

Kenilworth Public Schools

Curriculum Guide

Content Area: Honors Chemistry
Grade: 11-12
BOE Approved: 5/11/15

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Submitted by: Michael Adamcik
BOE Revision Approved: 3/8/21

Honors Chemistry - 10th Grade Scope and Sequence

Unit 1 - Safety, Lab Procedures, and Data Analysis	Unit 2 - Classification	Unit 3 - Atomic Structure	Unit 4 - The Periodic Table	Unit 5 - Chemical Bonding	Unit 6 - Writing and Balancing Chemical Equations
Weeks 1-3	Weeks 4-6	Weeks 7-9	Weeks 10-12	Weeks 13-16	Weeks 17-20
<p><i>Unit Description:</i> Measurements and observations tools are essential activities in science. It allows for the understanding of concept quantitatively as well as for analyzing data collected during experiments. In this unit, conceptual, mathematical, physical, and computational tools will be utilized. Introductory labs will focus on selecting the appropriate lab equipment and its proper use. Dimensional analysis will be introduced as a way of converting units</p>	<p><i>Unit Description:</i> Everything is made up of matter. Matter has 2 defining qualities: it takes up space and has inertia. All matter is held together by forces. Energy flows between every particles of matter. Matter can be classified based on its properties. In this unit, the different types of matter will be compared. The physical and chemical changes by which matter can undergo will be observed. The basic form of a chemical equation will be introduced.</p>	<p><i>Unit Description:</i> Atoms are the building blocks of matter. By understanding the structure of an atom, one can begin to understand the chemical and physical properties associated with an element. Electron and their energy levels are explored in the use of electron configuration.</p>	<p><i>Unit Description:</i> The periodic table organizes elements based on their properties. It allows trends in physical properties and chemical reactivity to appear. Using the periodic table, the possible formation of chemical compound can be predicted.</p>	<p><i>Unit Description:</i> Chemical bonds hold all compounds together. The electron dot formula of an element will help predict what type of bond will form in a compound. Creating physical models of molecular structures will reinforce this concept. The different types of bonds will be contrasted. Both systems of naming compounds will be utilized when writing the name of a molecular and ionic compound. Oxidation numbers are assigned to elements to help in the formation of compounds.</p>	<p><i>Unit Description:</i> Chemical reactions evident throughout our world. This unit explores the reactions of elements and their compounds. Equations are balanced to ensure the reaction occurs properly. Chemical reactions can be classified using their unique characteristics. The five major types of reactions will be introduced and guidelines for determining chemical equations will be discussed. Labs will be performed to reinforce the various reaction types.</p>
<i>Unit Targets:</i>	<i>Unit Targets:</i>	<i>Unit Targets:</i>	<i>Unit Targets:</i>	<i>Unit Targets:</i>	<i>Unit Targets:</i>

<ul style="list-style-type: none"> • Use their learning of safety and lab procedures to make informed decisions when selecting and using equipment or tools. • Transfer their learning of the scientific method and data analysis to solve problems and identify sources of error. • Differentiate between quantitative and qualitative data. • Identify both the independent and dependent variables for an experiment • 	<ul style="list-style-type: none"> • Analyze the properties of matter for the purpose of classification. • Connect the effects of energy transfer with the different states of matter. • Identify classifications of matter (element, compound, homogeneous mixture, and heterogeneous mixture). • Differentiate samples for the purpose of classification. • Connect the arrangement of molecules with the amount of energy transfer through data analysis questions or a conclusion paragraph. • Use the kinetic molecular theory to describe and explain the properties of solids, liquids, and gases. 	<ul style="list-style-type: none"> • Compare the modern atomic model to previous models of the atom • Use atomic models to predict the behaviors of atoms in interactions. • Explain how the properties of isotopes, including half-lives, decay modes, and nuclear resonances, lead to useful applications of isotopes. • Create a Bohr model including subatomic particles from the name of an element on the periodic table. • Formulate electron configurations by analyzing Aufbau diagrams, Hund's rule, and Pauli Exclusion Principle. 	<ul style="list-style-type: none"> • Accurately explain the placement of elements on the periodic table. • Predict patterns in the chemical and physical properties of elements. • Connect the placement of elements on the periodic table to each other and prove the various trends. • Analyze patterns in the periodic trends of atomic size, ionization energy and electronegativity. • Determine the identity of missing elements based upon the properties of the other elements in the group 	<ul style="list-style-type: none"> • Differentiate between covalent, ionic, and metallic bonding in terms of valence electrons. • Develop a reason why metals tend to form positive ions while nonmetals form negative ions. • Calculate formula mass, molar mass and percent compositions. • Predict the oxidation number of an element based on its location on the periodic table. • Apply the concepts of ionic and covalent bonding to effectively represent compounds using chemical formulas and names. • Compare the different types of intermolecular forces and recognize in which types of compounds they are present. • Construct Lewis structures for molecular compounds. • Develop a logical 	<ul style="list-style-type: none"> • Accurately represent chemical reactions using word equations • Formulate and balance skeleton equations using coefficients. • Cite evidence of the indicators of a chemical reaction such as: energy change, color change, production of a gas, formation of a precipitate. • Differentiate reactants products, coefficients, subscripts, and yield signs and what they represent. • Apply the Law of Conservation of Mass to explain why the mass of reactants must equal the mass of products. • Differentiate chemical reactions by one of the five main types: synthesis, decomposition, single replacement, double replacement, and combustion. • Utilize the activity
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				<p>argument as to how the "sea of electrons" model and delocalized electrons explain various properties of metals.</p> <ul style="list-style-type: none">• Predict the molecular shapes of the compound using the VSEPR theory.	<p>series to determine if a single replacement reaction will occur.</p> <ul style="list-style-type: none">• Predict the formation of a precipitate from a solubility table. <p>Communicate how a change in activation energy, concentration, temperature, or addition of a catalyst can affect reaction rate.</p>
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Honors Chemistry - 10th Grade Scope and Sequence

