Washington Township School District

The mission of the Washington Township Public Schools *is to provide a safe, positive, and progressive educational environment that provides opportunity for all students to attain the knowledge and skills specified in the NJ Learning Standards at all grade levels, so as to ensure their full participation in an ever-changing world as responsible, self-directed and civic-minded citizens.*

Course Title:	**Integrated Science 3**
Grade Level(s):	**11-12**

Duration:	*Full Year:*	**X**	*Semester:*		*Marking Period:*	

Course Description:

This course includes topics in chemistry, physical, and environmental science. First an understanding of atomic structure, properties, periodic trends, and how compounds are formed is discussed. Then a solid foundation of how properties dictate processes and behaviors of atoms follows. The students will be exposed to real-life applications of scienctific issues, including environmental issues. It is designed to enhance problem solving skills for students planning a career in the applied sciences or vocational education after high school completion. This course is designed to prepare students that are planning on continuing their education at the community college level for related introductory science courses. Several hands-on investigations will be required and the students will be practicing writing through notebook or portfolio work. A variety of projects and individual and group research will be completed by the students.

Grading Procedures:

Marking Period Grades		Semester Grade	
Tests	35%	Marking Period 1	20%
Quizzes	20%	Marking Period 2	20%
Lab Work	20%	Marking Period 3	20%
Independent work	15%	Marking Period 4	20%
Proficiency assessment	10%	Midterm/Final Exam	10% **EACH Semester**

Primary Resources:

Textbook: Introductory Chemistry, An Atom's First Approach, McGraw Hill

Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21st century skills for College and Career Readiness in a global society

Designed by:	Beth McIlvaine

Under the Direction of:	Dr. Patricia Hughes

Written: _____

Revised: _____

BOE Approval: _____

Unit Title: Unit 1 Atoms and Elements (Chapter 1)

Unit Description:

This unit will define Chemistry and the importance of its role in society. The scientific method will be investigated and applied to various questions.

Basic atomic structure and historic discoveries of the subatomic particles will be studied. The organization of the periodic table will also be discussed along with the symbols that are on the periodic table.

Laboratory Practices

- This unit is introduced in the beginning of the academic year and continues throughout the entire course. It deals specifically with the requirement and skills of the laboratory, lab notebook documentation protocol, lab safety, and the lab report.

Unit Duration: 7 Weeks

Desired Results

Standard(s): HS-PS1-1, Periodic Table, HS-PS1-8 Atomic Structure and Nuclear Energy

Indicators: PS1.A, Structure and Properties of Matter
PS1.C, Nuclear Processes

Understandings:
Students will understand that…

1. Chemistry is the central science.
2. Chemistry is studied using the scientific method.
3. The periodic table is an organized chart of elements.
4. The periodic table is organized based on periodic properties of the elements.
5. The symbols on the periodic table represent the subatomic particles.
6. The atomic mass of an element is the weighted average atomic mass of the various isotopes.
7. All atoms have atomic structure that individually defines their identity and chemical reactivity.

Laboratory Practices:

1.Proper laboratory technique is applied to various equipment in the laboratory to prevent injury.

2.Safety hazards are unique to each experiment, and the laboratory in general.

3. Specified behaviors are expected in the laboratory.

4.The laboratory notebook has a specified protocol format to maintain integrity of the documentation.

Essential Questions:

1. Why learn Chemistry?
2. What is an atom?
3. What are subatomic particles?
4. How were the subatomic particles discovered?
5. How is the periodic table used to determine the placement of elements?
6. What are the groups or families of the periodic table?
7. What is an isotope?
8. What is weighted average atomic mass?
9. How is weighted average atomic mass calculated?

Laboratory Practices:

1.What are some of the dangerous situations that could develop in the laboratory environment?
2.Where are new developments in technology, medicine, and science discovered?
3. What is the importance of recording details and using lab documentation protocol in a laboratory notebook?
4. What would happen if there was no efficient way for scientists to share their discoveries?

