relationships in Chemical Reactions; Choose a Practical Unit; Stoichiometry Calculations

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.4.6) Perform calculations to determine the composition of a compound or mixture when given the necessary information.	**Experience Notebook, Volume 1:** Percent Composition of a Compound, 192-193 Sample Problem: Percent Composition From Mass Data, 193 Percent Composition From Chemical Formulas, 194 Sample Problem: Calculating Percent Composition From a Chemical Formula, 195 Percent Composition as a Conversion Factor, 196 Sample Problem: Calculating the Mass of an Element in a Compound Using Percent Composition, 197 **Teacher Guide:** **Engineering Design Challenge:** An Empirical Formula Challenge **Performance Based Assessment:** Analysis of Basic Copper Carbonate **Digital Activities:** Assess the Percent Composition in DNA; Model Percent Composition
(C.4.7) Apply lab data to determine the empirical and molecular formula of a compound.	**Experience Notebook, Volume 1:** Empirical Formulas, 198 Sample Problem: Determining the Empirical Formula, 199 Molecular Formulas, 200 Sample Problem: Determining the Molecular Formula, 201 Revisit Investigative Phenomenon, 202 **Teacher Guide:** **Inquiry Labs:** Determine an Empirical Formula **Engineering Design Challenge:** An Empirical Formula Challenge **Performance Based Assessment:** Analysis of Basic Copper Carbonate **Digital Activities:** Model Percent Composition

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.5) Behavior of Gases	
(C.5.1) Use the kinetic molecular theory with the combined and ideal gas laws to explain changes in volume, pressure, moles, and temperature of a gas.	**Experience Notebook, Volume 1:** Kinetic Theory and A Model for Gases, 112 **Experience Notebook, Volume 2:** Combined Gas Law, 19 Sample Problem: Using the Combined Gas Law, 20 Ideal Gas Law, 23-25 Sample Problem: Using the Ideal Gas Law, 24 Revisit Investigative Phenomenon, 30 **Teacher Guide:** **Inquiry Labs:** Relationships Between Gas Variables; The Ideal Gas Law **Engineering Design Challenge:** What's in a Container? **Digital Activities:** Relate Gas Pressure and Temperature; Model the Combined Gas Laws; Gas Behavior in Popping Candy
(C.5.2) Apply the ideal gas equation (PV = nRT) to calculate the change in one variable when another variable is changed and the others are held constant.	**Experience Notebook, Volume 2:** Ideal Gas Law, 23-25 Sample Problem: Using the Ideal Gas Law, 24 Revisit Investigative Phenomenon, 30 **Teacher Guide:** **Inquiry Labs:** The Ideal Gas Law **Digital Activities:** Gas Behavior in Popping Candy
(C.5.3) Use lab data and a balanced chemical equation to calculate volume of a gas at STP and non STP conditions, assuming that the reaction goes to completion and the ideal gas law holds.	**Experience Notebook, Volume 1:** Avogadro's Hypothesis, 187 Volume-Volume Calculations, 264 Sample Problem: Calculating the Volume of a Product, 265 **Teacher Guide:** **Performance Based Assessment:** The Stoichiometry of Filling a Balloon **Digital Activities:** Choose a Practical Unit

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.6) Thermochemistry	
(C.6.1) Explain that atoms and molecules are in constant motion and that this motion increases as thermal energy increases.	**Experience Notebook, Volume 1:** Interaction of Matter and Energy, 10 Phase Changes, 125-126 Heating a Liquid, 127 Evaporation and Condensation, 128-129 Heating a Solid, 132 Systems and Surroundings, 283 **Teacher Guide:** **Digital Activities:** States of Matter; Phase Transitions and Particle Motion; Energy Changes in Changes of State
(C.6.2) Distinguish between the concepts of temperature and heat flow in macroscopic and microscopic terms.	**Experience Notebook, Volume 1:** Interaction of Matter and Energy, 10 Thermochemistry, 281 Systems and Surroundings, 283 Enthalpy, 284 **Teacher Guide:** **Inquiry Labs:** The Thermodynamics of Hand Warmers **Engineering Design Challenge:** Flameless Heating Systems **Digital Activities:** Temperature Changes in Chemical Reactions
(C.6.3) Classify chemical reactions and phase changes as exothermic or endothermic based on enthalpy values. Use a graphical representation to illustrate the energy changes involved.	**Experience Notebook, Volume 1:** Energy of Reactions, 223-224 Revisit Investigative Phenomenon, 226 Combustion Reactions, 228 Decomposition Reactions, 229 Bond Enthalpy, 285-286 Activation Energy, 287 Representations of Enthalpy, 288 Revisit Investigative Phenomenon, 290 **Teacher Guide:** **Engineering Design Challenge:** Flameless Heating Systems **Performance Based Assessment:** Enthalpy of a Neutralization Reaction **Digital Activities:** Temperature Changes in Chemical Reactions; Energy Changes in Reactions; Bond Energy and Enthalpy; Energy Input for the Rusting of Iron; Enthalpy Diagrams for Phase Changes