Unit 7 -Stoichiometry	Unit 8 - Gas Laws	Unit 9 - Solutions	Unit 10 - Kinetics	Unit 11 - Thermodynamics	
Weeks 21-24	Weeks 24-26	Weeks 27-29	Weeks 30-32	Weeks 33-35	
<p><i>Unit Description:</i> All objects and substances in the natural world are composed of matter. Matter can be changed either physically or chemically, utilizing energy. The conservation of energy can be demonstrated by keeping track of energy as it is transferred from one object to another. In this unit, molar ratio and molar mass will be introduced. Problem solving involving conversions of moles and grams will be established. The concepts of limiting and excess reactants will be discussed.</p>	<p><i>Unit Description:</i> Gases are all around us. This unit will examine the properties of gases in comparison to solids and liquids. Gas law calculations and stoichiometry will be introduced. The factors that affect the relationship between gases, such as temperature, volume and pressure will be explained. The relationship between mass and rate of diffusion will be established.</p>	<p><i>Unit Description:</i> Solutions are important aspects of the human body and daily life. This unit will explore the characteristics of solutions and the factors that will affect solution formation and solubility. Concentrations of solutions will be calculated in terms of molality and molarity and utilize stoichiometry. The concept of chemical equilibrium will be used to summarize the ratio of reactants to products in a reaction. Acids and bases will be introduced. The pH scale will be utilized to determine whether a</p>	<p><i>Unit Description:</i> Develop an understanding of the rates at which chemical changes occur and the factors that influence the rates. Those factors include the concentration of reactants, temperature, catalysts, and other environmental factors. Chemical changes are represented by chemical reactions, and the rates of chemical reactions are determined by the details of the molecular collisions. Rates of change in chemical reactions are observable and measurable. When measuring rates of change, students are measuring the</p>	<p><i>Unit Description:</i> The laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter. The availability or disposition of energy plays a role in virtually all observed chemical processes. Thermodynamics provides tools for understanding this key role, particularly the conservation of energy, including energy transfer in the forms of heat and work. Chemical bonding is central to chemistry. A key concept to know is that the breaking of a chemical bond</p>	

		<p>solution is an acid or a base based on the ion concentrations.</p>	<p>concentration of reactant or product species as a function of time. These chemical processes may be observed in a variety of ways and often involve changes in energy as well. In subsequent units, students will describe the role of energy in changes in matter.</p>	<p>inherently requires an energy input, and because bond formation is the reverse process, it will release energy. In subsequent units, the application of thermodynamics will determine the favorability of a reaction occurring.</p>	
<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • Solve mole conversion problems. • Determine the amount of reactants and products in a chemical reaction using stoichiometry. • Prove the Law of Conservation of Mass is satisfied using a balanced equation. • Conclude the thickness of the piece of aluminum foil and convert the thickness into atoms. • Determine the amount of a product produced by applying quantities to chemical 	<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • Apply the Kinetic Molecular Theory to the behavior of gases. • Apply the mathematical models to illustrate the relationships between Pressure (P), Volume, (V) and Temperature (T). • Analyze data and graph representing the relationships between pressure, volume, and temperature of a gas. This includes 5 trials with the given values of P, V, and T depending on each gas laws. 	<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • Differentiate between the different types of solutions. • Calculate the concentration of various visual solutions. • Calculate the molarity of a substance. • Prove the solubility of a substance using a solubility curve. • Calculating the pH. • Analyze a solution with litmus paper and pH paper. • Identify various substances as acids or bases and the degrees of acidity and 	<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • Explain the relationship between the rate of a chemical reaction and experimental parameters. • Represent experimental data with a consistent rate law expression. • Identify the rate law expression of a chemical reaction using data that show how the concentrations of reaction species change over time. • Represent an elementary reaction 	<p><i>Unit Targets:</i></p> <ul style="list-style-type: none"> • Explain the relationship between experimental observations and energy changes associated with a chemical or physical transformation. • Represent a chemical or physical transformation with an energy diagram. • Explain the relationship between the transfer of thermal energy and molecular collisions. • Calculate the heat q absorbed or released by a system 	

<p>reactions.</p> <ul style="list-style-type: none"> • Determine the percent yield and formulate hypotheses for errors. 	<ul style="list-style-type: none"> • Draw conclusions as the variables change (inverse or direct relationships). • Calculate the unknown variables of various practice problems. • Draw conclusions connecting real world situations to gas law relationships. 	<p>alkalinity based on various indicators.</p>	<p>as a rate law expression using stoichiometry</p> <ul style="list-style-type: none"> • Explain the relationship between the rate of an elementary reaction and the frequency, energy, and orientation of molecular collisions. • Represent the activation energy and overall energy change in an elementary reaction using a reaction energy profile. • Identify the components of a reaction mechanism. • Identify the rate law for a reaction from a mechanism in which the first step is rate limiting. • Identify the rate law for a reaction from a mechanism in which the first step is not rate limiting. • Represent the activation energy and overall energy change in a multistep reaction 	<p>undergoing heating/cooling based on the amount of the substance, the heat capacity, and the change in temperature.</p> <ul style="list-style-type: none"> • Explain changes in the heat q absorbed or released by a system undergoing a phase transition based on the amount of the substance in moles and the molar enthalpy of the phase transition. • Calculate the heat q absorbed or released by a system undergoing a chemical reaction in relationship to the amount of the reacting substance in moles and the molar enthalpy of reaction. • Calculate the enthalpy change of a reaction based on the average bond energies of bonds broken and formed in the reaction. • Calculate the enthalpy change for a 	
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			<p>with a reaction energy profile.</p> <ul style="list-style-type: none">• Explain the relationship between the effect of a catalyst on a reaction and changes in the reaction mechanism.	<p>chemical or physical process based on the standard enthalpies of formation.</p> <ul style="list-style-type: none">• Represent a chemical or physical process as a sequence of steps.	
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Honors Chemistry – 10th Grade Unit 1