Assessment Evidence

Performance Tasks:

1.List and describe the 3 subatomic particles
2.Define nuclear force
3.Define ion and isotope
4.Define and calculate average atomic mass
5.List the order, scientists and experiments that lead to the discovery of the 3 subatomic particles
6.Describe and list chronologically the events leading to the discovery of radioactivity on a timeline
7.List the three forms of natural radiation
8.List and describe common radioactive elements
9.Define Half-Life
10.Discover and Describe applications of radioactivity
11.Explain arrangement of the periodic table
12.Name groups on the periodic table
13.List and explain common periodic trends
14.Describe the chemical and physical differences between metals and nonmetals
15.Label oxidation numbers on the periodic table

Laboratory Practices

1.Identify and display proper use of safety equipment in laboratory settings
2. Identify the safety hazards unique to each experiment, and the laboratory in general
3. List the behaviors that a responsible student in a chemistry laboratory must follow
4. Read and understand the safety contract and procure a parent or guardian signature
5. Set-up the laboratory notebook using the proper format
6. Document laboratory experiments using specific skills
7. Write formal laboratory reports
8. Manage a laboratory team
9. Verify that all members of the team know the proper use of each piece of equipment
10. Plan and execute a guided experiment

Other Evidence:

1.Independent work

2.Section quizzes 1.1-1.3 and 1.4-1.7

3.Lab activities: L.E. Mint lab and Determining and Graphing the Half-Life of M&Mium lab

4.Web quests: ions and isotopes

5.Supplemental teacher materials as needed.

6.Peer evaluation

7.Self-evaluation

8.Project: Timeline of events leading to the discovery of radioactivity

9.Section tests 1.1-1.3 and 1.4-1.7

Benchmarks:

- SGO Pre-assessment for Lab and Content areas
- Cumulative Chapter 1 test
- Lab Notebook set up

Learning Plan

Learning Activities:

- View "Accident at Jefferson High" video
- Worksheet and lab quiz derived from 'accident at Jefferson High'
- Set up lab notebook using documentation protocol
- Pre – lab first lab
- Teacher generated lab "introduction to lab"
- Chapter 1 vocabulary
- Distribute Chapter 1 ppt. Notes/Lecture
- 1.1 The study of chemistry notes
- Sample problem 1.1 "Identifying a Neutral Atom Using Numbers of Subatomic particles" page 9
- 1.2 Atoms First notes
- 1.3 Subatomic particles and the nuclear model of the atom
- Textbook section 1.3 check point questions page 10
- View "Bill Nye- Atoms" Available in IMC 539.7 Ato
- Complete video questions
- Sections 1.1-1.3 study guide
- Section 1.1-1.3 quiz and test
- 1.4 Elements and periodic table notes
- Sample problem 1.2 "Identifying an element by its Atomic Number" page 11
- Sample problem 1.3 "Relating an Element's Identity to its Chemical Symbol and Atomic Number" pages 12 and 13
- Textbook section 1.4 check point questions page 13
- Discuss Elements in the Human Body
- View “Mendeleev: Father of the Periodic Table” Available in the IMC 540.92 Men
- Complete follow up questions derived from video
- 1.5 Organization of the periodic table notes
- Sample problem 1.4 "Identifying an Element as Metal, Nonmetal, or Metalloid by its Position on the Periodic Table" pages 14 and 15
- Textbook section 1.5 checkpoint questions page 16
- LAB Mr. L. E. Mint Activity
- 1.6 Isotopes notes
- Sample problem 1.5 "Determining the Numbers of Subatomic Particles in a Given Atom" page 18
- Textbook section 6 check point questions
- LAB Half-Life: Determining and Graphing the Half-Life of M&Mium
- 1.7 Atomic Mass notes
- Sample Problem 1.6 "Identifying the More Abundant Isotope Given Average Atomic Mass" page 20
- Sample Problem 1.7 "Calculating Average Atomic Mass Given Isotope Abundance" page 21
- Textbook section 1.7 check point questions page 21
- View "Chernobyl Nuclear Disaster” Available in IMC 363.17
- Follow up questions derived from video
- Section 1.4-1.7 study guide
- Sections 1.4-1.7 quiz and test
- Teacher generated lab assignments
- Teacher generated worksheets to fit students' needs
- Teacher approved web quest
- Chapter 1 test review
- Chapter 1 test

Resources:

- Textbook: Introductory Chemistry, An Atom's First Approach

Unit Learning Goal and Scale

(Level 2.0 reflects a minimal level of proficiency)

Standard(s): 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.

