Conceptual Chemistry

Unit Title: Chapter #1: Introduction to Chemistry

Stage 1: Desired Results

Standards & Indicators:

HS-PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties

HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

Science and Engineering Practices(SEP)

- **Planning and Carrying Out Investigations** -Planning and carrying out investigations in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HSPS1-3)
- **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 9–12 builds on K–8 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2)

Disciplinary Core Ideas (DCI)

- The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (HSPS1-3)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)(HS-PS1-2)

Crosscutting Concepts (CCC)

- **Patterns -** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.(HS PS1-2)(HS PS1-3)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).	With a growth mindset, failure is an important part of success.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).	Innovative ideas or innovation can lead to career opportunities.

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9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform decision-making.
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).	In order for members of our society to participate productively, information needs to be shared accurately and ethically.
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).	Accurate information may help in making valuable and ethical choices.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	Digital tools differ in features, capacities, and styles. Knowledge of different digital

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		tools is helpful in selecting the best tool for a given task.
9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.

Central Idea/Enduring Understanding:

- Chemistry overlaps with all of the other sciences-physics, biology, astronomy, geology, environmental science and others
- The steps in the scientific method include making observations, proposing and testing hypotheses, and developing theories
- When scientists communicate and work together, a successful outcome is more likely.
- Creating a plan and then following that plan helps you solve a problem effectively.

Essential/Guiding Question:

- Why is it important to study chemistry?
- What are the main steps for the Scientific Method?
- Why is it important for scientists to communicate both nationally and internationally?
- How do chemists solve problems?

Content:

- Definition of Chemistry and its branches
- Relationship of Chemistry and matter
- Five areas of study in chemistry
- Big ideas in Chemistry
- Importance for studying Chemistry
- The correlation of Chemistry, technology and our society via examples and/or career opportunities
- History of chemistry and its inventors
- Explanation and understanding of the Scientific Method
- Importance of models in science
- Problem Solving in chemistry

Skills (Objectives):

- Explain why the scope of chemistry is so vast
- Identify five traditional areas of study in chemistry
- Identify the central themes of chemistry
- Identify three general reasons to study chemistry
- Identify some outcomes of modern research in chemistry
- Describe how Lavoisier and his wife transformed chemistry
- Identify the major steps in the scientific method
- Explain the role of collaboration and communication play in science
- Identify the general approach to solving a problem
- Describe the steps for solving numeric problems
- Describe the steps for solving non numeric problems

Interdisciplinary Connections:

RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
MP.4: Model with mathematics.
SL.11-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

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Stage 2: Assessment Evidence

Performance Task(s):

-Balloon Lab with baking soda (Balloon Lab-Online) and/or teacher generated lab
-Observation and Experiment Lab (*by Flinn Scientific Lab Kit*)
-Explore: Class Activity, pg. 12 (*Pearson Chemistry Foundation Edition,* Textbook)
-Bubble Lab, pg. 15 (*Pearson Chemistry Foundation Edition,* Textbook)
-Explore: Teacher Demo, pg. 20 (*Pearson Chemistry Foundation Edition,* Textbook)

Other Evidence:

- Do Now Exercises
- Quizzes
- Test
- Labs Practicum

Stage 3: Learning Plan

Learning Opportunities/Strategies:

- Team building activities
- Cooperative Learning Activities
- Online learning websites/web quest/ tutorial programs
- Internet research
- Student driven activities

Resources:

- *PowerPoint Notes*
- *Pearson Chemistry Foundation Edition (Copyright 2012),* ***Textbook*** *by Anthony Wilbraham, Dennis D. Stanley, Michael S. Matta and Edward L. Waterman.*
- *Pearson Chemistry: Classroom Resources*
- *Person Chemistry: Exam View Test Bank*
- *Person Chemistry: Untamed Science* ***Video Series****: Chem Adventures*
- *Conceptual Chemistry: Instructor Resource*
- *Pearson Chemistry, Reading and Study* ***Workbook****:* ***Teacher's Guide****, Upper Saddle River, NJ. Copyright 2012.*
- *PearsonChem.com-****Online tutorial and learning program***

LGBT and Disabilities Resources:

- LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth
- LGBTQ+ Books

DEI Resources:

- Learning for Justice
- GLSEN Educator Resources
- Supporting LGBTQIA Youth Resource List
- Respect Ability: Fighting Stigmas, Advancing Opportunities
- NJDOE Diversity, Equity & Inclusion Educational Resources
- Diversity Calendar

Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

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High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Students will be given advanced level reading material. Formative assessments will be used to determine students' level of comprehension. Students may be given an additional assignment when their work is completed. Students will be given choices when appropriate to choose their end product for a lesson. Students grouped into small groups, which are designed around their strengths and weaknesses so that students can assist and challenge each other.	Lessons will be designed based on student learning styles. Formative assessments will be used to determine students' level of comprehension. Students will be given choices when appropriate to choose their end product for a lesson	Formative assessments will be used to determine students' level of comprehension. Assessments will be restructured prior to testing to accommodate students' needs. Students will be offered tutoring with the teacher or use a weekly school tutoring program. Students will be given choices when appropriate to choose their end product for a lesson. Teacher will develop an 8-minute model to help the student prior to referring the student to I&RST. Allow additional time on assessments.	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following: ● Extended time ● Provide visual aids ● Repeated directions ● Differentiate based on proficiency ● Provide word banks ● Allow for translators, dictionaries

Unit Title: Chapter #2: Matter and Change

Stage 1: Desired Results

Standards & Indicators:

HS-PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties

HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

Science and Engineering Practices(SEP)

- **Planning and Carrying Out Investigations** -Planning and carrying out investigations in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. Plan and conduct an investigation individually and

collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HSPS1-3)

- **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 9–12 builds on K–8 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2)
- **Using Mathematics and Computational Thinking** Mathematical and computational thinking at the 9–12 builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. Use mathematical representations of phenomena to support claims. (HS-PS1-7)

Disciplinary Core Ideas (DCI)

- The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (HSPS1-3)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)(HS-PS1-2)
- The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. (HS-PS1-2), (HS-PS1-7)

Crosscutting Concepts (CCC)

- **Patterns -** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.(HS PS1-2)(HS PS1-3)
- **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** Science assumes the universe is a vast single system in which basic laws are consistent. (HS-PS1-7)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).	With a growth mindset, failure is an important part of success.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.