Unit Title: Safety, Lab Procedure, and Data Analysis	
Unit Summary: Measurements and observations tools are essential activities in science. It allows for the understanding of concept quantitatively as well as for analyzing data collected during experiments. In this unit, conceptual, mathematical, physical, and computational tools will be utilized. Introductory labs will focus on selecting the appropriate lab equipment and its proper use. Dimensional analysis will be introduced as a way of converting units.	
Primary Interdisciplinary Connections: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3	
Career Readiness, Life Literacies, and Key Skills: 9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2	
Learning Targets	
NJSLS Standards: HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8	
Computer Science and Design Thinking Standards: 8.1.12.A.2, 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1, 8.1.12.E.1, 8.1.12.E.2	
Climate Change Standards: HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6	
ELA Companion Standards: RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5	
Content Statements:	
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.
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.
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.
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.
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.
6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
7	Use mathematical representations to support the claim that atoms, and therefore mass, are

	conserved during a chemical reaction.	
8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	
Big Idea: Utilizing proper lab practices and measurement techniques are essential when conducting research in science.		
Unit Essential Questions:		Unit Enduring Understandings:
<ul style="list-style-type: none"> • What do we need to do in order to be safe in the laboratory setting? • How do we organize and analyze data? • Can we solve problems without the scientific method? 		<ul style="list-style-type: none"> • Following safety procedures, using protective equipment, and selecting the appropriate laboratory tools will reduce the risk of injury. • Planning, organizing, and analyzing data are essential components of solving problems.
Unit Learning Targets		
<i>Students will...</i>		
<ul style="list-style-type: none"> • Use their learning of safety and lab procedures to make informed decisions when selecting and using equipment or tools. • Transfer their learning of the scientific method and data analysis to solve problems and identify sources of error. • Differentiate between quantitative and qualitative data. Identify both the independent and dependent variables for an experiment. 		
Evidence of Learning		
Summative Assessment: Unit Test, Labs		
Formative Assessments:		
<ul style="list-style-type: none"> • Quizzes • Chapter tests • Homework • Mini-labs 		
Lesson Plans		
<i>Activities/Interdisciplinary Connections</i>		<i>Timeframe</i>
<ul style="list-style-type: none"> • Use the steps of the scientific method to solve a problem • Equipment scavenger hunt • Lab on the scientific method • Analysis of data and graphs 		Weeks 1-3
<i>Teacher Resources</i>		<i>Teacher Note</i>
<ul style="list-style-type: none"> • Textbook • PowerPoint presentations • Laboratory materials 		

- Technology Tools:
- Google Classroom
- Seesaw
- Pear Deck
- BrainPOP
- Book Creator
- FlipGrid
- Kahoot
- Kami

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Examples of Strategies and Practices that Support Students with Disabilities:

- Use of visual and multisensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Examples of Strategies and Practices that Support Gifted & Talented Students:

- Adjusting the pace of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Honors Chemistry – 10th Grade Unit 2

Unit Title: Classification	
Unit Summary: Everything is made up of matter. Matter has 2 defining qualities: it takes up space and has inertia. All matter is held together by forces. Energy flows between every particles of matter. Matter can be classified based on its properties. In this unit, the different types of matter will be compared. The physical and chemical changes by which matter can undergo will be observed. The basic form of a chemical equation will be introduced.	
Primary Interdisciplinary Connections: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3	
Career Readiness, Life Literacies, and Key Skills: 9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2	
Learning Targets	
NJSLS Standards: HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8	
Computer Science and Design Thinking Standards: 8.1.12.A.2, 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1, 8.1.12.E.1, 8.1.12.E.2	
Climate Change Standards: HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6	
ELA Companion Standards: RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5	
Content Statements:	
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.
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.
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.
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.
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.
6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
7	Use mathematical representations to support the claim that atoms, and therefore mass, are

	conserved during a chemical reaction.	
8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	
Big Idea: Analyze and communicate how matter and energy transfer affects all the components of our lives.		
Unit Essential Questions:		Unit Enduring Understandings:
<ul style="list-style-type: none"> • What is energy? • How do we classify things in the world around us? • How can the classification of matter help us better understand the physical world? 		<ul style="list-style-type: none"> • Everyday occurrences of changes in matter are related to energy transfer. • The classification of matter based on distinctive properties or characteristics allows for a better understanding of the world around us.
Unit Learning Targets		
<i>Students will...</i>		
<ul style="list-style-type: none"> • Analyze the properties of matter for the purpose of classification. • Connect the effects of energy transfer with the different states of matter. • Identify classifications of matter (element, compound, homogeneous mixture, and heterogeneous mixture). • Differentiate samples for the purpose of classification. • Connect the arrangement of molecules with the amount of energy transfer through data analysis questions or a conclusion paragraph. <p>Use the kinetic molecular theory to describe and explain the properties of solids, liquids, and gases.</p>		
Evidence of Learning		
Summative Assessment: Unit Test, Labs		
Formative Assessments:		
<ul style="list-style-type: none"> • Quizzes • Chapter tests • Homework • Mini-labs 		
Lesson Plans		
<i>Activities/Interdisciplinary Connections</i>		<i>Timeframe</i>
<ul style="list-style-type: none"> • Mixture separation lab • Finding examples at home • Lab on changing states of matter • Conservation of Matter Lab 		Weeks 4-6
<i>Teacher Resources</i>		<i>Teacher Note</i>
<ul style="list-style-type: none"> • Textbook 		