4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • 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. • Formulate the identity of an unknown element given known information.
2.0	**Students will be able to:** • Recognize or recall specific vocabulary (for example, atom, electron, proton, neutron, atomic mass, atomic number, molecule, element, nucleus, electron cloud, orbital. • Classify the subatomic the particles with regards to charge, size, and purpose. • Distinguish elements based of their atomic number, mass, and symbol
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Standard(s): HS-PS1-8. 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	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • 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. • Hypothesize the identity of an unknown element within a nuclear reaction. • Describe the processes of fission, fusion, alpha, beta, and gamma radioactive decay.
2.0	**Students will be able to:** • Recognize or recall specific vocabulary (for example, isotope, emission, decay, positron, alpha, beta, gamma, fusion, fission, nuclear reaction, radioactive, radioactive decay, half-life, spontaneous decay, transformation, nuclear force)
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Unit Modifications for Special Population Students	
Advanced Learners	Critical thinking problems and applications of skills presented.
Struggling Learners	Copy notes using fill in notes, collaborative learning activities, utilize all learning styles (visual, audio, kinesthetic etc.)
English Language Learners	Translation of notes in their native language. http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered

		• Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504	Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.	

Interdisciplinary Connections

Indicators:
Embedded English Language Arts/Literacy and Mathematics Standards
English Language Arts/Literacy
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.
WHST.9-12.2, Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.9-12.5, Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
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.
WHST.11-12.8, Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
WHST.9-12.9, Draw evidence from informational texts to support analysis, reflection, and research.
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.

Mathematics
MP.2 Reason abstractly and quantitatively.
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.

Integration of 21st Century Skills

Indicators:
Career Ready Practices
CRP2 – Apply appropriate academic and technical skills.
CRP5 – Consider the environmental, social and economic impacts of decisions.
CRP6 – Demonstrate creativity and innovation.
CRP7 – Employ valid and reliable research strategies.
CRP8 – Utilize critical thinking to make sense of problems and persevere in solving them.
CRP10 – Plan education and career paths aligned to personal goals.
CRP11 – Use technology to enhance productivity.
CRP12 – Work productively in teams while using cultural global competence.
9.2 Career Awareness, Exploration, and Preparation
9.2.12.C.1 – Review career goals and determine steps necessary for attainment.
9.2.12.C.3 – Identify transferable career skills and design alternate career plans.
9.2.12.C.6 – Investigate entrepreneurship opportunities as options for career planning and identify the knowledge, skills, abilities, and resources for owning and managing a business.

Unit Title: Unit 2 Electrons and the Periodic Table

Unit Description:

This unit will review the properties of light, also known as electromagnetic radiation and how it is used to further the understanding of the electron structure in atoms. The electrons locations in an atom will be also determined. The arrangement of the electrons will determine some of the atom's properties will be explored.

Unit Duration: 4 Weeks

Desired Results

Standard(s):HS-PS1-1, Periodic table HS-PS4-1, Waves HS-PS4-4 , Electromagnetic Radiation

Indicators: PS1.A,Structure of Matter PS4.A, Wave Properties PS4.B, Electromagnetic Radiation

Understandings:
Students will understand that…

1. Electromagnetic Radiation is a property of light.
2. Light is used to further the understanding of electrons.
3. An atoms properties are effected by the arrangement of electrons.
4. Stars far away from earth can be studied by the light energy interacting with atoms.
   Light is one of the ways that energy can be transmitted in the form of waves (which has components).

Essential Questions:

1. What is spectroscopy?
2. Can spectroscopy be used to identify elements present in different substances?
3. What are the different components of a wave?
4. What is wavelength, frequency, speed of light?
5. How are the components related to one another?
6. How are the elements placed on the periodic table?
7. Does the periodic table have trends?
8. What are the trends of the periodic table?

Assessment Evidence

Performance Tasks:

1.Describe the electromagnetic and visible light spectrums.
2. List chronologically and describe the 4 models of the atom.
3.Explain wave-particle duality.
4.List and define the 4 quantum numbers.
5.Write electron configurations.
6.Draw Lewis dot structures.
7.Explain arrangement of the Periodic Table.

