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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 1 Chemistry: The Science of Matter
Chapter Question: How is chemistry a science that is central to our lives?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 1.1, 1.2 SE: 14-16, 24-31, 32-38, 42 *ChemLab* 10-11	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 1.1, 1.2 SE: 8-9, 34-35 *ChemLab* 36-37	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 1.2 SE: 34-35 *ChemLab* 36-37 *Everyday Chemistry* 17	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 1.1, 1.2 SE: 4-6, 34-35 *ChemLab* 10-11, 18-19, 36-37 *Launch Lab* 3 *MiniLab* 21, 22, 28	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 1.1, 1.2 SE: 8-9, 34 *ChemLab* 36-37	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 1.1, 1.2 SE: 8-9, 34-35 *ChemLab* 10-11, 18-19, 36-37 *Launch Lab* 3 *Literature Connection* 26 *MiniLab* 22, 28	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 1.1, 1.2 SE: 35 *ChemLab* 18-19, 36-37	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 1.1 SE: 9 *Science and Society* 29	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 1.1, 1.2 SE: 8-9, 27, 31 *ChemLab* 18-19, 36-37 *Everyday Chemistry* 17	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 1.1 SE: 9	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 1.1 *In the Field* 12-13 *Literature Connection* 26	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 1.1, 1.2 SE: 24, 27 *ChemLab* 10-11, 18-19, 36-37 *Everyday Chemistry* 17	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 1.1, 1.2 SE: 20, 35, 39 *Launch Lab* 2 *MiniLab* 22	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 1.1, 1.2 SE: 8-9, 31, 40	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: Differences in the physical properties of solids, liquids, and gases are explained by the ways in which the atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules.	
5.2.12.A.2 Section 1.1, 1.2 SE: 20, 33-34 *Literature Connection* 26	Account for the differences in the physical properties of solids, liquids, and gases.

Content Statement: In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.	
5.2.12.A.3 Section 1.1 SE: 27	Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties.
Content Statement: Solids, liquids, and gases may dissolve to form solutions. When combining a solute and solvent to prepare a solution, exceeding a particular concentration of solute will lead to precipitation of the solute from the solution. Dynamic equilibrium occurs in saturated solutions. Concentration of solutions can be calculated in terms of molarity, molality, and percent by mass.	
5.2.12.A.5 Section 1.2 SE: 32	Describe the process by which solutes dissolve in solvents.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section 1.2 SE: 42	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.
Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 Section 1.1 *ChemLab* 10-11	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
Content Statement: The conservation of atoms in chemical reactions leads to the ability to calculate the mass of products and reactants using the mole concept.	
5.2.12.B.3 Section 1.2 SE: 40	Balance chemical equations by applying the law of conservation of mass.
Essential Questions: • What is matter? • How can matter undergo physical and chemical changes?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 2 Matter is made of Atoms
Chapter Question: What are the fundamental building blocks of matter?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 2.1, 2.2 SE: 50-53, 59-63, 72-77 *ChemLab* 54-55 *MiniLab* 61	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 2.1, 2.2 SE: 50-53, 57, 59-63, 72-77 *ChemLab* 54-55 *MiniLab* 61	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 2.1, 2.2 SE: 61-63, 72-73 *ChemLab* 54-55 *Launch Lab* 49	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 2.1, 2.2 SE: 57, 59-63 *ChemLab* 54-55 *History Connection* 56 *Launch Lab* 49 *MiniLab* 75	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 2.1, 2.2 SE: 52-53, 59-63, 68-70, 72-73 *ChemLab* 54-55 *MiniLab* 61, 75	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 2.1, 2.2 SE: 52-53, 57, 59-63, 72-73 *ChemLab* 54-55 *Everyday Chemistry* 74 *History Connection* 56 *Launch Lab* 49 *MiniLab* 61, 75	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 2.1, 2.3 SE: 50-53, 57, 59-63, 64-66, 72-73, 75-77 *ChemLab* 54-55 *Everyday Chemistry* 74 *History Connection* 56 *MiniLab* 61, 75	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 2.1, 2.2 SE: 52-53, 57, 59-63, 72-73, 75-77 *History Connection* 56 *Science and Society* 58	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 2.1, 2.2 SE: 50-53, 57, 59-63, 68-70, 75-77 *History Connection* 56	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 2.1, 2.2 SE: 50-53, 59-63, 64-66, 72-73, 75-77 *History Connection* 56	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 2.1 SE: 50-53, 61-63, 75-77 *History Connection* 56	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 2.1, 2.2 SE: 52-53, 57, 60-66, 68-70, 72-73, 75-77	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 2.1, 2.2 SE: 59-63, 67 *ChemLab* 54-55 *MiniLab* 75	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 2.1, 2.2 SE: 52-53, 60-66, 68-70, 75-77 *MiniLab* 75	Use atomic models to predict the behaviors of atoms in interactions.

Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section 2.2 SE: 76-77	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.
Essential Questions: • What structures make up an atom? • What is the role of electrons in atoms?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 3 Introduction to the Periodic Table
Chapter Question: How is the periodic table organized?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 3.1, 3.2 SE: 84-89, 92, 94, 100-103, 109-111 *ChemLab* 98-99 *Literature Connection* 95 *MiniLab* 96	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 3.1 SE: 85-86, 92, 94-96, 109-110 *ChemLab* 98-99	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 3.1, 3.2 SE: 86-89, 92, 93-97, 104-105 *Chemistry and Technology* 106-107 *ChemLab* 98-99 *MiniLab* 87, 96	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 3.1, 3.2 SE: 84-89, 104-105 *ChemLab* 98-99 *Launch Lab* 83 *MiniLab* 87	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 3.1, 3.2 SE: 84-86, 88-89, 90-91, 109-111 *ChemLab* 98-99	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 3.1, 3.2 SE: 84-89, 90-91, 92, 93-94, 97, 100-103, 104-105, 109-111 *Chemistry and Technology* 106-107 *ChemLab* 98-99 *Everyday Chemistry* 108 *Launch Lab* 83 *MiniLab* 87, 96	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 3.1, 3.2 SE: 86-89, 92, 93-94, 100-105, 109-110 *Chemistry and Technology* 106-107 *ChemLab* 98-99 *Launch Lab* 83 *MiniLab* 87, 96	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 3.1, 3.2 SE: 88-89, 92, 100-105, 109-111	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 3.1, 3.2 SE: 85-89, 90-91, 92, 97, 100-105, 109-111 *Chemistry and Technology* 106-107 *ChemLab* 98-99 *MiniLab* 87, 96	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 3.1 SE: 84-89, 92, 96-97, 100-105, 109-111 *Chemistry and Technology* 106-107 *MiniLab* 96	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 3.1, 3.2 SE: 84-89, 92, 109-111 *Literature Connection* 95	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 3.1, 3.2 SE: 86-92, 96-97, 102 *Chemistry and Technology* 106-107, 109-110 *ChemLab* 98-99 *MiniLab* 87	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 3.1, 3.2 SE: 109-111 *Chemistry and Technology* 106-107 *ChemLab* 98-99 *Launch Lab* 83	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 3.1, 3.2 SE: 90-91, 96-97, 103, 109-111	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: Differences in the physical properties of solids, liquids, and gases are explained by the ways in which the atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules.	
5.2.12.A.2 Section 3.1, 3.2 SE: 100-101, 109-111 *Launch Lab* 83	Account for the differences in the physical properties of solids, liquids, and gases.
Content Statement: In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.	
5.2.12.A.3 Section 3.1, 3.2 SE: 88-89, 90-91, 92, 96-97, 100-103 *ChemLab* 98-99 *MiniLab* 87, 96	Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties.
Essential Questions: • How was the periodic table developed? • How is the periodic table used?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 4 Formation of Compounds
Chapter Question: How are compounds formed?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 4.1, 4.2 SE: 120-121, 127, 128-133, 136-139, 141-145 *ChemLab* 134-135 *Launch Lab* 117 *MiniLab* 133	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 4.2 SE: 128-133, 136-145 *MiniLab* 133	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 4.1, 4.2 SE: 122-125, 129-133 *Chemistry and Society* 144 *ChemLab* 134-135 Everyday Chemistry 126 *MiniLab* 120, 133	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 4.1, 4.2 SE: 119 *ChemLab* 134-135 *Launch Lab* 117 *MiniLab* 120, 133	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 4.1, 4.2 SE: 119-125, 129-133, 141-145 *ChemLab* 134-135	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 4.1, 4.2 SE: 118-121, 127, 129-133, 141-145 *ChemLab* 134-135 *Launch Lab* 117 *MiniLab* 120, 133	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 4.1, 4.2 SE: 122, 124, 129-132, 138, 141-145 *Chemistry and Society* 144 *ChemLab* 134-135 *Launch Lab* 117 *MiniLab* 133	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 4.1, 4.2 SE: 122-125, 127, 129-133, 138-139, 141-145 *ChemLab* 134-135 *MiniLab* 120	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 4.1, 4.2 SE: 127, 128, 141-145 *Chemistry and Society* 144 *ChemLab* 134-135	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 4.2 SE: 130-133, 141-145 *ChemLab* 134-135 *MiniLab* 133	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 4.2 SE: 141 *Chemistry and Society* 144	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 4.1, 4.2 SE: 122, 124, 129-132, 137-139, 142	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 4.1, 4.2 SE: 119, 141-142 *ChemLab* 134-135	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 4.2 SE: 129-131, 137-139, 142 *ChemLab* 134-135	Use atomic models to predict the behaviors of atoms in interactions.