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9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGl.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform decision-making.
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).	In order for members of our society to participate productively, information needs to be shared accurately and ethically.
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).	Accurate information may help in making valuable and ethical choices.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.).	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.

Central Idea/Enduring Understanding:	**Essential/Guiding Question:** ● What properties are used to describe matter?

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- The properties used to describe matter can be classified as either extensive or intensive properties
- A physical change alters some properties of a material, but it does not change the composition of the material
- Substances are either classified as an element or compound. An Element is the simplest form of matter that has a unique set of properties. A compound is a substance that contains two or more elements that are chemically combined
- A substance is a particular kind of matter, all samples of which have the same makeup and properties. A mixture is a combination of two or more kinds of matter that can be separated by physical means
- A periodic table is an arrangement of elements in which the elements are placed into groups based on their properties. It compares properties of elements
- During a chemical change the composition of matter always changes.

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- How can matter change its form?
- What is the difference between an element and compound?
- What is the difference between a substance and a mixture?
- What is the purpose of a periodic table?
- What happens during a chemical change?

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Content:

- Definition of matter and volume
- Extensive versus Intensive properties and examples for each
- Physical Property versus Physical change
- Identifying the three main states of matter and their properties and examples
- Substance versus Mixture
- Homogeneous mixture versus Heterogeneous mixture
- Separate mixtures into components
- Element versus Compound and their properties
- Function of a Periodic table
- Learning symbols of elements
- Chemical change versus chemical property
- Recognizing chemical changes

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Skills (Objectives):

- Explain why all samples of a substance have the same intensive properties
- Identify the three states of matter and provide their: properties, three examples for each, and motion of particles
- Classify physical changes
- Explain how mixtures are classified
- Explain how mixtures can be separated
- Explain the difference between elements and compounds providing examples for each
- Distinguish the difference between a substance and a mixture
- Describe what chemists use to represent elements and compounds
- Explain how a periodic table is useful
- Describe what happens during a chemical change
- Identify four factors which determine a chemical change has taken place
- Identify the parts of a chemical equation
- Discuss the relationship between the mass of a reactant and product

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Interdisciplinary Connections:
RST.11-12.1: Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS1-5)
SL.11-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Stage 2: Assessment Evidence

Performance Task(s):
-Online: States of Matter Collage Lab (*teacher generated lab*)
-States of Matter Poster Lab (*teacher generated lab*)
- Cube Lab (*Online Demonstration:* Motion of Particles-Cube Lab)
- Chromatography Lab (*Flinn, Scientific Lab Kit*)
-Three Hole Water Bottle: Making a Prediction Lab
-Teacher Demo pg. 29 (*Pearson Chemistry Foundation Edition, Textbook)*
-Teacher Demo, pg 30 (*Pearson Chemistry Foundation Edition, Textbook)*
-Teacher Demo, pg 34 (*Pearson Chemistry Foundation Edition, Textbook)*
-Teacher Demo, pg 37 (*Pearson Chemistry Foundation Edition, Textbook)*
-Teacher Demo, pg 44 (*Pearson Chemistry Foundation Edition, Textbook)*
-Separating Mixtures Lab, pg 33 (*Pearson Chemistry Foundation Edition, Textbook)*
-Density Lab (***teacher generated lab***)
-Virtual Density Lab (Virtual Density Lab)
-Virtual Mixture Lab (Virtual Mixture Lab)

Other Evidence:
- Do Now Exercises
- Quizzes
- Test
- Labs Practicum

Stage 3: Learning Plan

Learning Opportunities/Strategies:
- Team building activities
- Cooperative Learning Activities
- Online learning websites/web quest/ tutorial programs
- Internet research
- Student driven activities

Resources:
- *Pearson Chemistry Foundation Edition (Copyright 2012),* **Textbook** *by Anthony Wilbraham, Dennis D. Stanley, Michael S. Matta and Edward L. Waterman.*
- *Pearson Chemistry: Classroom Resources*
- *Person Chemistry: Exam View Test Bank*
- *Person Chemistry: Untamed Science* ***Video Series****: Chem Adventures*
- *Conceptual Chemistry: Instructor Resource*
- *Pearson Chemistry, Reading and Study* ***Workbook****:* ***Teacher's Guide****, Upper Saddle River, NJ. Copyright 2012.*
- *PearsonChem.com-****Online tutorial and learning program***
- *Silver Burdett & Ginn Physical Science (Copy 1988),* **Textbook** *by Peter Alexander, Ph.D, and Marilyn Fielgel, Ed.D*

LGBT and Disabilities Resources:
- LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth

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	• LGBTQ+ Books DEI Resources: • Learning for Justice • GLSEN Educator Resources • Supporting LGBTQIA Youth Resource List • Respect Ability: Fighting Stigmas, Advancing Opportunities • NJDOE Diversity, Equity & Inclusion Educational Resources • Diversity Calendar

Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Students will be given advanced level reading material. Formative assessments will be used to determine students' level of comprehension. Students may be given an additional assignment when their work is completed. Students will be given choices when appropriate to choose their end product for a lesson. Students grouped into small groups, which are designed around their strengths and weaknesses so that students can assist and challenge each other.	Lessons will be designed based on student learning styles. Formative assessments will be used to determine students' level of comprehension. Students will be given choices when appropriate to choose their end product for a lesson	Formative assessments will be used to determine students' level of comprehension. Assessments will be restructured prior to testing to accommodate students' needs. Students will be offered tutoring with the teacher or use a weekly school tutoring program. Students will be given choices when appropriate to choose their end product for a lesson. Teacher will develop an 8-minute model to help the student prior to referring the student to I&RST. Allow additional time on assessments.	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following: • Extended time • Provide visual aids • Repeated directions • Differentiate based on proficiency • Provide word banks • Allow for translators, dictionaries

Unit Title: Chapter #3: Scientific Measurement

Stage 1: Desired Results

Standards & Indicators:

HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are

conserved during a chemical reaction.

Science and Engineering Practices(SEP)

- **Developing and Using Models-** Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. Use a model to predict the relationships between systems or between components of a system. (HS-PS1-1)
- **Using Mathematics and Computational Thinking** Mathematical and computational thinking at the 9–12 builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. Use mathematical representations of phenomena to support claims. (HS-PS1-7)

Disciplinary Core Ideas (DCI)

- Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)
- The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. (HS-PS1-7)

Crosscutting Concepts (CCC)

- **Patterns -** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.(HS-PS1-1)
- **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** Science assumes the universe is a vast single system in which basic laws are consistent. (HS-PS1-7)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).	With a growth mindset, failure is an important part of success.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.