- PowerPoint presentations
- Laboratory materials
- Technology Tools:
 - Google Classroom
 - Seesaw
 - Pear Deck
 - BrainPOP
 - Book Creator
 - FlipGrid
 - Kahoot
 - Kami

**Differentiating Instruction:
Students with Disabilities, English Language Learners,
and Gifted & Talented Students**

Examples of Strategies and Practices that Support Students with Disabilities:

- Use of visual and multisensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Examples of Strategies and Practices that Support Gifted & Talented Students:

- Adjusting the pace of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share

•Cooperative learning groups

Honors Chemistry – 10th Grade Unit 3

Unit Title: Atomic Structure	
Unit Summary: Atoms are the building blocks of matter. By understanding the structure of an atom, one can begin to understand the chemical and physical properties associated with an element. Electron and their energy levels are explored in the use of electron configuration.	
Primary Interdisciplinary Connections: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3	
Career Readiness, Life Literacies, and Key Skills: 9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2	
Learning Targets	
NJSLS Standards: HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8	
Computer Science and Design Thinking Standards: 8.1.12.A.2, 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1, 8.1.12.E.1, 8.1.12.E.2	
Climate Change Standards: HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6	
ELA Companion Standards: RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5	
Content Statements:	
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.
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.
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.
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.
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6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
8	Develop models to illustrate the changes in the composition of the nucleus of the atom and

the energy released during the processes of fission, fusion, and radioactive decay.	
Big Idea: The structure of an atom allows each element on the periodic table to have a unique combination of properties.	
Unit Essential Questions: <ul style="list-style-type: none"> • How does the modern theory of the atom explain atomic structure? • What causes instability in the nucleus of atoms? • How can a particle exist as a wave causing duality? • What happens when an electron in an atom absorbs or releases energy? • How are electrons configured around a nucleus? • How do current atomic models with electron arrangement compare with previous models? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • Atoms are the fundamental building blocks of all matter. • Atoms can be unstable and emit radiation. • Electron movement can be explained by the duality of particles and waves. • Modern atomic theory suggests that electrons may be located in regions of high probability.
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> • Compare the modern atomic model to previous models of the atom • Use atomic models to predict the behaviors of atoms in interactions. • Explain how the properties of isotopes, including half-lives, decay modes, and nuclear resonances, lead to useful applications of isotopes. • Create a Bohr model including subatomic particles from the name of an element on the periodic table. Formulate electron configurations by analyzing Aufbau diagrams, Hund’s rule, and Pauli Exclusion Principle.	
Evidence of Learning	
Summative Assessment: Unit Test, Labs	
Formative Assessments: <ul style="list-style-type: none"> • Quizzes • Chapter tests • Homework • Mini-labs 	
Lesson Plans	
<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>

<ul style="list-style-type: none"> • Location of a 1s electron lab • Construction of a model atom • Identifying chemicals in a product mini-lab • Flame test lab • Model different types of nuclear decay activity • Spectroscopy lab • Electron orbital diagrams 	<p>Weeks 7-9</p>
<p><i>Teacher Resources</i></p>	<p><i>Teacher Note</i></p>
<ul style="list-style-type: none"> • Textbook • PowerPoint presentations • Laboratory materials • Technology Tools: <ul style="list-style-type: none"> -Google Classroom -Seesaw -Pear Deck -BrainPOP -Book Creator -FlipGrid -Kahoot -Kami 	

**Differentiating Instruction:
Students with Disabilities, English Language Learners,
and Gifted & Talented Students**

Examples of Strategies and Practices that Support Students with Disabilities:

- Use of visual and multisensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Examples of Strategies and Practices that Support Gifted & Talented Students:

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- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
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- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Honors Chemistry – 10th Grade Unit 4

Unit Title: The Periodic Table	
Unit Summary: The periodic table organizes elements based on their properties. It allows trends in physical properties and chemical reactivity to appear. Using the periodic table, the possible formation of chemical compound can be predicted.	
Primary Interdisciplinary Connections: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3	
Career Readiness, Life Literacies, and Key Skills: 9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2	
Learning Targets	
NJSLS Standards: HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8	
Computer Science and Design Thinking Standards: 8.1.12.A.2, 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1, 8.1.12.E.1, 8.1.12.E.2	
Climate Change Standards: HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6	
ELA Companion Standards: RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5	
Content Statements:	
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.
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.
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.
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.
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.
6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
8	Develop models to illustrate the changes in the composition of the nucleus of the atom and

the energy released during the processes of fission, fusion, and radioactive decay.	
Big Idea: The placement of elements of the periodic table reveals patterns in chemical and physical properties of elements.	
Unit Essential Questions: <ul style="list-style-type: none"> • How do properties or characteristics influence the placement of elements on the periodic table? • What is the relationship between an element's placement on the periodic table and its trends? • How can the placement of an element on the periodic table become known when a specific trend is observed? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • The placement of elements on the periodic table is based upon specific properties and characteristics of elements. • The properties and characteristics of elements follow noticeable patterns and trends on the periodic table.
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> • Accurately explain the placement of elements on the periodic table. • Predict patterns in the chemical and physical properties of elements. • Connect the placement of elements on the periodic table to each other and prove the various trends. • Analyze patterns in the periodic trends of atomic size, ionization energy and electronegativity. Determine the identity of missing elements based upon the properties of the other elements in the group. 	
Evidence of Learning	
Summative Assessment: Unit Test, Labs	
Formative Assessments: <ul style="list-style-type: none"> • Quizzes • Chapter tests • Homework • Mini-labs 	
Lesson Plans	
<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>
<ul style="list-style-type: none"> • Create your own periodic table • Graph trends on a periodic 	Weeks 10-12
<i>Teacher Resources</i>	<i>Teacher Note</i>
<ul style="list-style-type: none"> • Textbook 	