Content Statement: Differences in the physical properties of solids, liquids, and gases are explained by the ways in which the atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules.	
5.2.12.A.2 Section 4.2 SE: 142-145	Account for the differences in the physical properties of solids, liquids, and gases.
Content Statement: In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.	
5.2.12.A.3 Section 4.2 SE: 129	Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties.
Content Statement: Solids, liquids, and gases may dissolve to form solutions. When combining a solute and solvent to prepare a solution, exceeding a particular concentration of solute will lead to precipitation of the solute from the solution. Dynamic equilibrium occurs in saturated solutions. Concentration of solutions can be calculated in terms of molarity, molality, and percent by mass.	
5.2.12.A.5 Section 4.2 SE: 142-143	Describe the process by which solutes dissolve in solvents.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section 4.2 SE: 129-133, 136-139, 141-145 *MiniLab* 133	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.

Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Heating increases the energy of the atoms composing elements and the molecules or ions composing compounds. As the kinetic energy of the atoms, molecules, or ions increases, the temperature of the matter increases. Heating a pure solid increases the vibrational energy of its atoms, molecules, or ions. When the vibrational energy of the molecules of a pure substance becomes great enough, the solid melts.	
5.2.12.C.2 Section 4.2 SE: 141-143	Account for any trends in the melting points and boiling points of various compounds.
Essential Questions: • How do properties of compounds differ from the properties of the elements that form the compounds? • What is the role of elements when forming compounds?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 5 Types of Compounds
Chapter Question: What are the two types of compounds?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 5.1, 5.2 SE: 152-157, 160-167, 168-169, 172-173, 177-181 *ChemLab* 170-171 *Launch Lab* 151	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 5.1, 5.2 SE: 152-155, 164-167, 168-169 *Chemistry and Technology* 174-176 *ChemLab* 170-171	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 5.1, 5.2 SE: 159 *ChemLab* 170-171 *MiniLab* 164, 169	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 5.1, 5.2 SE: 159, 164-165 *ChemLab* 170-171 *MiniLab* 164, 169	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 5.1 SE: 156, 159 *Chemistry and Technology* 174-176 *ChemLab* 170-171 *MiniLab* 164, 169	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 5.1, 5.2 SE: 173 *Chemistry and Technology* 174-176 *ChemLab* 170-171 *Everyday Chemistry* 158 *Launch Lab* 151 *MiniLab* 164, 169	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 5.1, 5.2 SE: 155, 157, 162, 178-181 *ChemLab* 170-171 *Launch Lab* 151 *MiniLab* 164, 169	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 5.1, 5.2 SE: 164-165 *Chemistry and Technology* 174-176 *ChemLab* 170-171 Everyday Chemistry 158 *How It Works* 166	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 5.1, 5.2 SE: 152-157, 164-165 *Chemistry and Technology* 174-176 *ChemLab* 170-171	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 5.1, 5.2 SE: 154-155, 167, 173-177 *Chemistry and Technology* 174-176	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 5.1, 5.2 SE: 156-159, 168, 173 *Chemistry and Technology* 174-176 *Launch Lab* 151	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 5.2 SE: 169 *ChemLab* 170-171	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 5.1, 5.2 SE: 156, 172-173 *Chemistry and Technology* 174-176	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: Differences in the physical properties of solids, liquids, and gases are explained by the ways in which the atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules.	
5.2.12.A.2 Section 5.1 SE: 169	Account for the differences in the physical properties of solids, liquids, and gases.

Content Statement: In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.	
5.2.12.A.3 Section 5.1 SE: 154-155, 160	Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties.
Content Statement: Solids, liquids, and gases may dissolve to form solutions. When combining a solute and solvent to prepare a solution, exceeding a particular concentration of solute will lead to precipitation of the solute from the solution. Dynamic equilibrium occurs in saturated solutions. Concentration of solutions can be calculated in terms of molarity, molality, and percent by mass.	
5.2.12.A.5 Section 5.1 SE: 152	Describe the process by which solutes dissolve in solvents.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section 5.1 SE: 154-155	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.
Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 Section 5.1 SE: 155	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
Essential Questions: • How are atoms in ionic compounds held together? • How are atoms in covalent compounds held together?	

2009 New Jersey Curriculum Project

Aligned to the 2009 New Jersey Core Curriculum Content Standards

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

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***Chemistry: Concepts and Applications* © 2009**

Chapter Title: Chapter 6 Chemical Equations and Reactions

Chapter Question: What are chemical reactions?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 6.1, 6.2, 6.3 SE: 188-189, 199-194, 202-206, 208-213, 216-221 *ChemLab* 204-205 *Everyday Chemistry* 192 *How It Works* 195	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 6.1, 6.2, 6.3 SE: 190-191, 196-197, 200-207, 209-213, 216-220 *ChemLab* 204-205	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 6.1, 6.2, 6.3 SE: 190-193, 196-197, 202-207, 216-220 *ChemLab* 204-205	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 6.1, 6.2 SE: 196-197 *ChemLab* 204-205 *Launch Lab* 187 *MiniLab* 203, 218	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 6.1, 6.2, 6.3 SE: 196-197, 202-207, 212-221 *ChemLab* 204-205	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 6.1, 6.2, 6.3 SE: 196-198 *Chemistry and Technology* 214-215 *ChemLab* 204-205 *Launch Lab* 187 *MiniLab* 194, 203, 218	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 6.1, 6.2, 6.3 SE: 193, 207, 216-218 *ChemLab* 204-205 *Launch Lab* 187 *MiniLab* 194, 203, 218	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 6.2, 6.3 SE: 202-207, 212-213, 216-221 *MiniLab* 203	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 6.1, 6.2, 6.3 SE: 189, 190-191, 196-197, 200-207, 208-213 *ChemLab* 204-205 *Launch Lab* 187 *MiniLab* 194, 203	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 6.1, 6.2, 6.3 SE: 193-194, 207, 216-221 *ChemLab* 204-205 *MiniLab* 194	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 6.2, 6.3 SE: 207, 218 *Chemistry and Technology* 214-215 *ChemLab* 204-205	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 6.1, 6.2, 6.3 SE: 193, 196 *Chemistry and Technology* 214-215 *ChemLab* 204-205 *Launch Lab* 187 *MiniLab* 203, 218	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 6.1 SE: 197	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: Solids, liquids, and gases may dissolve to form solutions. When combining a solute and solvent to prepare a solution, exceeding a particular concentration of solute will lead to precipitation of the solute from the solution. Dynamic equilibrium occurs in saturated solutions. Concentration of solutions can be calculated in terms of molarity, molality, and percent by mass.	
5.2.12.A.5 Section 6.3 SE: 213	Describe the process by which solutes dissolve in solvents.

Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 Section 6.2 SE: 206-207 *ChemLab* 204-205	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
Content Statement: The conservation of atoms in chemical reactions leads to the ability to calculate the mass of products and reactants using the mole concept.	
5.2.12.B.3 Section 6.1 SE: 196-199	Balance chemical equations by applying the law of conservation of mass.
Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Gas particles move independently and are far apart relative to each other. The behavior of gases can be explained by the kinetic molecular theory. The kinetic molecular theory can be used to explain the relationship between pressure and volume, volume and temperature, pressure and temperature, and the number of particles in a gas sample. There is a natural tendency for a system to move in the direction of disorder or entropy.	
5.2.12.C.1 Section 6.3 SE: 212-213	Use the kinetic molecular theory to describe and explain the properties of solids, liquids, and gases.
Essential Questions: • What happens when substances go under chemical changes? • What are the five types of chemical reactions?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 7 Completing the Model of the Atom
Chapter Question: What and how are valence electrons used?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 7.1, 7.2 SE: 228-229, 233, 238-240, 241-245 *ChemLab* 234-235	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 7.1, 7.2 SE: 228-229, 231-233, 238-240, 242-245 *ChemLab* 234-235 *MiniLab* 244	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 7.1, 7.2 SE: 232-233 *Chemistry and Technology* 236-237 *Everyday Chemistry* 246-247 *MiniLab* 232	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 7.1, 7.2 SE: 228-229, 242-245 *ChemLab* 234-235 *Launch Lab* 227 *MiniLab* 232, 244	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 7.1, 7.2 SE: 228-229, 231-233, 238-239, 241-245, 248-249 *Chemistry and Technology* 236-237 *MiniLab* 244	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 7.1, 7.2 SE: 228-229, 232-233, 238-240, 242-245, 248-249 *MiniLab* 232, 244 Physics Connection 230	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 7.1, 7.2 SE: 228-229, 242-245 *ChemLab* 234-235 *MiniLab* 232, 244	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 7.1, 7.2 SE: 228-229, 233, 238-240, 241-243 *Chemistry and Technology* 236-237 *MiniLab* 244 *Physics Connection* 230	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 7.1, 7.2 SE: 228-229, 231-233, 238-240, 241-245, 248-249 *ChemLab* 234-235 *Physics Connection* 230	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 7.1, 7.2 SE: 228-229, 233, 238-240, 241-245 *Physics Connection* 230	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 7.1 SE: 228, 238 *Physics Connection* 230	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 7.1, 7.2 SE: 229, 231, 232, 239-240, 241-245, 249 *Chemistry and Technology* 236-237 Everyday Chemistry 246-247	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 7.1 *Chemistry and Technology* 236-237 *ChemLab* 234-235	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 7.1, 7.2 SE: 228-231, 238-240, 248-249 *MiniLab* 244 *Physics Connection* 230	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.	
5.2.12.A.3 Section 7.2 SE: 241	Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section 7.1, 7.2 SE: 229-231, 248 *ChemLab* 234-235	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.

Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 Section 7.2 SE: 248	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
Essential Questions: • How are electrons organized? • How is the periodic table arranged??	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 8 Periodic Properties of the Elements
Chapter Question: What are trends among elements in the periodic table?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 8.1, 8.2 SE: 256-259, 280-283, 292-293 *Biology Connection* 276 *ChemLab* 266-267 *Launch Lab* 255 *MiniLab* 260	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 8.1, 8.2 SE: 256-260, 280-283, 290-293 *Launch Lab* 255 *MiniLab* 260	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 8.1, 8.2 SE: 290-293 *ChemLab* 266-267 *Everyday Chemistry* 273 *Launch Lab* 255 *MiniLab* 260, 283	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 8.1, 8.2 SE: 256-259, 283, 290-293 *ChemLab* 266-267 *Everyday Chemistry* 273 *Launch Lab* 255 *MiniLab* 260, 283	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 8.1, 8.2 *ChemLab* 266-267 *Launch Lab* 255 *MiniLab* 260, 283	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 8.1, 8.2 SE: 258-261 *Biology Connection* 278 *Chemistry and Technology* 286-289 *ChemLab* 266-267 *Everyday Chemistry* 273 *History Connection* 270 *Launch Lab* 255 *MiniLab* 260, 283	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 8.1, 8.2 SE: 256-261, 283. 290-291 *ChemLab* 266-267 *History Connection* 270 *Launch Lab* 255 *MiniLab* 260, 283	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 8.1, 8.2 SE: 257-259, 262-265, 284-285, 292-293 *Chemistry and Technology* 286-289 *ChemLab* 266-267 *Everyday Chemistry* 273 *History Connection* 270 *Launch Lab* 255 *MiniLab* 260, 283	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 8.1, 8.2 SE: 256-260, 280-283, 290-293 *ChemLab* 266-267 *Launch Lab* 255 *MiniLab* 260, 283	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 8.1, 8.2 SE: 256-258, 268-271, 280-283, 290-293 *ChemLab* 266-267 *Launch Lab* 255	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 8.1, 8.2 SE: 256-259, 271, 290 *Launch Lab* 255 *MiniLab* 260	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 8.1, 8.2 *ChemLab* 266-267 *MiniLab* 283	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 8.1 SE: 258-271	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.	
5.2.12.A.3 Section 8.1, 8.2 SE: 256-265, 268-272, 274-279, 280-283, 290-293	Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties.
Essential Questions: • What pattern do metallic character and atomic radius follow on the period table? • From what do the properties of the transitions elements result?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 9 Chemical Bonding
Chapter Question: How do atoms bond?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 9.1, 9.2 SE: 300-304, 306-309, 313-315, 328-331 *History Connection* 305	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 9.1, 9.2 SE: 301-304, 308-309, 313-315, 319-323, 328-331 *MiniLab* 323	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 9.1, 9.2 SE: 303-304, 308-309, 313-323 *Chemistry and Technology* 324-325 *ChemLab* 326-327 *MiniLab* 310, 323	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 9.1, 9.2 SE: 300-303, 307-309, 328-331 *Chemistry and Technology* 324-325 *ChemLab* 326-327 *History Connection* 305 *MiniLab* 310, 323	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 9.1, 9.2 SE: 300-301, 304, 307-309, 313-323, 328-331 *History Connection* 305 *MiniLab* 310, 323	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 9.1, 9.2 SE: 301-304, 307-309, 313-315, 330-331 *Chemistry and Technology* 324-325 *ChemLab* 326-327 *Everyday Chemistry* 318 *History Connection* 305 *Launch Lab* 299 *MiniLab* 310, 323	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 9.1, 9.2 SE: 301-304, 307-309 *Chemistry and Technology* 324-325 *ChemLab* 326-327 *MiniLab* 310, 323	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 9.1, 9.2 SE: 301-303, 307-309, 313-323, 330-331 *Chemistry and Technology* 324-325 *ChemLab* 326-327 *Everyday Chemistry* 318 *History Connection* 305 *MiniLab* 310, 323	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 9.1, 9.2 SE: 300-303, 309, 311-312, 314-315, 320-323, 330-331 *Chemistry and Technology* 324-325 *ChemLab* 326-327 *Everyday Chemistry* 318 *History Connection* 305 *MiniLab* 323	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 9.1, 9.2 SE: 300-303, 311-312, 330-331 *Chemistry and Technology* 324-325 *History Connection* 305 *MiniLab* 323	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 9.1 *History Connection* 305 *In the Field* 316-317	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 9.1, 9.2 SE: 301-304, 307-309, 311-312, 313-323, 329-330 *ChemLab* 326-327 *Chemistry and Technology* 324-325 *Everyday Chemistry* 318 *MiniLab* 310, 323	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 9.2 SE: 330-331 *Chemistry and Technology* 324-325 *ChemLab* 326-327 *Everyday Chemistry* 318 *Launch Lab* 299	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 9.1, 9.2 SE: 301-304, 307-309, 311-312, 328-331 *Everyday Chemistry* 318 *MiniLab* 323	Use atomic models to predict the behaviors of atoms in interactions.

Content Statement: Differences in the physical properties of solids, liquids, and gases are explained by the ways in which the atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules.	
5.2.12.A.2 Section 9.1, 9.2 SE: 307-309, 328-331	Account for the differences in the physical properties of solids, liquids, and gases.
Content Statement: In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.	
5.2.12.A.3 Section 9.1 SE: 302-303	Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section 9.1, 9.2 SE: 300-304, 306-309, 313-315, 319-323, 328-331 *Everyday Chemistry* 305 *MiniLab* 323	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.
Essential Questions: • What determines the type of bond that forms between two atoms? • What determines whether a molecule as a whole is polar?	