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9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform decision-making.
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).	In order for members of our society to participate productively, information needs to be shared accurately and ethically.
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).	Accurate information may help in making valuable and ethical choices.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate

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		the views of groups of people.

Central Idea/Enduring Understanding:

- In many aspects of chemistry, it is vital to know the amount of material with which one is dealing with
- Measurements must always be reported to the correct number of significant figures. Calculated answers often depend on the number of significant figures in the values used in the calculations. Significant figures in a measurement include all the digits that are know plus a last digit that is estimated

Essential/Guiding Question:

- Why is it important to know accurate and precise measurements?
- How do scientists express the degree of uncertainty in their measurement?

Content:

- Scientific notation's function and how to use it
- Accuracy versus Precision (visual added)
- Calculating Error and Percentage Error in a mathematical problem
- Identifying Significant Figures
- Understanding Units of measurement and its application
- Dimensional Analysis and it application

Skills (Objectives):

- Learn to write large/small numbers in scientific notation
- Define and evaluate accuracy and precision
- Understand why measurements must be reported to the correct number of significant figures
- Understand why society uses metric system
- Learn various units of the metric system such as distance, length, volume, density, temperature
- Understand how to use dimensional analysis

Interdisciplinary Connections:

RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
MP.4: Model with mathematics.
HSN-Q.A.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
HSN-Q.A.2: Define appropriate quantities for the purpose of descriptive modeling.

HSN-Q.A.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
SL.11-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Stage 2: Assessment Evidence

Performance Task(s):

-Accuracy and Precision, pg. 67 (*Pearson Chemistry Foundation Edition,* Textbook)
-Explore: Class Activity, pg. 70 (*Pearson Chemistry Foundation Edition,* Textbook)
-Online Origami Lab (Origami Sunshades Lab)
-Measure Like An Egyptian Lab
-Using Measuring Tools Lab(*teacher generated lab)*
-Cube Density Lab

Other Evidence:

- Do Now Exercises
- Quizzes
- Test
- Labs Practicum

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Resources:

Conceptual Chemistry

• Team building activities • Cooperative Learning Activities • Online learning websites/web quest/ tutorial programs • Internet research • Student driven activities	• *PowerPoint Notes* • *Pearson Chemistry Foundation Edition (Copyright 2012),* ***Textbook*** *by Anthony Wilbraham, Dennis D. Stanley, Michael S. Matta and Edward L. Waterman.* • *Pearson Chemistry: Classroom Resources Person Chemistry: Exam View Test Bank* • *Person Chemistry: Untamed Science* ***Video Series****: Chem Adventures* • *Conceptual Chemistry: Instructor Resource* • *Pearson Chemistry, Reading and Study* ***Workbook****:* ***Teacher's Guide****, Upper Saddle River, NJ. Copyright 2012.* • *PearsonChem.com-****Online tutorial and learning program*** LGBT and Disabilities Resources: • LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth • LGBTQ+ Books DEI Resources: • Learning for Justice • GLSEN Educator Resources • Supporting LGBTQIA Youth Resource List • Respect Ability: Fighting Stigmas, Advancing Opportunities • NJDOE Diversity, Equity & Inclusion Educational Resources • Diversity Calendar

Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Students will be given advanced level reading material. Formative assessments will be used to determine students' level of comprehension. Students may be given an additional assignment when their work is completed. Students will be given choices when appropriate to choose their end product for a lesson. Students grouped into small groups, which are designed around their strengths and weaknesses so that	Lessons will be designed based on student learning styles. Formative assessments will be used to determine students' level of comprehension. Students will be given choices when appropriate to choose their end product for a lesson	Formative assessments will be used to determine students' level of comprehension. Assessments will be restructured prior to testing to accommodate students' needs. Students will be offered tutoring with the teacher or use a weekly school tutoring program. Students will be given choices when appropriate to choose their end product for a lesson.	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following: • Extended time • Provide visual aids • Repeated directions • Differentiate based on proficiency • Provide word banks • Allow for translators,

students can assist and challenge each other.		Teacher will develop an 8-minute model to help the student prior to referring the student to I&RST. Allow additional time on assessments.	dictionaries

Unit Title: Chapter #4: Atomic Structure

Stage 1: Desired Results

Standards & Indicators:

HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS-PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties

HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

HS-PS1-5 Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs

Science and Engineering Practices(SEP)

- **Developing and Using Models-** Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. Use a model to predict the relationships between systems or between components of a system. (HS-PS1-1)
- **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 9–12 builds on K–8 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2)

Disciplinary Core Ideas (DCI)

- Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)(HS-PS1-2)
- The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (HSPS1-3)
- The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. (HS-PS1-2)

Crosscutting Concepts (CCC)

- **Patterns -** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.(HS-PS1-1),(HS PS1-2)

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Career Readiness, Life Literacies and Key Skills		
Standard	**Performance Expectations**	**Core Ideas**
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).	With a growth mindset, failure is an important part of success.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform decision-making.
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).	In order for members of our society to participate productively, information needs to be shared accurately and ethically.

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9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).	Accurate information may help in making valuable and ethical choices.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.).	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.

Central Idea/Enduring Understanding:

- Many early scholars, scientists and philosophers made vast contributions toward the discovery of the atom. Amongst those early contributors were: Democritus, Aristotle, John Dalton, J.J. Thomson, Robert Millikan, James Chadwick, Eugen Goldstein, Ernest Rutherford and Niels Bohr.
- The main components that make up the atom are the nucleus, protons, neutrons, and electrons
- Elements are different from one another because they contain different numbers of protons
- Protons and electrons are the subatomic particles responsible for chemical behavior of an atom

Essential/Guiding Question:

- What scientists and philosophers contributed toward the discovery, behaviors and components of the atom?
- What components make up an atom?
- How are atoms of one element different from atoms of another element
- Are subatomic particles responsible for the chemical behavior of an atom?