- PowerPoint presentations
- Laboratory materials
- Technology Tools:
 - Google Classroom
 - Seesaw
 - Pear Deck
 - BrainPOP
 - Book Creator
 - FlipGrid
 - Kahoot
 - Kami

**Differentiating Instruction:
Students with Disabilities, English Language Learners,
and Gifted & Talented Students**

Examples of Strategies and Practices that Support Students with Disabilities:

- Use of visual and multisensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Examples of Strategies and Practices that Support Gifted & Talented Students:

- Adjusting the pace of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

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- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share

•Cooperative learning groups

Honors Chemistry – 10th Grade Unit 5

Unit Title: Chemical Bonding	
Unit Summary: Chemical bonds hold all compounds together. The electron dot formula of an element will help predict what type of bond will form in a compound. Creating physical models of molecular structures will reinforce this concept. The different types of bonds will be contrasted. Both systems of naming compounds will be utilized when writing the name of a molecular and ionic compound. Oxidation numbers are assigned to elements to help in the formation of compounds.	
Primary Interdisciplinary Connections: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3	
Career Readiness, Life Literacies, and Key Skills: 9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2	
Learning Targets	
NJSLS Standards: HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8	
Computer Science and Design Thinking Standards: 8.1.12.A.2, 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1, 8.1.12.E.1, 8.1.12.E.2	
Climate Change Standards: HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6	
ELA Companion Standards: RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5	
Content Statements:	
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.
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.
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.
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.
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.
6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
Big Idea: Learning the atomic structure of an element will allow students to predict what compounds will form and the properties of those compounds.	
Unit Essential Questions: <ul style="list-style-type: none"> • Why do elements form chemical bonds in nature and how does this determine their properties? • How are the properties of an element determined by its electron arrangement? • How are ionic, covalent, and metallic bonds formed, and how are they characterized? • How are the names and formulas of ionic and covalent compounds written? • How does V.S.E.P.R. Theory allow us to predict molecular geometry? • Why is an understanding of intermolecular forces important? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • The formation of chemical bonds can be explained by the atom's ability to satisfy the Octet Rule and achieve stability. • The type of chemical bond an element forms can be linked to its valence electrons and its location on the periodic table. • Chemical formulas can be used to represent the ratios in which atoms combine to form compounds. • A compound's structure and shape can be determined through an understanding of the interactions between valence electrons. • Intermolecular forces determine the properties of compounds.
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> • Differentiate between covalent, ionic, and metallic bonding in terms of valence electrons. • Develop a reason why metals tend to form positive ions while nonmetals form negative ions. • Calculate formula mass, molar mass and percent compositions. • Predict the oxidation number of an element based on its location on the periodic table. • Apply the concepts of ionic and covalent bonding to effectively represent compounds using chemical formulas and names. • Compare the different types of intermolecular forces and recognize in which types of compounds they are present. • Construct Lewis structures for molecular compounds. • Develop a logical argument as to how the "sea of electrons" model and delocalized electrons explain various properties of metals. <p>Predict the molecular shapes of the compound using the VSEPR theory.</p>	
Evidence of Learning	
Summative Assessment: Unit Test, Labs	
Formative Assessments:	

- Quizzes
- Chapter tests
- Homework
- Mini-labs

Lesson Plans

<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>
<ul style="list-style-type: none"> • Ionic compound lab • Molecular modeling • Practice writing chemical formulas • Ionic bond vs. covalent bonds demos • Metallic bonding demonstration • Determining empirical formula of Magnesium Oxide lab 	Weeks 13-16
<i>Teacher Resources</i>	<i>Teacher Note</i>
<ul style="list-style-type: none"> • Textbook • PowerPoint presentations • Laboratory materials • Technology Tools: <ul style="list-style-type: none"> -Google Classroom -Seesaw -Pear Deck -BrainPOP -Book Creator -FlipGrid -Kahoot -Kami 	

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students

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- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

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- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
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- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Honors Chemistry – 10th Grade Unit 6

Unit Title: Writing and Balancing Chemical Equations	
Unit Summary: Chemical reactions evident throughout our world. This unit explores the reactions of elements and their compounds. Equations are balanced to ensure the reaction occurs properly. Chemical reactions can be classified using their unique characteristics. The five major types of reactions will be introduced and guidelines for determining chemical equations will be discussed. Labs will be performed to reinforce the various reaction types.	
Primary Interdisciplinary Connections: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3	
Career Readiness, Life Literacies, and Key Skills: 9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2	
Learning Targets	
NJSLS Standards: HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8	
Computer Science and Design Thinking Standards: 8.1.12.A.2, 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1, 8.1.12.E.1, 8.1.12.E.2	
Climate Change Standards: HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6	
ELA Companion Standards: RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5	
Content Statements:	
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.
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.
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.
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.
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.
6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
7	Use mathematical representations to support the claim that atoms, and therefore mass, are