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Chapter Title: Chapter 10 The Kinetic Theory of Matter
Chapter Question: What is the kinetic theory of matter?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 10.1, 10.2 SE: 339-343, 346-350, 358-359, 362-363 *ChemLab* 360-361 *MiniLab* 341, 355	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 10.1, 10.2 SE: 340-343 *Launch Lab* 337 *MiniLab* 341	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 10.1, 10.2 SE: 346-350, 358-363 *ChemLab* 360-361 *MiniLab* 341, 355	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 10.1, 10.2 SE: 346-350, 358-359, 362-363 *ChemLab* 360-361 *Launch Lab* 337 *MiniLab* 341, 355	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 10.1, 10.2 SE: 339-343, 346-350, 358-359, 362-363 *ChemLab* 360-361 *MiniLab* 341, 355	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 10.1, 10.2 SE: 338-343, 345, 346-350, 358-359, 362-363 *Chemistry and Technology* 352-353 *ChemLab* 360-361 *Launch Lab* 337 *MiniLab* 341, 355	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 10.1, 10.2 SE: 346-350, 358-359, 362-363 *ChemLab* 360-361 *Launch Lab* 337 *MiniLab* 341, 355	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 10.1, 10.2 SE: 345, 346-350, 358-359, 362-363 *ChemLab* 369-361 *How It Works* 357 *Launch Lab* 337 *MiniLab* 341, 355	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 10.1, 10.2 SE: 338-343, 345, 346-350, 354-356, 358-359, 362-363 *Chemistry and Technology* 352-353 *ChemLab* 360-361 *MiniLab* 341	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 10.1, 10.2 SE: 339-343, 345, 346-350, 362-363 *ChemLab* 360-361 *Launch Lab* 337 *MiniLab* 341, 355	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 10.1 *Art Connection* 344	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 10.1, 10.2 SE: 340, 342-345, 346-350, 354, 258-359, 362-363 *Chemistry and Technology* 352-353 *ChemLab* 360-361 *How It Works* 357	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 10.1, 10.2 SE: 346-348, 358-359 *Chemistry and Technology* 352-253 *ChemLab* 360-361 *How It Works* 357 *Launch Lab* 337 *MiniLab* 341, 355	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 10.1, 10.2 SE: 339-343, 348-350, 354-356	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: Differences in the physical properties of solids, liquids, and gases are explained by the ways in which the atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules.	
5.2.12.A.2 Section 10.1, 10.2 SE: 338-339, 340-343, 346-350, 354-356, 358-359, 362-363 *ChemLab* 360-361 *MiniLab* 355	Account for the differences in the physical properties of solids, liquids, and gases.
Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Gas particles move independently and are far apart relative to each other. The behavior of gases can be explained by the kinetic molecular theory. The kinetic molecular theory can be used to explain the relationship between pressure and volume, volume and temperature, pressure and temperature, and the number of particles in a gas sample. There is a natural tendency for a system to move in the direction of disorder or entropy.	
5.2.12.C.1 Section 10.1, 10.2 SE: 339-343, 346-350, 354-356, 358-359, 362-363 *ChemLab* 360-361 *MiniLab* 355	Use the kinetic molecular theory to describe and explain the properties of solids, liquids, and gases.

Content Statement: Heating increases the energy of the atoms composing elements and the molecules or ions composing compounds. As the kinetic energy of the atoms, molecules, or ions increases, the temperature of the matter increases. Heating a pure solid increases the vibrational energy of its atoms, molecules, or ions. When the vibrational energy of the molecules of a pure substance becomes great enough, the solid melts.	
5.2.12.C.2 Section 10.1, 10.2 SE: 343-345, 346-350, 362-363 *ChemLab* 360-361	Account for any trends in the melting points and boiling points of various compounds.
Essential Questions: • What are the common states of matter? • When does matter change state?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 11 Behavior of Gases
Chapter Question: How do gases respond?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 11.1, 11.2 SE: 370-373, 380-382, 389-396 *ChemLab* 386-387 *MiniLab* 373	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 11.1, 11.2 SE: 371, 380-382, 389-396 *Chemistry and Technology* 388 *ChemLab* 386-387 *MiniLab* 373	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 11.1, 11.2 SE: 370-371, 374, 380-382, 389-396 *MiniLab* 373	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 11.1, 11.2 SE: 374, 377-379, 389-391, 394-396 *ChemLab* 386-387 *How It Works* 375 *Launch Lab* 369 *MiniLab* 373, 384	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 11.1, 11.2 SE: 371, 380-382, 389-396 *Chemistry and Technology* 388 *ChemLab* 386-387 *MiniLab* 373	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 11.1, 11.2 SE: 370-374, 380-382, 389-396 *Chemistry and Technology* 388 *ChemLab* 386-387 *Launch Lab* 369 *MiniLab* 373, 384	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 11.1, 11.2 SE: 380-382, 384-385, 389-394 *ChemLab* 386-387 *Earth Science Connection* 383 *MiniLab* 373	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 11.1, 11.2 SE: 370-373, 380-382, 389-394 *ChemLab* 386-387 *MiniLab* 373, 384	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 11.1, 11.2 SE: 371-373, 380-382, 389-394 *ChemLab* 386-387 *Launch Lab* 369 *MiniLab* 373	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 11.1, 11.2 SE: 371-373, 380-382, 389-394 *Chemistry and Technology* 388 *ChemLab* 386-387 *MiniLab* 373, 384	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 11.2 *Chemistry and Technology* 388 *Earth Science Connection* 383	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 11.1, 11.2 SE: 370, 372, 374, 376, 380-382, 389-390, 394 *Chemistry and Technology* 388 *How It Works* 375	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 11.1, 11.2 SE: 371, 374 *Chemistry and Technology* 388 *ChemLab* 386-387 *Earth Science Connection* 383 *How It Works* 375 *MiniLab* 373	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Gas particles move independently and are far apart relative to each other. The behavior of gases can be explained by the kinetic molecular theory. The kinetic molecular theory can be used to explain the relationship between pressure and volume, volume and temperature, pressure and temperature, and the number of particles in a gas sample. There is a natural tendency for a system to move in the direction of disorder or entropy.	
5.2.12.C.1 Section 11.1, 11.2 SE: 370-373, 382, 390, 396 *ChemLab* 386-387	Use the kinetic molecular theory to describe and explain the properties of solids, liquids, and gases.
Essential Questions: • What is gas pressure? • What is Boyle's law?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 12 Chemical Quantities
Chapter Question: How is a mole used in stoichiometric calculations?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 12.1, 12.2 SE: 404-408, 412, 413-415, 418-421, 426-428 *ChemLab* 422-423 *Launch Lab* 403 *MiniLab* 418	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 12.1, 12.2 SE: 404-407, 413-415, 418-421, 426-428 *Chemistry and Technology* 424-425 *ChemLab* 422-423 *MiniLab* 408, 418	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 12.1, 12.2 SE: 404-408, 412, 413-416, 418-421, 426-428 *Art Connection* 411 *Chemistry and Technology* 424-425 *ChemLab* 422-423 *Launch Lab* 403 *MiniLab* 408, 418	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 12.1, 12.2 SE: 404-410, 413-416, 418-421, 426-428 *ChemLab* 422-423 *Everyday Chemistry* 417 *Launch Lab* 403 *MiniLab* 408, 418	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 12.1, 12.2 SE: 404-407, 413-415, 418-421, 426-428 *Chemistry and Technology* 424-425 *ChemLab* 422-423 *Launch Lab* 403 *MiniLab* 408, 418	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 12.1, 12.2 SE: 404-407, 412, 413-415, 418-421, 426-428 *Art Connection* 411 *Chemistry and Technology* 424-425 *ChemLab* 422-423 *Everyday Chemistry* 417 *Launch Lab* 403 *MiniLab* 408, 418	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 12.1, 12.2 SE: 413-416, 420 *Art Connection* 411 *Chemistry and Technology* 424-425 *ChemLab* 422-423 *Everyday Chemistry* 417 *Launch Lab* 403 *MiniLab* 408, 418	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 12.1, 12.2 SE: 404-410, 412, 413-415, 418-421, 426-428 *Chemistry and Technology* 424-425 *ChemLab* 422-423 *Everyday Chemistry* 417 *Launch Lab* 403 *MiniLab* 408, 418	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 12.1, 12.2 SE: 404-410, 412, 413-415, 418-421, 426-428 *Chemistry and Technology* 424-425 *ChemLab* 422-423 *Everyday Chemistry* 417 *Launch Lab* 403 *MiniLab* 408, 418	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 12.2 SE: 413-416, 420 *Chemistry and Technology* 424-425	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 12.2 SE: 420 *Chemistry and Technology* 424-425	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 12.2 SE: 413, 415, 421, 426 *Chemistry and Technology* 424-425	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 12.1, 12.2 SE: 406-407, 413 *Art Connection* 411 *ChemLab* 422-423	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 Section 12.2 *Chemistry and Technology* 424-425	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.