Content:

- Scientists and philosophers who made great efforts to determine the composition, behavior and model of an atom.
- Components of an atom and properties
- Atomic Number versus the Atomic Mass Number
- Definition of an Isotope, its structure, and samples of different isotopes
- Determine how to calculate the number of neutrons in an atom
- How to calculate atomic mass units

Skills (Objectives):

- Understand how famous scientists such as Democritus and John Dalton contributed toward the discovery and improvement of the atom
- Identify instruments used to observe individual atoms
- Identify the three subatomic particles of the atom, their mass, charge, and location
- Distinguish the difference between the atomic number and atomic mass number
- Calculate the atomic mass of an element
- Illustrate and understand the structure for different isotopes and how to calculate the number of neutrons

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	• Distinguish the difference between ionic and covalent bonding • Define energy level and understand how to determine energy level for different elements

Interdisciplinary Connections:
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
MP.4: Model with mathematics.
SL.11-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Stage 2: Assessment Evidence

Performance Task(s):
-Cereal Box Scientist Lab
-Energy Level Diagram Lab (*teacher generated lab)*
-Enlarged Post-it Famous Scientists Lab (*teacher generated lab-Team Activity*)

Other Evidence:
- Do Now Exercises
- Quizzes
- Test
- Labs Practicum

Stage 3: Learning Plan

Learning Opportunities/Strategies:
- Team building activities
- Cooperative Learning Activities
- Online learning websites/web quest/ tutorial programs
- Internet research
- Student driven activities

Resources:
- *PowerPoint Notes*
- *Pearson Chemistry Foundation Edition (Copyright 2012),* **Textbook** *by Anthony Wilbraham, Dennis D. Stanley, Michael S. Matta and Edward L. Waterman.*
- *Pearson Chemistry: Classroom Resources Person Chemistry: Exam View Test Bank*
- *Person Chemistry: Untamed Science* ***Video Series****: Chem Adventures*
- *Conceptual Chemistry: Instructor Resource*
- *Pearson Chemistry, Reading and Study* ***Workbook****:* ***Teacher's Guide****, Upper Saddle River, NJ. Copyright 2012.*
- *PearsonChem.com-****Online tutorial and learning program***

LGBT and Disabilities Resources:
- LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth
- LGBTQ+ Books

DEI Resources:
- Learning for Justice
- GLSEN Educator Resources
- Supporting LGBTQIA Youth Resource List
- Respect Ability: Fighting Stigmas, Advancing Opportunities
- NJDOE Diversity, Equity & Inclusion Educational Resources
- Diversity Calendar

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Differentiation
*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Students will be given advanced level reading material. Formative assessments will be used to determine students' level of comprehension. Students may be given an additional assignment when their work is completed. Students will be given choices when appropriate to choose their end product for a lesson. Students grouped into small groups, which are designed around their strengths and weaknesses so that students can assist and challenge each other.	Lessons will be designed based on student learning styles. Formative assessments will be used to determine students' level of comprehension. Students will be given choices when appropriate to choose their end product for a lesson	Formative assessments will be used to determine students' level of comprehension. Assessments will be restructured prior to testing to accommodate students' needs. Students will be offered tutoring with the teacher or use a weekly school tutoring program. Students will be given choices when appropriate to choose their end product for a lesson. Teacher will develop an 8-minute model to help the student prior to referring the student to I&RST. Allow additional time on assessments.	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following: ● Extended time ● Provide visual aids ● Repeated directions ● Differentiate based on proficiency ● Provide word banks ● Allow for translators, dictionaries

Unit Title: Chapter #5: Electrons in Atoms

Stage 1: Desired Results

Standards & Indicators:
HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS-PS2-5 : Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current

HS-PS4-1 : Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

HS-PS4-5: Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

Science and Engineering Practices(SEP)
- **Developing and Using Models-** Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their

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components in the natural and designed worlds. Use a model to predict the relationships between systems or between components of a system. (HS-PS1-1)

- **Planning and Carrying Out Investigations-**Planning and carrying out investigations to answer questions or test solutions to problems in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical and empirical models. Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design:decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time),and refine the design accordingly. (HS-PS2-5)
- **Using Mathematics and Computational Thinking-** Mathematical and computational thinking at the 9-12 level builds on K-8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. Use mathematical representations of phenomena or design solutions to describe and/or support claims and/or explanations (HS-PS4-1)

Disciplinary Core Ideas (DCI)

- Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)
- Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields. (HS-PS2-5)
- The wavelength and frequency of a wave are related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is passing. (HS-PS4-1)

Crosscutting Concepts (CCC)

- **Patterns -** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.(HS-PS1-1)
- **Cause and Effect -** Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS- PS2-5)(HS- PS4-1)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).	With a growth mindset, failure is an important part of success.
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.

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9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform decision-making.
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).	In order for members of our society to participate productively, information needs to be shared accurately and ethically.
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).	Accurate information may help in making valuable and ethical choices.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.).	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.

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Central Idea/Enduring Understanding:	**Essential/Guiding Question:**
• The quantum mechanical model describes the allowed energies an electron can have. It also describes how likely it is to find the electron in various locations around an atom's nucleus • For a particular atom, the amount of energy an electron gains or loses is not always the same. An electron needs less energy to move to the next higher energy level when it is already in a high energy level • Electrons move to higher energy levels when atoms absorb energy. These electrons lose energy by emitting light when they return to lower energy • The light emitted by an electron moving from a higher to a lower energy level has a frequency that depends on the electron's energy change	• How does the quantum mechanical model describe the electron arrangement in atoms? • What happens when electrons in atoms absorb or release energy? • What causes atomic emission spectra? • How does the frequency of light relate to changes in electron energies?
Content: • Define energy level and provide valence electron examples for elements • Limitation of Rutherford's Atomic Model • Definition of quantum relative to the energy of the energy level • Define the Quantum Mechanical Model and Erwin Schrodinger's explanation of the Electron Cloud theory • Types of atomic orbitals and how each are used with the Principal Energy Level • Three rules for writing the electron configurations of elements • Light and the Atomic Emission Spectra • Model of the Electromagnetic wave spectrum and its' parts	**Skills (Objectives):** • Describe what Bohr proposed in his model of an atom • Describe what the quantum mechanical model determines about the electrons in an atom • Explain how sublevels of principal energy levels differ • List the three rules for writing the electron configurations of elements • Explain what causes emission spectra • Explain how the frequencies of light are related to changes in electron energies • Understand how to read the electromagnetic wave spectrum • Understand how a rainbow prism is produced

Interdisciplinary Connections:
MP.4: Model with mathematics.
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
SL.11-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Stage 2: Assessment Evidence