	conserved during a chemical reaction.	
8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	
Big Idea: Chemical changes that transpire can be portrayed both quantitatively and qualitatively by completing and balancing chemical reactions.		
Unit Essential Questions:		Unit Enduring Understandings:
<ul style="list-style-type: none"> • Why must the mass of reactants equal the mass of products in a chemical reaction? • What characteristics are used to classify chemical reactions? • What are the different types of chemical reactions that can occur? 		<ul style="list-style-type: none"> • Chemical equations are used to represent chemical reactions and show that mass can neither be created nor destroyed. • There are different types of chemical reactions that occur in everyday life.
Unit Learning Targets		
<i>Students will...</i>		
<ul style="list-style-type: none"> • Accurately represent chemical reactions using word equations • Formulate and balance skeleton equations using coefficients. • Cite evidence of the indicators of a chemical reaction such as: energy change, color change, production of a gas, formation of a precipitate. • Differentiate reactants products, coefficients, subscripts, and yield signs and what they represent. • Apply the Law of Conservation of Mass to explain why the mass of reactants must equal the mass of products. • Differentiate chemical reactions by one of the five main types: synthesis, decomposition, single replacement, double replacement, and combustion. • Utilize the activity series to determine if a single replacement reaction will occur. • Predict the formation of a precipitate from a solubility table. <p>Communicate how a change in activation energy, concentration, temperature, or addition of a catalyst can affect reaction rate.</p>		
Evidence of Learning		
Summative Assessment: Unit Test, Labs		
Formative Assessments:		
<ul style="list-style-type: none"> • Quizzes • Chapter tests • Homework • Mini-labs 		
Lesson Plans		
<i>Activities/Interdisciplinary Connections</i>		<i>Timeframe</i>

<ul style="list-style-type: none"> • Identify chemical reactions • 5 chemical reaction demos • Practice writing chemical equations • Practice balancing chemical equations • Distinguishing chemical and physical changes activity • Reaction types virtual lab • Unknown solution solubility lab 	<p>Weeks 17-20</p>
<p><i>Teacher Resources</i></p>	<p><i>Teacher Note</i></p>
<ul style="list-style-type: none"> • Textbook • PowerPoint presentations • Laboratory materials • Technology Tools: <ul style="list-style-type: none"> -Google Classroom -Seesaw -Pear Deck -BrainPOP -Book Creator -FlipGrid -Kahoot -Kami 	
<p>Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students</p>	
<p>Examples of Strategies and Practices that Support Students with Disabilities:</p> <ul style="list-style-type: none"> • Use of visual and multisensory formats • Use of assisted technology • Use of prompts • Modification of content and student products • Testing accommodations • Authentic assessments <p>Examples of Strategies and Practices that Support Gifted & Talented Students:</p> <ul style="list-style-type: none"> • Adjusting the pace of lessons • Curriculum compacting • Inquiry-based instruction • Independent study • Higher-order thinking skills • Interest-based content • Student-driven instruction • Real-world problems and scenarios 	

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
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- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Honors Chemistry – 10th Grade Unit 7

Unit Title: Stoichiometry

Unit Summary: All objects and substances in the natural world are composed of matter. Matter can be changed either physically or chemically, utilizing energy. The conservation of energy can be demonstrated by keeping track of energy as it is transferred from one object to another. In this unit, molar ratio and molar mass will be introduced. Problem solving involving conversions of moles and grams will be established. The concepts of limiting and excess reactants will be discussed.

Primary Interdisciplinary Connections:

MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2

Learning Targets

NJSLS Standards:

HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8

Computer Science and Design Thinking Standards:

8.1.12.A.2, 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1, 8.1.12.E.1, 8.1.12.E.2

Climate Change Standards:

HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6

ELA Companion Standards:

RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5

Content Statements:

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.
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.
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6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
7	Use mathematical representations to support the claim that atoms, and therefore mass, are

	conserved during a chemical reaction.	
8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	
Big Idea: Stoichiometry allows for the knowledge of elements and compounds to be used to determine the amounts of reactants and products in a chemical reaction.		
Unit Essential Questions:		Unit Enduring Understandings:
<ul style="list-style-type: none"> • How can we quantify something that we can't see? How do we know that we are right? • Why is the mole an important measurement of chemistry? 		<ul style="list-style-type: none"> • The mole is the unit for specifying the amount of the material. • Mass and mole ratios between different compounds in a reaction can answer quantitative questions concerning reactants and products.
Unit Learning Targets		
<i>Students will...</i>		
<ul style="list-style-type: none"> • Solve mole conversion problems. • Determine the amount of reactants and products in a chemical reaction using stoichiometry. • Prove the Law of Conservation of Mass is satisfied using a balanced equation. • Conclude the thickness of the piece of aluminum foil and convert the thickness into atoms. • Determine the amount of a product produced by applying quantities to chemical reactions. • Determine the percent yield and formulate hypotheses for errors. 		
Evidence of Learning		
Summative Assessment: Unit Test, Labs		
Formative Assessments:		
<ul style="list-style-type: none"> • Quizzes • Chapter tests • Homework • Mini-labs 		
Lesson Plans		
<i>Activities/Interdisciplinary Connections</i>		<i>Timeframe</i>
<ul style="list-style-type: none"> • Popcorn lab • Percent composition mini-lab • Practice stoichiometric conversion problems Unknown solution solubility lab 		Weeks 21-24
<i>Teacher Resources</i>		<i>Teacher Note</i>
<ul style="list-style-type: none"> • Textbook 		

- PowerPoint presentations
- Laboratory materials
- Technology Tools:
 - Google Classroom
 - Seesaw
 - Pear Deck
 - BrainPOP
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 - Kahoot
 - Kami

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- Think-pair-share

•Cooperative learning groups

Honors Chemistry – 10th Grade Unit 8

Unit Title: Gas Laws	
Unit Summary: Gases are all around us. This unit will examine the properties of gases in comparison to solids and liquids. Gas law calculations and stoichiometry will be introduced. The factors that affect the relationship between gases, such as temperature, volume and pressure will be explained. The relationship between mass and rate of diffusion will be established.	
Primary Interdisciplinary Connections: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3	
Career Readiness, Life Literacies, and Key Skills: 9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2	
Learning Targets	
NJSLS Standards: HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8	
Computer Science and Design Thinking Standards: 8.1.12.A.2, 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1, 8.1.12.E.1, 8.1.12.E.2	
Climate Change Standards: HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6	
ELA Companion Standards: RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5	
Content Statements:	
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.
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.
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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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.
6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
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Big Idea: The behavior of gases can be explained by the Kinetic Molecular Theory and specific gas laws can be used to illustrate how gas will react under experimental conditions.