Content Statement: The conservation of atoms in chemical reactions leads to the ability to calculate the mass of products and reactants using the mole concept.	
5.2.12.B.3 Section 12.2 SE: 413-416, 420 *Chemistry and Technology* 424-425	Balance chemical equations by applying the law of conservation of mass.
Essential Questions: • What is molar mass of an element? • How are moles of reactants related to moles of products?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 13 Water and Its Solutions
Chapter Question: Why is water vital to our existence?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 13.1, 13.2 SE: 438-440, 442-446, 451-454, 458-461, 464-467, 469-473 *ChemLab* 456-457 *MiniLab* 443	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 13.1, 13.2 SE: 436-439, 442-446, 451-454, 464-467, 469 *ChemLab* 456-457 *Everyday Chemistry* 455 *Launch Lab* 435 *MiniLab* 452	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 13.1, 13.2 SE: 436-437, 440, 442-446, 459 *ChemLab* 456-457 *MiniLab* 443, 452	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 13.1, 13.2 SE: 441, 458-461 *ChemLab* 456-457 *In the Field* 448-449 *Launch Lab* 435 *MiniLab* 443, 452	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 13.1, 13.2 SE: 437-439, 441, 451-454, 467 *ChemLab* 456-457 *Launch Lab* 435 *MiniLab* 443, 452	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 13.1, 13.2 SE: 440-441, 442-446, 458-461, 464-467 *ChemLab* 456-457 *Launch Lab* 435 *MiniLab* 443, 452	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 13.1, 13.2 SE: 436-440, 441, 458-461, 467-469 *ChemLab* 456-457 *In the Field* 448-449 *Launch Lab* 435 *MiniLab* 443, 452	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 13.1, 13.2 SE: 436-440, 441, 442-446, 454, 464-469 *ChemLab* 456-457 *Launch Lab* 435 *MiniLab* 443, 452	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 13.1, 13.2 SE: 436-439, 441, 442-446, 451-454, 464-469 *ChemLab* 456-457 *Everyday Chemistry* 455 *Launch Lab* 435 *MiniLab* 452	Use data representations and new models to revise predictions and explanations.

Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 13.1, 13.2 SE: 436-440, 441, 442-446, 451-454, 464-469 *Launch Lab* 435 *MiniLab* 443, 452	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 13.1 *In the Field* 448-449	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 13.1, 13.2 SE: 436-440, 441, 442-446, 451-453, 464-469 *Chemistry and Society* 447 *ChemLab* 456-457 *Launch Lab* 435 *MiniLab* 443, 452	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 13.1, 13.2 SE: 453, 467 *Chemistry and Society* 447 *ChemLab* 456-457 *How It Works* 468 *In the Field* 448-449 *MiniLab* 452	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 13.1, 13.2 SE: 437-439, 441, 442-443, 451-453, 467	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: Differences in the physical properties of solids, liquids, and gases are explained by the ways in which the atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules.	
5.2.12.A.2 Section 13.1, 13.2 SE: 436-440, 441, 469	Account for the differences in the physical properties of solids, liquids, and gases.
Content Statement: Solids, liquids, and gases may dissolve to form solutions. When combining a solute and solvent to prepare a solution, exceeding a particular concentration of solute will lead to precipitation of the solute from the solution. Dynamic equilibrium occurs in saturated solutions. Concentration of solutions can be calculated in terms of molarity, molality, and percent by mass.	
5.2.12.A.5 Section 13.2 SE: 451-454, 458-461, 469 *ChemLab* 456-457 *Everyday Chemistry* 455	Describe the process by which solutes dissolve in solvents.

Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Gas particles move independently and are far apart relative to each other. The behavior of gases can be explained by the kinetic molecular theory. The kinetic molecular theory can be used to explain the relationship between pressure and volume, volume and temperature, pressure and temperature, and the number of particles in a gas sample. There is a natural tendency for a system to move in the direction of disorder or entropy.	
5.2.12.C.1 Section 13.1, 13.2 SE: 436-440, 441, 469	Use the kinetic molecular theory to describe and explain the properties of solids, liquids, and gases.
Content Statement: Heating increases the energy of the atoms composing elements and the molecules or ions composing compounds. As the kinetic energy of the atoms, molecules, or ions increases, the temperature of the matter increases. Heating a pure solid increases the vibrational energy of its atoms, molecules, or ions. When the vibrational energy of the molecules of a pure substance becomes great enough, the solid melts.	
5.2.12.C.2 Section 13.1 SE: 436-440, 441	Account for any trends in the melting points and boiling points of various compounds.
Essential Questions: • What are the unique physical characteristics of water? • How does water dissolve a solute?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 14 Acids, Bases, and pH
Chapter Question: How are acids and bases different?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 14.1, 14.2 SE: 480-483, 493-494, 497-500 *Biology Connection* 487 *ChemLab* 506-507 *MiniLab* 482	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 14.1, 14.2 SE: 482-488, 493-494, 497-500, 501-504 *Biology Connection* 487 *Chemistry and Society* 495 *Chemistry and Technology* 485 *ChemLab* 506-507 *Launch Lab* 479 *MiniLab* 482, 504	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 14.1, 14.2 SE: 497-500, 501-504 *Biology Connection* 487 *Chemistry and Society* 495 *ChemLab* 506-507 *Everyday Chemistry* 505 *In the Field* 490-491 *Launch Lab* 479 *MiniLab* 482, 504	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 14.1, 14.2 SE: 480-483, 493-494, 497-500, 501-504 *Biology Connection* 487 *Chemistry and Society* 495 *Chemistry and Technology* 485 *ChemLab* 506-507 *Everyday Chemistry* 505 *In the Field* 490-491 *Launch Lab* 479 *MiniLab* 482, 504	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 4.1, 14.2 SE: 483-488, 489-492, 493-496, 497-500, 501-504 *Biology Connection* 487 *Chemistry and Society* 495 *Chemistry and Technology* 485 *ChemLab* 506-507 *Launch Lab* 479	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 14.1, 14.2 SE: 482-488, 489-494, 497-500, 501-504 *Biology Connection* 487 *Chemistry and Society* 495 *ChemLab* 506-507 *Launch Lab* 479 *MiniLab* 482	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 14.1, 14.2 SE: 480-484, 497-500, 501-504 *Biology Connection* 487 *Chemistry and Society* 495 *Chemistry and Technology* 485 *ChemLab* 506-507 *In the Field* 490-491 *Launch Lab* 479 *MiniLab* 482, 504	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 14.1, 14.2 SE: 483-484, 489-492, 493-496, 498-500, 501-504 *Chemistry and Society* 495 *Chemistry and Technology* 485 *ChemLab* 506-507 *Launch Lab* 479	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 4.1, 14.2 SE: 480-484, 489-492, 493-496, 497-500, 501-504 *Biology Connection* 487 *Chemistry and Society* 495 *ChemLab* 506-507 *Launch Lab* 479 *MiniLab* 504	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 14.1, 14.2 SE: 480-484, 489-492, 497-500 *Chemistry and Society* 495 *ChemLab* 506-507 *MiniLab* 504	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 14.1 *In the Field* 490-491	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 14.1, 14.2 SE: 481-482, 488, 492, 498-500, 501-504 *ChemLab* 506-507	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 14.1, 14.2 SE: 481-482, 488, 492 *Biology Connection* 487 *ChemLab* 506-507 *In the Field* 490-491	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 14.1 SE: 488, 492	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: Acids and bases are important in numerous chemical processes that occur around us, from industrial to biological processes, from the laboratory to the environment.	
5.2.12.A.6 Section 14.2 SE: 501-504 *ChemLab* 506-507 *Everyday Chemistry* 505	Relate the pH scale to the concentrations of various acids and bases.
Essential Questions: • What are properties of acids and bases? • What are differences between strong acids and bases and weak acids and bases? What is pH?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 15 Acids and Bases React
Chapter Question: What happens when an acid and base react?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 15.1, 15.2 SE: 516-517, 526-530, 539-542 *ChemLab* 544-545 *Launch Lab* 515 *MiniLab* 518, 533	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 15.1, 15.2 SE: 517-527, 531-535, 540 *ChemLab* 544-545 *How It Works* 543 *MiniLab* 533	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 15.1, 15.2 SE: 526-529, 539-542 *ChemLab* 544-545 *How It Works* 543 *Launch Lab* 515 *MiniLab* 518, 533	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 15.1, 15.2 SE: 516-521, 526-529, 535-538, 539-542 *ChemLab* 544-545 *How It Works* 543 *Launch Lab* 515 *MiniLab* 518, 533	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 15.1, 15.2 SE: 517-527, 531-535, 539-542 *Chemistry and Society* 537 *ChemLab* 544-545 *How It Works* 519, 543 *MiniLab* 518, 533	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 15.1, 15.2 SE: 517-521, 522-524, 526-529, 531-535, 539-542 *ChemLab* 544-545 *Earth Science Connection* 525 *Everyday Chemistry* 534 *How It Works* 519, 543 *Launch Lab* 515 *MiniLab* 518, 533	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 15.1, 15.2 SE: 526-529, 535-536, 539-542 *ChemLab* 544-545 *How It Works* 543 *Launch Lab* 515 *MiniLab* 518, 533	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 15.1, 15.2 SE: 517-524, 526-530, 532-533, 539-542 *Chemistry and Society* 537 *ChemLab* 544-545 *Earth Science Connection* 525 *Everyday Chemistry* 534 *Launch Lab* 515 *MiniLab* 518, 533	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 15.1, 15.2 SE: 517-518, 523, 539-542 *ChemLab* 544-545 *Earth Science Connection* 525 *Everyday Chemistry* 534 *How It Works* 519	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 15.1, 15.2 SE: 526-530, 532-533, 535-538, 539-542 *ChemLab* 544-545 *Earth Science Connection* 525 *Everyday Chemistry* 534 *How It Works* 519	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 15.1, 15.2 SE: 517, 523, 533, 536, 540 *Everyday Chemistry* 534 *How It Works* 519	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 15.1, 15.2 SE: 522, 526, 528, 532, 539-541 *ChemLab* 544-545 *How It Works* 543 *Launch Lab* 515 *MiniLab* 518	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 15.1 SE: 523	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: Acids and bases are important in numerous chemical processes that occur around us, from industrial to biological processes, from the laboratory to the environment.	
5.2.12.A.6 Section 15.2 SE: 531-533, 535-539, 540 *Everyday Chemistry* 534 *How It Works* 543 *Launch Lab* *MiniLab* 533	Relate the pH scale to the concentrations of various acids and bases.
Essential Questions: • What determines the classification of an acid-base reaction? • What is the role of pH in the body?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 16 Oxidation-Reduction Reactions
Chapter Question: What is oxidation-reduction reaction?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 16.1, 16.2 SE: 554-562, 563-564, 570, 573, 575-576 *Chemistry and Technology* 574 *ChemLab* 560-561 *Launch Lab* 553 *MiniLab* 568 *Physics Connection* 566	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 16.1, 16.2 SE: 558-559, 565, 570 *Chemistry and Technology* 574 *Everyday Chemistry* 571 *How It Works* 569 *MiniLab* 568 *Physics Connection* 566	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 16.1, 16.2 SE: 558-559, 570 *Chemistry and Technology* 574 *ChemLab* 560-561 *How It Works* 569 *MiniLab* 557, 568	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 16.1, 16.2 SE: 563-564, 565 *Chemistry and Technology* 574 *ChemLab* 560-561 *Everyday Chemistry* 571 *How It Works* 569 *Launch Lab* 553 *MiniLab* 557, 568 *Physics Connection* 566	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 16.1, 16.2 SE: 558-559, 565, 570 *Chemistry and Technology* 574 *Everyday Chemistry* 571 *How It Works* 569 *MiniLab* 568 *Physics Connection* 566	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 16.1, 16.2 SE: 554-558, 564-565, 572-573 *Chemistry and Technology* 574 *ChemLab* 560-561 *Everyday Chemistry* 571 *How It Works* 569 *Launch Lab* 553 *MiniLab* 557, 568 *Physics Connection* 566	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 16.1, 16.2 SE: 558-559, 564-565, 567, 570, 572-573 *Chemistry and Technology* 574 *ChemLab* 560-561 *Everyday Chemistry* 571 *How It Works* 569 *MiniLab* 557, 568	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 16.1, 16.2 SE: 554, 558, 564-565 *Chemistry and Technology* 574 *ChemLab* 560-561 *Everyday Chemistry* 571 *How It Works* 569 *Launch Lab* 553 *MiniLab* 557, 568	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 16.1, 16.2 SE: 554, 556-557, 562, 565, 575-576 *Chemistry and Technology* 574 *ChemLab* 560-561 *Everyday Chemistry* 571 *How It Works* 569 *MiniLab* 557, 568 *Physics Connection* 566	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 16.1, 16.2 SE: 554-558, 562, 564-565, 567-568, 570, 575-576 *Everyday Chemistry* 571 *How It Works* 569 *MiniLab* 568 *Physics Connection* 566	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 16.1, 16.2 SE: 556-557, 559, 567, 570, 575	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 16.1, 16.2 SE: 565 *Chemistry and Technology* 574 *ChemLab* 560-561 *How It Works* 569 *MiniLab* 557	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section 16.1, 16.2 SE: 555-556, 558-559, 562, 567, 574 *Physics Connection* 566	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.

Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 Section 16.1, 16.2 SE: 554-559, 564-565, 567, 570, 572-576 *Chemistry and Technology* 574 *ChemLab* 560-561 *Everyday Chemistry* 571 *How It Works* 569 *MiniLab* 557 *Physics Connection* 566	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
Content Statement: The conservation of atoms in chemical reactions leads to the ability to calculate the mass of products and reactants using the mole concept.	
5.2.12.B.3 Section 16.1, 16.2 SE: 555-558, 564, 567, 570, 572-575 *Physics Connection* 566	Balance chemical equations by applying the law of conservation of mass.
Essential Questions: • What factors identify a redox reaction? • What are examples of everyday redox reactions?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 17 Electrochemistry
Chapter Question: What is electrochemistry?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 17.1, 17.2 SE: 584-591, 594-599, 600-605 *ChemLab* 592-593 *MiniLab* 586	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 17.1, 17.2 SE: 584-586, 590-591, 594-599, 602-604, 614 *ChemLab* 592-593 *Launch Lab* 583 *MiniLab* 586	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 17.1, 17.2 SE: 587, 589-590, 601-604 *ChemLab* 592-593 *Launch Lab* 583 *MiniLab* 586, 602	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 17.1, 17.2 SE: 584-587, 596-599, 600-604, 609-610 *ChemLab* 592-593 *Launch Lab* 583 *MiniLab* 586, 602	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 17.1, 17.2 SE: 584-586, 588-589, 590-591, 594-599, 600-604, 614 *ChemLab* 592-593 *How It Works* 598 *Launch Lab* 583 *MiniLab* 586, 602	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 17.1, 17.2 SE: 584-587, 588-590, 596-599, 603-605, 609-614 *ChemLab* 592-593 *How It Works* 598 *Launch Lab* 583 *MiniLab* 586, 602	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 17.1, 17.2 SE: 585-587, 589-590, 596-599, 601-604, 610 *ChemLab* 592-593 *Everyday Chemistry* 611 *How It Works* 598 *Launch Lab* 583 *MiniLab* 586, 602	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 17.1, 17.2 SE: 584-587, 590-591, 596-597, 601-604, 609-610, 614 *ChemLab* 592-593 *How It Works* 595, 598 *MiniLab* 586	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 17.1, 17.2 SE: 586-587, 596-599, 600-603, 604-605, 610, 614 *ChemLab* 592-593 *How It Works* 598 *Launch Lab* 583 *MiniLab* 586, 602	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 17.1, 17.2 SE: 584-587, 596-599, 600-602, 610-614 *ChemLab* 592-593 *How It Works* 598 *Launch Lab* 583 *MiniLab* 586, 602	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 17.2 *In the Field* 612-613	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 17.1, 17.2 SE: 584-588, 590-591, 594, 600-601, 610 *Chemistry and Technology* 606-608 *ChemLab* 592-593 *How It Works* 597, 598	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 17.1, 17.2 SE: 585-586, 588, 600-603, 610 *ChemLab* 592-593 *How It Works* 595, 597, 598 *Launch Lab* 583 *MiniLab* 586, 602	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 Section 17.1, 17.2 SE: 584-587, 590-591, 594, 600-603, 614 *Chemistry and Technology* 606-608 *ChemLab* 592-593 *How It Works* 598 *MiniLab* 586, 602	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
Content Statement: The conservation of atoms in chemical reactions leads to the ability to calculate the mass of products and reactants using the mole concept.	
5.2.12.B.3 Section 17.1, 17.2 SE: 589-590, 594-596, 600-603 *ChemLab* 592-593	Balance chemical equations by applying the law of conservation of mass.
Essential Questions: • How is electric current produced? • What is electrolysis?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 18 Organic Chemistry
Chapter Question: What are organic compounds?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 18.1, 18.2, 18.3 SE: 625-627, 629-639, 640-644, 647-648, 654-659 *ChemLab* 649-651 *Launch Lab* 621 *MiniLab* 630	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 18.1, 18.2, 18.3 SE: 623-629, 641-644, 647-648, 654-656 *ChemLab* 649-651 *Launch Lab* 621	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 18.1, 18.2, 18.3 SE: 658-659 *ChemLab* 649-651 *MiniLab* 630, 645, 652	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 18.1, 18.2, 18.3 SE: 636-639, 654-656, 658-659 *ChemLab* 649-651 *Launch Lab* 621 *MiniLab* 630, 645, 652	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 18.1, 18.2, 18.3 SE: 623-629, 641-644, 647-648, 654-656 *ChemLab* 649-651 *Launch Lab* 621 *MiniLab* 630, 645, 652	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 18.1, 18.2, 18.3 SE: 622-623, 627-629, 636-639, 641-644, 654-656 *ChemLab* 649-651 *MiniLab* 630, 645, 652	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 18.1, 18.2, 18.3 SE: 658-659 *ChemLab* 649-651 *MiniLab* 630, 645, 652	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 18.1, 18.2, 18.3 SE: 627-629, 631, 636, 641-644, 654 *ChemLab* 649-651 *Everyday Chemistry* 655 *Launch Lab* 621 *MiniLab* 630	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 18.1, 18.2, 18.3 SE: 627-628, 630-631, 636, 641-644, 654-656 *Biology Connection* 632 *ChemLab* 649-651 *Launch Lab* 621 *MiniLab* 630, 645, 652	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 18.1, 18.2, 18.3 SE: 627-628, 631, 636, 640-644, 654-656 *ChemLab* 649-651 *Everyday Chemistry* 655 *Launch Lab* 621 *MiniLab* 630, 652	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 18.1 *In the Field* 634-635	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 18.1, 18.3 SE: 624-625, 627-629, 631, 636, 638, 653, 656 *Biology Connection* 632 *ChemLab* 649-651 *Everyday Chemistry* 655	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 18.1, 18.2, 18.3 SE: 637-638 *ChemLab* 649-651 *MiniLab* 630, 645	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 18.1, 18.3 SE: 624, 627-631, 636, 653-654, 656 *Launch Lab* 621	Use atomic models to predict the behaviors of atoms in interactions.

Content Statement: Differences in the physical properties of solids, liquids, and gases are explained by the ways in which the atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules.	
5.2.12.A.2 Section 18.1 SE: 628, 637-638	Account for the differences in the physical properties of solids, liquids, and gases.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section 18.1 SE: 622, 629	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.
Content Statement: The conservation of atoms in chemical reactions leads to the ability to calculate the mass of products and reactants using the mole concept.	
5.2.12.B.3 Section 18.1 SE: 638	Balance chemical equations by applying the law of conservation of mass.
Essential Questions: • What are hydrocarbons? • What are properties and uses of each class of substituted hydrocarbon? • What are properties of polymers?	

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Chapter Title: Chapter 19 The Chemistry of Life
Chapter Question: What are biological molecules?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 19.1, 19.2 SE: 666-667, 685-687, 689-693, 695-696 *ChemLab* 674-675 *Everyday Chemistry* 680 *Launch Lab* 665 *MiniLab* 687, 696	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 19.1, 19.2 SE: 668-672, 685-687, 689-693, 695-696 *Biology Connection* 694 *Everyday Chemistry* 680, 684	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 19.1, 19.2 SE: 685-687, 693-695 *ChemLab* 674-675 *Launch Lab* 665 *MiniLab* 687, 696	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 19.1, 19.2 SE: 666-670, 678-679, 685-687, 693-695 *ChemLab* 674-675 *Launch Lab* 665 *MiniLab* 687, 696	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 19.1, 19.2 SE: 666-667, 669-672, 678-679, 686-687, 689, 693, 695 *Biology Connection* 694 *ChemLab* 674-675 *Everyday Chemistry* 680	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 19.1, 19.2 SE: 667-670, 685-687, 690-691, 693-695 *Biology Connection* 694 *ChemLab* 674-675 *Everyday Chemistry* 680, 684 *Launch Lab* 665 *MiniLab* 687, 696	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 19.1, 19.2 SE: 666, 672, 685-687, 693-695 *ChemLab* 674-675 *Everyday Chemistry* 680 *Launch Lab* 665 *MiniLab* 687, 696	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 19.1, 19.2 SE: 667, 686-688, 692-694, 695 *Biology Connection* 694 *Everyday Chemistry* 680, 684	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 19.1, 19.2 SE: 667, 688 *Biology Connection* 694 *ChemLab* 674-675 *Everyday Chemistry* 680, 684	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 19.1, 19.2 SE: 667, 670-672, 686-688, 695-696 *Biology Connection* 694 *Everyday Chemistry* 680	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 19.1 SE: 667 *In the Field* 676-677	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 19.1, 19.2 SE: 666, 669-670, 672, 676, 682-683, 686-687, 689, 691, 693-694 *Biology Connection* 694 *ChemLab* 674-675 *Everyday Chemistry* 680	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 19.1, 19.2 *ChemLab* 674-675 *Launch Lab* 665 *MiniLab* 687, 696	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section 19.1, 19.2 SE: 686, 693-695 *Biology Connection* 694 *Everyday Chemistry* 680	Use atomic models to predict the behaviors of atoms in interactions.

Standard: 5.3 Life Science: All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.	
Strand: A. Organization and Development: Living organisms are composed of cellular units (structures) that carry out functions required for life. Cellular units are composed of molecules, which also carry out biological functions.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Cells are made of complex molecules that consist mostly of a few elements. Each class of molecules has its own building blocks and specific functions.	
5.3.12.A.1 Section 19.1,19.2 SE: 666-673, 678-679, 685-688, 689-692, 693-695 *Biology Connection* 694 *ChemLab* 674-675 *Everyday Chemistry* 680, 684 *MiniLab* 687	Represent and explain the relationship between the structure and function of each class of complex molecules using a variety of models.
Content Statement: Cellular processes are carried out by many different types of molecules, mostly by the group of proteins known as enzymes.	
5.3.12.A.2 Section 19.1 SE: 672 *ChemLab* 674-675	Demonstrate the properties and functions of enzymes by designing and carrying out an experiment.
Content Statement: Cellular function is maintained through the regulation of cellular processes in response to internal and external environmental conditions.	
5.3.12.A.3 Section 19.2 SE: 690-692, 695 *Biology Connection* 694 *MiniLab* 696	Predict a cell's response in a given set of environmental conditions.