Performance Task(s):	**Other Evidence:**
-Flame Lab, pg. 134 (*Pearson Chemistry Foundation Edition,* Textbook) -Explore: Teacher Demo pg. 119 (*Pearson Chemistry Foundation Edition,* Textbook)	• Do Now Exercises • Quizzes • Test • Labs Practicum

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-Explore: Teacher Demo, pg. 122 (*Pearson Chemistry Foundation Edition,* Textbook) -Atomic Orbital 3-D Lab Kit -Energy Level Marble Lab Practicum (teacher generated lab) -Van de Graff Generator and Spectroscope Demonstration (*Guest Speaker)*	

Stage 3: Learning Plan

Learning Opportunities/Strategies: ● Team building activities ● Cooperative Learning Activities ● Online learning websites/web quest/ tutorial programs ● Internet research ● Student driven activities	**Resources:** ● *PowerPoint Notes* ● *Pearson Chemistry Foundation Edition (Copyright 2012),* **Textbook** *by Anthony Wilbraham, Dennis D. Stanley, Michael S. Matta and Edward L. Waterman.* ● *Pearson Chemistry: Classroom Resources Person Chemistry: Exam View Test Bank* ● *Person Chemistry: Untamed Science* ***Video Series****: Chem Adventures* ● *Conceptual Chemistry: Instructor Resource* ● *Pearson Chemistry, Reading and Study* ***Workbook****:* ***Teacher's Guide****, Upper Saddle River, NJ. Copyright 2012.* ● *PearsonChem.com-****Online tutorial and learning program*** LGBT and Disabilities Resources: ● LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth ● LGBTQ+ Books DEI Resources: ● Learning for Justice ● GLSEN Educator Resources ● Supporting LGBTQIA Youth Resource List ● Respect Ability: Fighting Stigmas, Advancing Opportunities ● NJDOE Diversity, Equity & Inclusion Educational Resources ● Diversity Calendar

Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Students will be given advanced level reading material. Formative assessments will be used to determine students' level of comprehension. Students may be given an additional assignment	Lessons will be designed based on student learning styles. Formative assessments will be used to determine students' level of comprehension.	Formative assessments will be used to determine students' level of comprehension. Assessments will be restructured prior to testing to accommodate	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual,

when their work is completed. Students will be given choices when appropriate to choose their end product for a lesson. Students grouped into small groups, which are designed around their strengths and weaknesses so that students can assist and challenge each other.	Students will be given choices when appropriate to choose their end product for a lesson	students' needs. Students will be offered tutoring with the teacher or use a weekly school tutoring program. Students will be given choices when appropriate to choose their end product for a lesson. Teacher will develop an 8-minute model to help the student prior to referring the student to I&RST. Allow additional time on assessments.	kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following: ● Extended time ● Provide visual aids ● Repeated directions ● Differentiate based on proficiency ● Provide word banks ● Allow for translators, dictionaries

Unit Title: Chapter #6: The Periodic Table

Stage 1: Desired Results

Standards & Indicators:

HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

Science and Engineering Practices(SEP)

- **Developing and Using Models-** Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. Use a model to predict the relationships between systems or between components of a system. (HS-PS1-1)

Disciplinary Core Ideas (DCI)

- Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)

Crosscutting Concepts (CCC)

- **Patterns -** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.(HS-PS1-1)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).	With a growth mindset, failure is an important part of success.
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).	Innovative ideas or innovation can lead to career opportunities.

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9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform decision-making.
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).	In order for members of our society to participate productively, information needs to be shared accurately and ethically.
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).	Accurate information may help in making valuable and ethical choices.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.

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9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.

Central Idea/Enduring Understanding:

- The periodic table arranges elements in order of atomic number and classification of properties of the elements.
- The arrangement of elements according to atomic number and its properties provides easier readability, understanding and discovery of new unknown elements.
- An ion is an atom or group of atoms that has a positive or negative charge.
- An ion with a positive charge is called a cation and an ion with a negative charge is called an anion

Essential/Guiding Question:

- What information does the periodic table provide?
- How can periodic trends be explained?
- What is an ion?
- What is the difference between a cation and an anion?

Content:

- Scientists who made great strives toward the discovery of elements and organization of elements on the periodic table
- The importance of Mendeleev's work with the periodic table
- Identifying the parts of the periodic table, its properties, and location on the periodic table
- Reading the Periodic Table
- Electron configuration in groups on the periodic table
- Ions and the formation of cations and anions

Skills (Objectives):

- Explain how chemists began to organize the known elements
- Describe how Mendeleev organized the periodic table
- Describe how the modern periodic table is organized
- Learn parts and properties for parts of the periodic table and label each
- Identify three broad classes of elements
- Classify elements on the periodic table based on electron configuration
- Distinguish the difference between cation and anion

Interdisciplinary Connections:

SL.11-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest

Stage 2: Assessment Evidence

Performance Task(s):

-Adopt An Element Poster Lab
-Construct the Periodic Table and Color-Code(*teacher generated lab)*
-Explore: Teacher Demo, pg. 149 (*Pearson Chemistry Foundation Edition,* Textbook)

Other Evidence:

- Do Now Exercises
- Quizzes
- Test
- Labs Practicum

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Stage 3: Learning Plan

Learning Opportunities/Strategies:

- Team building activities
- Cooperative Learning Activities
- Online learning websites/web quest/ tutorial programs
- Internet research
- Student driven activities

Resources:

- *PowerPoint Notes*
- *Pearson Chemistry Foundation Edition (Copyright 2012),* **Textbook** *by Anthony Wilbraham, Dennis D. Stanley, Michael S. Matta and Edward L. Waterman.*
- *Pearson Chemistry: Classroom Resources Person Chemistry: Exam View Test Bank*
- *Person Chemistry: Untamed Science* ***Video Series****: Chem Adventures*
- *Conceptual Chemistry: Instructor Resource*
- *Pearson Chemistry, Reading and Study* ***Workbook****:* ***Teacher's Guide****, Upper Saddle River, NJ. Copyright 2012.*
- *PearsonChem.com-****Online tutorial and learning program***

LGBT and Disabilities Resources:

- LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth
- LGBTQ+ Books

DEI Resources:

- Learning for Justice
- GLSEN Educator Resources
- Supporting LGBTQIA Youth Resource List
- Respect Ability: Fighting Stigmas, Advancing Opportunities
- NJDOE Diversity, Equity & Inclusion Educational Resources
- Diversity Calendar

Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Students will be given advanced level reading material. Formative assessments will be used to determine students' level of comprehension. Students may be given an additional assignment when their work is completed. Students will be given choices when appropriate to choose their end product for a lesson.	Lessons will be designed based on student learning styles. Formative assessments will be used to determine students' level of comprehension. Students will be given choices when appropriate to choose their end product for a lesson	Formative assessments will be used to determine students' level of comprehension. Assessments will be restructured prior to testing to accommodate students' needs. Students will be offered tutoring with the teacher or use a weekly school tutoring program. Students will be given	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following: • Extended time • Provide visual aids • Repeated directions

Students grouped into small groups, which are designed around their strengths and weaknesses so that students can assist and challenge each other.		choices when appropriate to choose their end product for a lesson. Teacher will develop an 8-minute model to help the student prior to referring the student to I&RST. Allow additional time on assessments.	• Differentiate based on proficiency • Provide word banks • Allow for translators, dictionaries

Unit Title: Chapter #7: Ionic and Metallic Bonding

Stage 1: Desired Results

Standards & Indicators:

HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS-PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties

HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

HS-PS1-4: Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

HS-PS2-6: Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

Science and Engineering Practices(SEP)

- **Developing and Using Models-** Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. Use a model to predict the relationships between systems or between components of a system. (HS-PS1-1)
- **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 9–12 builds on K–8 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2)
- **Using Mathematics and Computational Thinking** Mathematical and computational thinking at the 9–12 builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based

on mathematical models of basic assumptions. Use mathematical representations of phenomena to support claims. (HS-PS1-7)

- **Planning and Carrying Out Investigations** -Planning and carrying out investigations in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS PS1-3)
- **Obtaining, Evaluating, and Communicating Information-** Obtaining, evaluating, and communicating information in 9–12 builds on K–8 and progresses to evaluating the validity and reliability of the claims, methods, and designs. Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-PS2-6)

Disciplinary Core Ideas (DCI)

- Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)(HS-PS1-2)
- The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (HS PS1-3)
- The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. (HS-PS1-2), (HS-PS1-7)
- Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. (HS-PS2-6)

Crosscutting Concepts (CCC)

- **Patterns -** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.(HS-PS1-1),(HS PS1-2)(HS-PS 1-3)
- **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** Science assumes the universe is a vast single system in which basic laws are consistent. (HS-PS1-7)
- **Structure and Function** Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-PS2-6)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).	With a growth mindset, failure is an important part of success.
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving

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		process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform decision-making.
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).	In order for members of our society to participate productively, information needs to be shared accurately and ethically.
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).	Accurate information may help in making valuable and ethical choices.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.).	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.

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9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.

Central Idea/Enduring Understanding:

- Charged particles exert forces on one another called electrostatic forces. The electrostatic forces that hold ion together in ionic compounds are called ionic bonds
- Metals are ductile. This means that metals can be drawn into wires. The free-floating valence gives metals their ductility and malleability.
- A set of eight is octet. Atoms tend to form compounds in a way that allows them to have eight electrons in their highest occupied energy level.
- For a representative element, the number of valence electrons is the same as its group number
- A chemical formula shows the number of atoms of each element in the smallest representative unit of a substance
- Ionic compounds involve transfer, gaining and losing electrons. Covalent compounds involve the sharing of electrons

Essential/Guiding Question:

- How do ionic compounds form?
- How does metallic bonding affect the properties of metals?
- What is the Octet Rule?
- How do you find the number of valence electrons in a representative element?
- What is a chemical formula?
- What is the difference between an ionic and covalent compound?

Content:

- Define valence Electrons and how to determine the its' number in the highest energy level of an element's atom
- Octet Rule
- Formation of cations and anions
- Forming Ionic Compounds
- Bonding in Metals and its Properties

Skills (Objectives):

- Distinguish the difference between ionic and covalent bonding
- Define energy level and understand how to determine valence electrons in an atom of a representative element
- Identify the atoms of elements that tend of lose and tend to gain electrons
- Understand how to use the electron dot method to determine valence electrons for an element
- Describe how cations and anions form
- Explain the electrical charge of an ionic compound
- Describe properties of ionic compounds
- Model the valence electrons of metal atoms
- Describe the arrangement of atoms in a metal
- Explain the importance of alloys

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Interdisciplinary Connections:
SL.11-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest

HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays

Stage 2: Assessment Evidence

Performance Task(s):
-Molecular Compound Lab
-Conducting Electricity: Teacher Demo (Generating Electricity with Ionic and Covalent compounds)
-Explore: Teacher Demo, pg. 181 (*Pearson Chemistry Foundation Edition,* Textbook)
Explore: Class Activity, pg. 190 (*Pearson Chemistry Foundation Edition,* Textbook)
Explore: Quick Lab, pg. 192 (*Pearson Chemistry Foundation Edition,* Textbook)

Other Evidence:
- Do Now Exercises
- Quizzes
- Test
- Labs Practicum

Stage 3: Learning Plan

Learning Opportunities/Strategies:
- Team building activities
- Cooperative Learning Activities
- Online learning websites/web quest/ tutorial programs
- Internet research
- Student driven activities

Resources:
- *PowerPoint Notes*
- *Pearson Chemistry Foundation Edition (Copyright 2012),* ***Textbook*** *by Anthony Wilbraham, Dennis D. Stanley, Michael S. Matta and Edward L. Waterman.*
- *Pearson Chemistry: Classroom Resources Person Chemistry: Exam View Test Bank*
- *Person Chemistry: Untamed Science* ***Video Series****: Chem Adventures*
- *Conceptual Chemistry: Instructor Resource*
- *Pearson Chemistry, Reading and Study* ***Workbook****:* ***Teacher's Guide****, Upper Saddle River, NJ. Copyright 2012.*
- *PearsonChem.com-****Online tutorial and learning program***

LGBT and Disabilities Resources:
- LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth
- LGBTQ+ Books

DEI Resources:
- Learning for Justice
- GLSEN Educator Resources
- Supporting LGBTQIA Youth Resource List
- Respect Ability: Fighting Stigmas, Advancing Opportunities
- NJDOE Diversity, Equity & Inclusion Educational Resources
- Diversity Calendar