Unit Essential Questions:

- How is the Kinetic Molecular Theory used to explain the behavior of matter?
- Why are some materials gases at room temperature and standard pressure, while others are solids or liquids?
- How do gases respond to changes in temperature, pressure, and volume?
- How are gas laws manipulated to mathematically determine unknown variables?

Unit Enduring Understandings:

- The behavior of gases is linked to the Kinetic Molecular Theory.
- The behavior of gases in the real world can be approximated by mathematical relations between pressure, temperature, volume, and amount.

Unit Learning Targets

Students will...

- Apply the Kinetic Molecular Theory to the behavior of gases.
 - Apply the mathematical models to illustrate the relationships between Pressure (P), Volume, (V) and Temperature (T).
 - Analyze data and graph representing the relationships between pressure, volume, and temperature of a gas. This includes 5 trials with the given values of P, V, and T depending on each gas laws.
 - Draw conclusions as the variables change (inverse or direct relationships).
 - Calculate the unknown variables of various practice problems.
- Draw conclusions connecting real world situations to gas law relationships.

Evidence of Learning

Summative Assessment: Unit Test, Labs

Formative Assessments:

- Quizzes
- Chapter tests
- Homework
- Mini-labs

Lesson Plans

<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>
• Gas laws lab	Weeks 24-26

<ul style="list-style-type: none"> • Boyle’s law animation • Mass and density of air at different pressures • Growing a balloon in a jar • Wet dry ice lab 	
<i>Teacher Resources</i>	<i>Teacher Note</i>
<ul style="list-style-type: none"> • Textbook • PowerPoint presentations • Laboratory materials • Technology Tools: <ul style="list-style-type: none"> -Google Classroom -Seesaw -Pear Deck -BrainPOP -Book Creator -FlipGrid -Kahoot -Kami 	
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- Use of cognates to increase comprehension
- Teacher modeling
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- Scaffolding
- Word walls
- Sentence frames
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- Cooperative learning groups

Honors Chemistry – 10th Grade Unit 9

Unit Title: Solutions	
Unit Summary: Solutions are important aspects of the human body and daily life. This unit will explore the characteristics of solutions and the factors that will affect solution formation and solubility. Concentrations of solutions will be calculated in terms of molality and molarity and utilize stoichiometry. The concept of chemical equilibrium will be used to summarize the ratio of reactants to products in a reaction. Acids and bases will be introduced. The pH scale will be utilized to determine whether a solution is an acid or a base based on the ion concentrations.	
Primary Interdisciplinary Connections: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3	
Career Readiness, Life Literacies, and Key Skills: 9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2	
Learning Targets	
NJSLS Standards: HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8	
Computer Science and Design Thinking Standards: 8.1.12.A.2, 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1, 8.1.12.E.1, 8.1.12.E.2	
Climate Change Standards: HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6	
ELA Companion Standards: RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5	
Content Statements:	
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.
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.
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.
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.
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.
6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
Big Idea: The solubility of a substance can be determined at a specific temperature and interpreted using a solubility curve. Substances can be identified as an acid or a base by evaluating the physical and chemical factors affecting solubility.	
Unit Essential Questions: <ul style="list-style-type: none"> • What are the various types of concentration that are used to describe a solution? • How can these different forms of concentrations of the solution be calculated? • What factors affect the solubility of a solution? • What are the factors that distinguish between acidity and basicity of a solution? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • Concentration of a solution can be expressed in different ways. • There are different factors that affect the solubility of a solution. • Everyday substances can easily be analyzed to determine whether they are an acid or a base.
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> • Differentiate between the different types of solutions. • Calculate the concentration of various visual solutions. • Calculate the molarity of a substance. • Prove the solubility of a substance using a solubility curve. • Calculating the pH. • Analyze a solution with litmus paper and pH paper. Identify various substances as acids or bases and the degrees of acidity and alkalinity based on various indicators.	
Evidence of Learning	
Summative Assessment: Unit Test, Labs	
Formative Assessments: <ul style="list-style-type: none"> • Quizzes • Chapter tests • Homework • Mini-labs 	
Lesson Plans	
<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>

<ul style="list-style-type: none"> • Solubility lab • Molarity solution lab • Testing water of ions • Paper Chromatography • Is it an acid or base lab? 	Weeks 27-29
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<i>Teacher Resources</i>	<i>Teacher Note</i>
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<ul style="list-style-type: none"> • Textbook • PowerPoint presentations • Laboratory materials • Technology Tools: <ul style="list-style-type: none"> -Google Classroom -Seesaw -Pear Deck -BrainPOP -Book Creator -FlipGrid -Kahoot -Kami 	
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**Differentiating Instruction:
Students with Disabilities, English Language Learners,
and Gifted & Talented Students**

Examples of Strategies and Practices that Support Students with Disabilities:

- Use of visual and multisensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Examples of Strategies and Practices that Support Gifted & Talented Students:

- Adjusting the pace of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Honors Chemistry – 10th Grade Unit 10

Unit Title: Kinetics

Unit Summary: Develop an understanding of the rates at which chemical changes occur and the factors that influence the rates. Those factors include the concentration of reactants, temperature, catalysts, and other environmental factors. Chemical changes are represented by chemical reactions, and the rates of chemical reactions are determined by the details of the molecular collisions. Rates of change in chemical reactions are observable and measurable. When measuring rates of change, students are measuring the concentration of reactant or product species as a function of time. These chemical processes may be observed in a variety of ways and often involve changes in energy as well. In subsequent units, students will describe the role of energy in changes in matter.