Content Statement: There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism.	
5.3.12.A.6 Section 19.1 SE: 672-673, 688	Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).
Essential Questions: • What are the four basic categories of biological macromolecules? • What is respiration?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 20 Chemical Reactions and Energy
Chapter Question: What are differences between energy and entropy?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 20.1, 20.2, 20.3 SE: 707-710, 712-714, 717-718, 726-728, 730-733 *ChemLab* 720-721 *MiniLab* 722	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 20.1, 20.2, 20.3 SE: 707-710, 712-713, 715-719, 726-728, 732-733 *Chemistry and Technology* 724-725 *ChemLab* 720-721	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 20.1, 20.2 SE: 715-718, 726-727 *ChemLab* 720-721 *Launch Lab* 703 *MiniLab* 708, 722	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 20.1, 20.2, 20.3 SE: 707-710, 712-714, 715-718, 726-727, 730-732 *Chemistry and Technology* 724-725 *ChemLab* 720-721 *Everyday Chemistry* 11 *Launch Lab* 703 *MiniLab* 708, 722	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 20.1, 20.2, 20.3 SE: 707-710, 712-713, 715-718, 726-727, 730-733 *ChemLab* 720-721 *MiniLab* 708, 722	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 20.1, 20.2, 20.3 SE: 707-710, 712-714, 715-718, 726-727, 730-732 *Chemistry and Technology* 724-725 *ChemLab* 720-721 *Everyday Chemistry* 711 *How It Works* 706 *Launch Lab* 703 *MiniLab* 708, 722	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 20.1, 20.2, 20.3 SE: 712-713, 715-718, 726-727, 730-732 *ChemLab* 720-721 *How It Works* 706 *Launch Lab* 703 *MiniLab* 708, 722	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 20.1, 20.2, 20.3 SE: 707-710, 712-714, 719, 729-733 *Chemistry and Technology* 724-725 *ChemLab* 720-721 *Everyday Chemistry* 711 *MiniLab* 722	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 20.1, 20.2, 20.3 SE: 707-710, 712-714, 715-718, 726-727, 730-732 *Chemistry and Technology* 724-725 *ChemLab* 720-721 *Everyday Chemistry* 711 *How It Works* 706 *Launch Lab* 703 *MiniLab* 708, 722	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 20.1, 20.2, 20.3 SE: 704-710, 712-713, 717-719, 726-728, 730-733 *Chemistry and Technology* 724-725 *ChemLab* 720-721 *Launch Lab* 703 *MiniLab* 708, 722	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 20.1 SE: 728 *Earth Science Connection* 723	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 20.1, 20.2, 20.3 SE: 704-710, 712, 715, 722, 726-727, 729-732 *How It Works* 711	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 20.1, 20.2, 20.3 SE: 709-710, 715, 722, 732-733 *ChemLab* 720-721 *How It Works* 711 *MiniLab* 708, 722	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: D. Energy Transfer and Conservation: The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: The driving forces of chemical reactions are energy and entropy. Chemical reactions either release energy to the environment (exothermic) or absorb energy from the environment (endothermic).	
5.2.12.D.2 Section 20.1, 20.2 SE: 704-705, 719, 722, 728 *Earth Science Connection* 723 *Everyday Chemistry* 711 *How It Works* 706	Describe the potential commercial applications of exothermic and endothermic reactions.
Content Statement: Chemical equilibrium is a dynamic process that is significant in many systems, including biological, ecological, environmental, and geological systems. Chemical reactions occur at different rates. Factors such as temperature, mixing, concentration, particle size, and surface area affect the rates of chemical reactions.	
5.2.12.D.5 Section 20.1, 20.2 SE: 710, 728 *Everyday Chemistry* 711 *Launch Lab* 703	Model the change in rate of a reaction by changing a factor.

Standard: 5.3 Life Science: All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.	
Strand: B. Matter and Energy Transformations: Food is required for energy and building cellular materials. Organisms in an ecosystem have different ways of obtaining food, and some organisms obtain their food directly from other organisms.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: As matter cycles and energy flows through different levels of organization within living systems (cells, organs, organisms, communities), and between living systems and the physical environment, chemical elements are recombined into different products.	
5.3.12.B.1 Section 20.2, 20.3 SE: 717-718, 729-733 *Chemistry and Technology* 724-725 *ChemLab* 720-721 *Earth Science Connection* 723	Cite evidence that the transfer and transformation of matter and energy links organisms to one another and to their physical setting.
Content Statement: Each recombination of matter and energy results in storage and dissipation of energy into the environment as heat.	
5.3.12.B.2 Section 20.2, 20.3 SE: 717-718, 730-733 *ChemLab* 720-721	Use mathematical formulas to justify the concept of an efficient diet.
Content Statement: Continual input of energy from sunlight keeps matter and energy flowing through ecosystems.	
5.3.12.B.3 Section 20.3 SE: 732-733	Predict what would happen to an ecosystem if an energy source was removed.
Content Statement: Plants have the capability to take energy from light to form sugar molecules containing carbon, hydrogen, and oxygen.	
5.3.12.B.4 Section 20.3 SE: 730-733	Explain how environmental factors (such as temperature, light intensity, and the amount of water available) can affect photosynthesis as an energy storing process.
Content Statement: In both plant and animal cells, sugar is a source of energy and can be used to make other carbon-containing (organic) molecules.	
5.3.12.B.5 Section 20.3 SE: 730-733	Investigate and describe the complementary relationship (cycling of matter and flow of energy) between photosynthesis and cellular respiration.

Content Statement: All organisms must break the high-energy chemical bonds in food molecules during cellular respiration to obtain the energy needed for life processes.	
5.3.12.B.6 Section 20.3 SE: 731	Explain how the process of cellular respiration is similar to the burning of fossil fuels.
Essential Questions: • What are differences between exothermic and endothermic reactions? • What is calorimetry? • What is the process of photosynthesis?	

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***Chemistry: Concepts and Applications* © 2009**
Chapter Title: Chapter 21 Nuclear Chemistry
Chapter Question: How does nuclear energy effect everyday life?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section 21.1, 21.2, 21.3 SE: 743-747, 752-753, 756-761, 763-764, 768-773 *Biology Connection* 766 *Chemistry and Technology* 750-751 *ChemLab* 748-749 *Everyday Chemistry* 771 *MiniLab* 758	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section 21.1, 21.2 SE: 752-755, 756 *Art Connection* 754 *Chemistry and Technology* 750-751 *ChemLab* 748-749 *MiniLab* 758	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section 21.1, 21.2, 21.3 SE: 752-755 *Art Connection* 754 *Biology Connection* 766 *Chemistry and Technology* 750-751 *ChemLab* 748-749 *Launch Lab* 739 *MiniLab* 758, 770	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section 21.1, 21.2, 21.3 SE: 752-755, 757-760, 764 *Art Connection* 754 *Biology Connection* 766 *ChemLab* 748-749 *Everyday Chemistry* 771 *Launch Lab* 739 *MiniLab* 758, 770	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section 21.1, 21.2 SE: 743-746, 752-755 *Chemistry and Technology* 750-751 *ChemLab* 748-749 *Everyday Chemistry* 771 *Launch Lab* 739 *MiniLab* 758, 770	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section 21.1, 21.2, 21.3 SE: 741, 743-747, 752-755, 757-760, 764 *Art Connection* 754 *Biology Connection* 766 *Chemistry and Technology* 750-751 *ChemLab* 748-749 *Everyday Chemistry* 771 *Launch Lab* 739 *MiniLab* 758, 770	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section 21.1, 21.2, 21.3 SE: 752-755 *Art Connection* 754 *Chemistry and Technology* 750-751 *ChemLab* 748-749 *Launch Lab* 739 *MiniLab* 758, 770	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section 21.1, 21.2 SE: 741, 743-747, 752-753, 757-760, 768-773 *Biology Connection* 766 *ChemLab* 748-749 *Everyday Chemistry* 771 *Launch Lab* 739 *MiniLab* 758	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section 21.1, 21.2, 21.3 SE: 752-753, 757-760, 764, 768-773 *Art Connection* 754 *Chemistry and Technology* 750-751 *ChemLab* 748-749 *Everyday Chemistry* 771	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section 21.1, 21.2, 21.3 SE: 740-741, 760-762, 764, 773 *Chemistry and Technology* 750-751 *ChemLab* 748-749 *Everyday Chemistry* 771	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section 21.1, 21.2 SE: 741, 757 *Biology Connection* 766	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section 21.1, 21.2, 21.3 SE: 743-745, 746, 752, 757-758, 759, 765, 768 *ChemLab* 748-749 *How It Works* 744 *Launch Lab* 739	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section 21.1, 21.3 SE: 746, 763-764 *Chemistry and Technology* 750-751 *Everyday Chemistry* 771 *Launch Lab* 739 *MiniLab* 770	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: D. Energy Transfer and Conservation: The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Nuclear reactions (fission and fusion) convert very small amounts of matter into energy.	
5.2.12.D.3 Section 21.2 SE: 757-762	Describe the products and potential applications of fission and fusion reactions.
Essential Questions: • What are differences between alpha, beta, and gamma radiation? • What is nuclear fission? • What are medical and nonmedical uses of radioisotopes?	