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Differentiation
*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Students will be given advanced level reading material. Formative assessments will be used to determine students' level of comprehension. Students may be given an additional assignment when their work is completed. Students will be given choices when appropriate to choose their end product for a lesson. Students grouped into small groups, which are designed around their strengths and weaknesses so that students can assist and challenge each other.	Lessons will be designed based on student learning styles. Formative assessments will be used to determine students' level of comprehension. Students will be given choices when appropriate to choose their end product for a lesson	Formative assessments will be used to determine students' level of comprehension. Assessments will be restructured prior to testing to accommodate students' needs. Students will be offered tutoring with the teacher or use a weekly school tutoring program. Students will be given choices when appropriate to choose their end product for a lesson. Teacher will develop an 8-minute model to help the student prior to referring the student to I&RST. Allow additional time on assessments.	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following: Extended time Provide visual aids Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries

Unit Title: Chapter #8: Covalent Bonding

Stage 1: Desired Results

Standards & Indicators:
HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS-PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties

HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

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HS-PS1-4: Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

HS-PS2-6: Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

Science and Engineering Practices(SEP)

- **Developing and Using Models-** Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. Use a model to predict the relationships between systems or between components of a system. (HS-PS1-1)
- **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 9–12 builds on K–8 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2)
- **Using Mathematics and Computational Thinking** Mathematical and computational thinking at the 9–12 builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. Use mathematical representations of phenomena to support claims. (HS-PS1-7)
- **Planning and Carrying Out Investigations** -Planning and carrying out investigations in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS PS1-3)
- **Obtaining, Evaluating, and Communicating Information-** Obtaining, evaluating, and communicating information in 9–12 builds on K–8 and progresses to evaluating the validity and reliability of the claims, methods, and designs. Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-PS2-6)

Disciplinary Core Ideas (DCI)

- Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)(HS-PS1-2)
- The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (HS PS1-3)
- The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. (HS-PS1-2), (HS-PS1-7)
- Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. (HS-PS2-6)

Crosscutting Concepts (CCC)

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- **Patterns -** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.(HS-PS1-1),(HS PS1-2)(HS-PS 1-3)
- **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** Science assumes the universe is a vast single system in which basic laws are consistent. (HS-PS1-7)
- **Structure and Function** Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-PS2-6)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).	With a growth mindset, failure is an important part of success.
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources

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	Studies Practice: Gathering and Evaluating Sources.	to answer questions, solve problems, and inform decision-making.
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).	In order for members of our society to participate productively, information needs to be shared accurately and ethically.
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).	Accurate information may help in making valuable and ethical choices.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.).	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.

Central Idea/Enduring Understanding:	**Essential/Guiding Question:**
• Ionic compounds are generally crystalline solids. Covalent or molecular compounds • do not transfer electrons, but share electrons when bonding • The VSEPR theory states that the repulsion between electron pairs causes molecular shapes to adjust so the valence electron pairs stay as far apart as possible • A molecular formula is the chemical formula which identifies the number and kind of atoms in each molecule of the compound. The structural formula is a diagram or model which identifies the number and kind of atoms in each molecule of the compound.	• How is bonding in the molecular compound different from the bonding of ionic compounds • How do electrons affect the shape of a molecule? • What is the difference between a molecular and structural formula
Content:	**Skills (Objectives):**
• Molecules and Molecular compounds • Drawing and building structural compounds • Covalent Bonding and the Octet rule and its exceptions to the rule • Atomic versus Molecular orbitals • Identifying molecular shapes of atoms	• Identify the information a molecular formula provides • Model molecular and structural formulas of compounds • Understand the electron dot method versus the bond (dash) method of modeling a molecular formula • Explain the result of electron sharing in covalent bonds • Explain the different types of covalent bonds • Identify some exceptions to the octet rule

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	• Describe the relationship between the atomic and molecular orbitals

Interdisciplinary Connections:

SL.11-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest

HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays

Stage 2: Assessment Evidence

Performance Task(s):

-Explore: Quick Lab: Strengths of Covalent Bonds, pg. 219 (*Pearson Chemistry Foundation Edition,* Textbook)

-Explore: Teacher Demo, pg. 216 (*Pearson Chemistry Foundation Edition,* Textbook)

-Explore: Teacher Demo, pg. 218 (*Pearson Chemistry Foundation Edition,* Textbook)

-Molecular Model Lab Kit: Construction of Molecular Compounds Molecular and Structural Formula (*teacher generated lab using Flinn Scientific Kits*)

Other Evidence:

- Do Now Exercises
- Quizzes
- Test
- Labs Practicum

Stage 3: Learning Plan

Learning Opportunities/Strategies:

- Team building activities
- Cooperative Learning Activities
- Online learning websites/web quest/ tutorial programs
- Internet research
- Student driven activities

Resources:

- *PowerPoint Notes*
- *Pearson Chemistry Foundation Edition (Copyright 2012),* ***Textbook*** *by Anthony Wilbraham, Dennis D. Stanley, Michael S. Matta and Edward L. Waterman.*
- *Pearson Chemistry: Classroom Resources Person Chemistry: Exam View Test Bank*
- *Person Chemistry: Untamed Science* ***Video Series****: Chem Adventures*
- *Conceptual Chemistry: Instructor Resource*
- *Pearson Chemistry, Reading and Study* ***Workbook****:* ***Teacher's Guide****, Upper Saddle River, NJ. Copyright 2012.*
- *PearsonChem.com-****Online tutorial and learning program***

LGBT and Disabilities Resources:

- LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth
- LGBTQ+ Books

DEI Resources:

- Learning for Justice
- GLSEN Educator Resources
- Supporting LGBTQIA Youth Resource List
- Respect Ability: Fighting Stigmas, Advancing Opportunities
- NJDOE Diversity, Equity & Inclusion Educational Resources
- Diversity Calendar

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Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Students will be given advanced level reading material. Formative assessments will be used to determine students' level of comprehension. Students may be given an additional assignment when their work is completed. Students will be given choices when appropriate to choose their end product for a lesson. Students grouped into small groups, which are designed around their strengths and weaknesses so that students can assist and challenge each other.	Lessons will be designed based on student learning styles. Formative assessments will be used to determine students' level of comprehension. Students will be given choices when appropriate to choose their end product for a lesson	Formative assessments will be used to determine students' level of comprehension. Assessments will be restructured prior to testing to accommodate students' needs. Students will be offered tutoring with the teacher or use a weekly school tutoring program. Students will be given choices when appropriate to choose their end product for a lesson. choices when appropriate to choose their end product for a lesson. Teacher will develop an 8-minute model to help the student prior to referring the student to I&RST. Allow additional time on assessments.	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following: ● Extended time ● Provide visual aids ● Repeated directions ● Differentiate based on proficiency ● Provide word banks ● Allow for translators, dictionaries