Primary Interdisciplinary Connections:

MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2

Learning Targets

NJSLS Standards:

HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8

Computer Science and Design Thinking Standards:

8.1.12.A.2, 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1, 8.1.12.E.1, 8.1.12.E.2

Climate Change Standards:

HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6

ELA Companion Standards:

RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5

Content Statements:

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.
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.
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.
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.
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.

6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

Big Idea: Rates of chemical reactions are determined by the details of the molecular collisions.

Unit Essential Questions:

- Why are some reactions faster than other reactions?
- How long will a marble statue last?
- How can a sports drink cure a headache?
- How does bread rise?

Unit Enduring Understandings:

- Some reactions happen quickly, while others happen more slowly and depend on reactant concentrations and temperature.
- There is a relationship between the speed of a reaction and the collision frequency of particle collisions.
- Many chemical reactions occur through a series of elementary reactions. These elementary reactions when combined form a chemical equation.
- The speed at which a reaction occurs can be influenced by a catalyst.

Unit Learning Targets

Students will...

- Explain the relationship between the rate of a chemical reaction and experimental parameters. • Represent experimental data with a consistent rate law expression.
- Identify the rate law expression of a chemical reaction using data that show how the concentrations of reaction species change over time.
- Represent an elementary reaction as a rate law expression using stoichiometry
- Explain the relationship between the rate of an elementary reaction and the frequency, energy, and orientation of molecular collisions.
- Represent the activation energy and overall energy change in an elementary reaction using a reaction energy profile.
- Identify the components of a reaction mechanism.
- Identify the rate law for a reaction from a mechanism in which the first step is rate limiting.
- Identify the rate law for a reaction from a mechanism in which the first step is not rate limiting.
- Represent the activation energy and overall energy change in a multistep reaction with a reaction energy profile.
- Explain the relationship between the effect of a catalyst on a reaction and changes in the reaction mechanism.

Evidence of Learning

Summative Assessment: Unit Test, Labs	
Formative Assessments:	
<ul style="list-style-type: none"> • Quizzes • Chapter tests • Homework • Mini-labs 	
Lesson Plans	
<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>
<ul style="list-style-type: none"> • Alka-Seltzer lab • Food coloring lab • Candle lab 	Weeks 30-32
<i>Teacher Resources</i>	<i>Teacher Note</i>
<ul style="list-style-type: none"> • Textbook • PowerPoint presentations • Laboratory materials • Technology Tools: <ul style="list-style-type: none"> -Google Classroom -Seesaw -Pear Deck -BrainPOP -Book Creator -FlipGrid -Kahoot -Kami 	
Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students	
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- Curriculum compacting
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- Student-driven instruction
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Honors Chemistry – 10th Grade Unit 11

Unit Title: Thermodynamics	
Unit Summary: The laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter. The availability or disposition of energy plays a role in virtually all observed chemical processes. Thermodynamics provides tools for understanding this key role, particularly the conservation of energy, including energy transfer in the forms of heat and work. Chemical bonding is central to chemistry. A key concept to know is that the breaking of a chemical bond inherently requires an energy input, and because bond formation is the reverse process, it will release energy. In subsequent units, the application of thermodynamics will determine the favorability of a reaction occurring.	
Primary Interdisciplinary Connections: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, and HSN-Q.A.3	
Career Readiness, Life Literacies, and Key Skills: 9.4.12.CI.1, 9.4.12.CI.2, 9.4.12.CI.3, 9.4.12.CT.1, 9.4.12.CT.2, 9.4.12.CT.4, 9.4.12.TL.2	
Learning Targets	
NJSLS Standards: HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS1-8	
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Climate Change Standards: HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6	
ELA Companion Standards: RST.9-10.7, RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, WHST.11-12.8, WHST.9-12.9, SL.11-12.5	
Content Statements:	
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.
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6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
Big Idea: The laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter.	
Unit Essential Questions: <ul style="list-style-type: none"> • Why is energy released when water becomes an ice cube? • How are chemical transformations that require bonds to break and form influenced by energy? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • Changes in a substance's properties or change into a different substance requires an exchange of energy. • The energy exchanged in a chemical transformation is required to break and form bonds.
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> • Explain the relationship between experimental observations and energy changes associated with a chemical or physical transformation. • Represent a chemical or physical transformation with an energy diagram. • Explain the relationship between the transfer of thermal energy and molecular collisions. • Calculate the heat q absorbed or released by a system undergoing heating/ cooling based on the amount of the substance, the heat capacity, and the change in temperature. • Explain changes in the heat q absorbed or released by a system undergoing a phase transition based on the amount of the substance in moles and the molar enthalpy of the phase transition. • Calculate the heat q absorbed or released by a system undergoing a chemical reaction in relationship to the amount of the reacting substance in moles and the molar enthalpy of reaction. • Calculate the enthalpy change of a reaction based on the average bond energies of bonds broken and formed in the reaction. • Calculate the enthalpy change for a chemical or physical process based on the standard enthalpies of formation. • Represent a chemical or physical process as a sequence of steps. 	
Evidence of Learning	
Summative Assessment: Unit Test, Labs	
Formative Assessments: <ul style="list-style-type: none"> • Quizzes • Chapter tests • Homework 	

- Mini-labs

Lesson Plans

<i>Activities/Interdisciplinary Connections</i>	<i>Timeframe</i>
<ul style="list-style-type: none"> • Copper pellet lab • Hess' law lab 	Weeks 33-35
<i>Teacher Resources</i>	<i>Teacher Note</i>
<ul style="list-style-type: none"> • Textbook • PowerPoint presentations • Laboratory materials • Technology Tools: <ul style="list-style-type: none"> -Google Classroom -Seesaw -Pear Deck -BrainPOP -Book Creator -FlipGrid -Kahoot -Kami 	

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