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.6.4) Perform calculations involving heat flow, temperature changes, and phase changes by using known values of specific heat, phase change constants, or both.	**Experience Notebook, Volume 1:** Sample Problem: Using Enthalpy of Reaction to Calculate Enthalpy Change, 289 Hess's Law, 291 Heat Summation, 292 Standard Enthalpy of Reaction, 294 Sample Problem: Calculating the Standard Enthalpy of Reaction, 295 Enthalpy of Solution, 296-297 Sample Problem: Calculating the Enthalpy Change in Solution Formation, 297 Revisit Investigative Phenomenon, 298 Enthalpy of Fusion and Solidification, 300 Sample Problem: Using the Heat of Fusion in Phase-Change Calculations, 301 Enthalpy of Vaporization and Condensation, 302 Sample Problem: Using the Heat of Vaporization in Phase-Change Calculations, 303 **Teacher Guide:** **Inquiry Labs:** Hess's Law and the Combustion of a Metal; The Heat of Melting Ice **Performance Based Assessment:** Enthalpy of a Neutralization Reaction **Digital Activities:** Energy in Reactions; Energy Input for the Rusting of Iron
(C.7) Solutions	
(C.7.1) Describe the composition and properties of solutions.	**Experience Notebook, Volume 1:** Aqueous Solutions, 154-155 Colloids and Suspensions, 168-169 **Teacher Guide:** **Inquiry Labs:** Aqueous Solutions **Digital Activities:** Model Concentration's Effect on Conductivity
(C.7.2) Explain how temperature, pressure, and polarity of the solvent affect the solubility of a solute.	**Experience Notebook, Volume 1:** Aqueous Solutions, 154-155 Solubility, 162 Solubility and Temperature, 163-164 Solubility and Pressure, 166 Sample Problem: Using Henry's Law, 167 Revisit Investigative Phenomenon, 170 **Teacher Guide:** **Digital Activities:** Solubility and Temperature; Solubility and Percent by Mass

Indiana 2016 Academic Standards for Science High School Chemistry	Experience Chemistry ©2021
(C.7.3) Describe the concentration of solutes in a solution in terms of molarity. Perform calculations using molarity, mass, and volume. Prepare a sample of given molarity provided a known solute.	**Experience Notebook, Volume 1:** Molarity, 203-204 Sample Problem: Calculating Molarity, 205 Sample Problem: Calculating Moles of Solute in Solution, 206 Dilutions, 207-208 Sample Problem: Preparing a Dilute Solution, 209 **Teacher Guide:** **Inquiry Labs:** Preparation of Solutions **Performance Based Assessment:** Analysis of Basic Copper Carbonate **Digital Activities:** Making Dilutions; Model Measures of Concentration
(C.8) Acids and Bases	
(C.8.1) Classify solutions as acids or bases and describe their characteristic properties.	**Experience Notebook, Volume 2:** Properties of Acids, Bases, and Salts, 194 Defining Acids and Bases, 195-197 **Teacher Guide:** **Digital Activities:** Compare pH of Everyday Solutions; Compare Acid-Base Models
(C.8.2) Compare and contrast the strength of acids and bases in solutions.	**Experience Notebook, Volume 2:** Strong Acids and Bases, 203 Weak Acids, 204-205 Weak Bases, 206-207 Strength vs. Concentration, 210-211 Revisit Investigative Phenomenon, 211 **Teacher Guide:** **Inquiry Labs:** Measure Acid Strength **Digital Activities:** Exploring Acid Strength and Concentration; Compare Equilibrium Positions of Weak Acids; Conductivity of Strong and Weak Acids
(C.8.3) Given the hydronium ion and/or the hydroxide ion concentration, calculate the pH and/or the pOH of a solution. Explain the meanings of these values.	**Experience Notebook, Volume 2:** Calculating pH, 199-200 Sample Problem: Calculating pH from H_3O^+ Concentration, 201 Calculating pH for Weak Acids and Bases, 208 Sample Problem: Estimating pH of a Weak Acid Solution, 209 **Teacher Guide:** **Inquiry Labs:** Measure Acid Strength **Digital Activities:** Exploring Acid Strength and Concentration; Interpret Ionization Constant Data