Unit Title: Chapter #9: Chemical Names and Formula

Stage 1: Desired Results

Standards & Indicators:

HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS-PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties

HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

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HS-PS1-4: Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

HS-PS2-6: Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

Science and Engineering Practices(SEP)

- **Developing and Using Models-** Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. Use a model to predict the relationships between systems or between components of a system. (HS-PS1-1)
- **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 9–12 builds on K–8 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2)
- **Using Mathematics and Computational Thinking** Mathematical and computational thinking at the 9–12 builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. Use mathematical representations of phenomena to support claims. (HS-PS1-7)
- **Planning and Carrying Out Investigations** -Planning and carrying out investigations in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS PS1-3)
- **Obtaining, Evaluating, and Communicating Information-** Obtaining, evaluating, and communicating information in 9–12 builds on K–8 and progresses to evaluating the validity and reliability of the claims, methods, and designs. Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-PS2-6)

Disciplinary Core Ideas (DCI)

- Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)(HS-PS1-2)
- The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (HS PS1-3)
- The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. (HS-PS1-2), (HS-PS1-7)
- Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. (HS-PS2-6)

Crosscutting Concepts (CCC)

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- **Patterns -** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.(HS-PS1-1),(HS PS1-2)(HS-PS 1-3)
- **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** Science assumes the universe is a vast single system in which basic laws are consistent. (HS-PS1-7)
- **Structure and Function** Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-PS2-6)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).	With a growth mindset, failure is an important part of success.
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources

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	Studies Practice: Gathering and Evaluating Sources.	to answer questions, solve problems, and inform decision-making.
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).	In order for members of our society to participate productively, information needs to be shared accurately and ethically.
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).	Accurate information may help in making valuable and ethical choices.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.).	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.

Central Idea/Enduring Understanding:	**Essential/Guiding Question:**
• Groups on the periodic table help to determine the valence electrons for elements • Monatomic ion consists of a single atom with a positive or negative charge. A polyatomic ion is a group of covalently bonded atoms that acts like a single atom when combining with other atoms • You use the oxidation numbers of atoms on the chart to predict how atoms will combine and what the formula for the resulting compound will be • Binary compound is composed of two elements, whereas polyatomic is a group of covalently bonded atoms which acts like a single atom.	• How does the periodic table help you determine the names and formulas of ions and compounds? • What is the difference between monatomic and polyatomic ion • How do you use the oxidation chart? • What is the difference between a binary compound and a polyatomic ion
Content: • Monatomic versus Polyatomic Ions • How to use the Oxidation Chart • Naming and writing formulas for ionic compounds	**Skills (Objectives):** • Explain how to determine the charges of monatomic ions • Explain how polyatomic ions differ from and are similar to monatomic ions

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• Binary compounds and its rules for naming and writing formulas • Naming and writing formulas for polyatomic ions • Naming and writing formulas for acids and bases	• Learn how to read an oxidation chart • Apply the rules for naming and writing formulas for both a binary ionic compound • Apply the rules for naming and writing formulas for compounds with polyatomic ions • Apply the rules for naming and writing formulas for binary molecular compounds • Determine the name and formula of an acid • Determine the name and formula of a base

Interdisciplinary Connections:
RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
SL.11-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays
MP.4: Model with mathematics.

Stage 2: Assessment Evidence

Performance Task(s):
-Alka Seltzer Film Cannister Lab
-Chemical Reaction Lab (Snow lab/Packing Foam Lab) (*teacher generated lab*)
-Flame Lab (Flinn Scientific Kit)
-Explore: Teacher Demo, pg. 240 (*Pearson Chemistry Foundation Edition,* Textbook)
Explore: Class Activity, pg. 242 (*Pearson Chemistry Foundation Edition,* Textbook)
Explore: Teacher Demo, pg. 245 (*Pearson Chemistry Foundation Edition,* Textbook)
Explore: Quick Lab, pg. 254 (*Pearson Chemistry Foundation Edition,* Textbook)

Other Evidence:
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Stage 3: Learning Plan

Learning Opportunities/Strategies:
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- *Pearson Chemistry, Reading and Study* ***Workbook****:* ***Teacher's Guide****, Upper Saddle River, NJ. Copyright 2012.*
- *PearsonChem.com-****Online tutorial and learning program***

LGBT and Disabilities Resources:
- LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth

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	• LGBTQ+ Books DEI Resources: • Learning for Justice • GLSEN Educator Resources • Supporting LGBTQIA Youth Resource List • Respect Ability: Fighting Stigmas, Advancing Opportunities • NJDOE Diversity, Equity & Inclusion Educational Resources • Diversity Calendar

Differentiation

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High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
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Pacing Guide

Course Name	Resource	Content Standards
UNIT 1 : **Introduction to Chemistry** **10 days** **Matter and Change** **10 Days**	**CHAPTER#1-2:** Online Assessment: Chapter #1: Intro to Chemistry Online Test Chapter#2: Matter and Change Online Test	**HS-PS1-2** **HS-PS1-3** **HS-PS1-7**
20 days		
UNIT 2: **Scientific Measurement** **10 days** **Atomic Structure** **15 days**	**CHAPTER#3-4** Online Assessment: Chapter #3: Scientific Measurement Online test Chapter #4: Atomic Structure	**HS-PS1-1** **HS-PS1-2** **HS-PS1-3** **HS-PS1-5** **HS-PS1-7**
25 days		
UNIT 3: **Electrons in Atoms** **15 days** **The Periodic Table** **10 days**	**CHAPTER#5-6:** Online Assessment: Chapter #5: Electrons in Atoms Chapter #6: The Periodic Table	**HS-PS1-1** **HS-PS1-2** **HS-PS1-3** **HS-PS4-1** **HS-PS4-3** **HS-PS4-5**
25 days		
UNIT 4: **Ionic and Metallic Bonding** **7 days** **Covalent Bonding** **6 days** **Chemical Names and Formula** **7 days**	**CHAPTER 7-9:** Online Assessment: Chapter #7: Ionic and Metallic Bonding Chapter #8: Covalent Bonding Chapter #9: Chemical Names and Formula	**HS-PS1-1** **HS-PS1-2** **HS-PS1-3** **HS-PS1-4** **HS-PS1-7** **HS-PS2-6**
20 days		