Other Evidence:

1.Independent work
2.Section quizzes 2.1-2.3 and 2.4-2.8
3.Lab notebook: Flame Test lab
4.Web quests: Periodic Table
5.Project: Element poster
6.Supplemental teacher materials as needed.
7.Peer evaluation

8.Names/ groups on the Periodic Table. 9. List and explain common periodic trends. 10.Describe the chemical and physical differences between metals and nonmetals. 11.Label oxidation numbers on the Periodic Table.	8.Self evaluation 9. Section tests 2.1-2.3 and 2.4-2.8

Benchmarks:

- Chapter 2 test

Learning Plan

Learning Activities:

- Discussion and demonstration of laser pointers
- Chapter 2 vocabulary
- Chapter 2 ppt. Notes/Lecture
- 2.1The nature of Light notes
- 2.2 The Bohr Atom notes
- Safari Montage; Atomic Structure and Periodic Table (20-minute video- In Atomic Structure & the Periodic Table, viewers explore the historical experiments by scientists Thomson and Rutherford, which led to the discovery of subatomic particles and the development of nuclear theory).
- Sample problem 2.1 "Using the Bohr Model to Identify Electron Transitions that Emit Light" page 40
- Textbook section 2.2 check point questions page 40
- Video clip of fireworks and laser light show
- Discussion of fireworks
- Discussion of the photoelectric effect
- Flame test lab demonstration
- 2.1 and 2.2 quiz review
- 2.1 and 2.2 quiz
- 2.3 Atomic Orbital notes
- Sample problem 2.2 "Identifying Legitimate Combinations of Quantum Numbers to Design Atomic Orbitals" page 45 and 46
- Textbook section 2.3 check point questions page 46
- Electron configuration diagrams
- Spectroscopy lab
- Sections2. 1-2.3 study guide
- Section 2.12.-3 quiz and test
- 2.4 Electron Configuration notes
- Sample problem 2.3 "Writing Electrons Configurations and Drawing Orbital Diagrams for Elements in the Third Period" page 50
- Textbook section 2.4 check point questions page 51
- 2.5 Electron Configuration and the Periodic Table notes
- Safari Montage; Periodic Table-Periods and Groups. (5-minute video clip)
- Sample Problem 2.4 "Writing Electron Configurations Using a Noble Gas Core" pages 52 and 53
- Sample Problem 2.5 "Identifying the Valence in Electron Configurations" page 54
- Textbook section 2.5 checkpoint questions page 55
- 2.6 Periodic Trends notes
- Sample problem 2.6 "Predicting Relative Atomic Sizes Based on Position on the Periodic Table" page 56
- Sample problem 2.7 "Assessing Relative Metallic Character Based on Position on the Periodic Table" page 58
- Sample problem 2.8 "Comparing the Ease with Which Atoms of Different Elements Can Lose Electrons" page 59
- Wave equation manipulation and calculations.
- Teacher generated lab work

- Reinforcement materials tailored to fit student needs
- Teacher approved web quest
- Sections2.4-2.8 study guide
- Section 2.4-2.8 quiz and test
- Chapter 2 test review
- Chapter 2 test

Resources:

1. Textbook: Introductory Chemistry, An Atom's First Approach

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s) 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.	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • · 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. · • Construct electron configurations based on orbital diagrams and vice versa. · • Hypothesize the identity of an element based on given periodic trends and group information
2.0	**Students will be able to:** • Recognize or recall specific vocabulary (for example, octet rule, electron configuration, orbital diagram, Pauli Exclusion Principle, Uncertainty Principle, orbital shapes, quantum, ground state, excited state, quantum numbers, Aufbau Principle, Hund's Rule, ionization energy, electronegativity, electron affinity, atomic radius, period law, group, period, group names) · • Describe Pauli Exclusion Principle, Uncertainty Principle, Aufbau Principle, and Hund's Rule • Classify elements by their group name · • Compare elements based on the periodic trends
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Standard(s): HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
2.0	**Students will be able to:** • Recognize or recall specific vocabulary (for example, electromagnetic radiation, frequency, wavelength, amplitude, medium, properties of waves, speed, vacuum, wave, wave packet.) • Describe the relationship between, speed, energy, frequency, amplitude, and wavelength.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Standard(s)	HS-PS4-4. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. · • Differentiate between the different types of radiation and their corresponding damage to different substances. · • Identify substances based on their spectrum emitted when given a known set of spectrums
2.0	**Students will be able to:** • Recognize or recall specific vocabulary (for example, absorb, damage, radiation, energy, frequency, infrared radiation, light, matter, photon, spectroscopy, line spectrum, emission spectrum, spectroscope.) · • Recall claims about the effects of the different types of electromagnetic radiation when absorbed by matter. · Satisfactory use of a spectroscope
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Standard(s): HS-PS4-3. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.
2.0	**Students will be able to:** • Recognize or recall specific vocabulary (for example, electromagnetic, radiation, photoelectric effect, wave model, interference, duality) · Describe the wave/ particle duality of radiation.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Unit Modifications for Special Population Students	
Advanced Learners	Critical thinking problems and applications of skills presented.
Struggling Learners	Copy notes using fill in notes, collaborative learning activities, utilize all learning styles (visual, audio, kinesthetic etc.)
English Language Learners	Translation of notes in their native language. http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:

		• Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
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Interdisciplinary Connections

Indicators:

Embedded English Language Arts/Literacy and Mathematics Standards

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WHST.9-12.5, Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

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.

WHST.11-12.8, Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

WHST.9-12.9, Draw evidence from informational texts to support analysis, reflection, and research.

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.

Mathematics

MP.2 Reason abstractly and quantitatively.

MP.4 Model with mathematics.

HSN-Q.A.1, Use units 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.

Integration of 21st Century Skills

Indicators:
Career Ready Practices
CRP2 – Apply appropriate academic and technical skills.
CRP5 – Consider the environmental, social and economic impacts of decisions.
CRP6 – Demonstrate creativity and innovation.
CRP7 – Employ valid and reliable research strategies.
CRP8 – Utilize critical thinking to make sense of problems and persevere in solving them.
CRP10 – Plan education and career paths aligned to personal goals.
CRP11 – Use technology to enhance productivity.
CRP12 – Work productively in teams while using cultural global competence.
9.2 Career Awareness, Exploration, and Preparation 9.2.12.C.1 – Review career goals and determine steps necessary for attainment. 9.2.12.C.3 – Identify transferable career skills and design alternate career plans. 9.2.12.C.6 – Investigate entrepreneurship opportunities as options for career planning and identify the knowledge, skills, abilities, and resources for owning and managing a business.

Unit Title: Unit 3 Compounds and Chemical Bonds

Unit Description:

This unit will discuss the states of matter, define what a mixture is and properties of matter. Ionic Bonding and binary ionic compounds will be discussed and how they are formed. Naming of compounds using the names of the cations and anions that comprise them is covered. Covalent bonding and molecules will also be discussed and how they are named using the prefix system. Polyatomic ions will be discussed and named.

Unit Duration: 5 weeks

Desired Results

Standard(s): HS-PS1-3, Particle electrical forces, HS-PS2-6, Molecular Structure

Indicators: PS2.B, Types of Interactions, PS1.A, Properties of Matter

Understandings:
Students will understand that…
1. If the atomic structure is known, bond type, crystalline structure, molecular shape, physical and chemical properties can be predicted.
2. The octet rule and the desire of all elements to have a stable outer level of electrons, drives bonding.
3. The electronegativity of an atom determines the type of chemical bond that is formed in a chemical reaction.
4. The shape of molecules is determined by the repulsion between electrons in chemical bonds and non-bonded valence electrons.
5. Bond type dictates chemical and physical properties, which leads to the extensive diversity of crystal solids, liquids and gas compounds.
6. Chemists have the ability to manipulate atoms and synthesize new compounds with desirable properties.
7. The position of an element on the periodic table determines the charge of the ion to form, which allows a neutral ionic compound.

Essential Questions:
1. How are the atomic structure and the chemical properties of an atom related?
2. Why do atoms enter into chemical bonds?
3. What happens when electrons in the bonds interact with each other?
4. Which elements are likely to gain electrons? Lose electrons?
5.How are ionic and covalent compounds named?
6.How are acids named?
7. What evidence is seen in everyday life that provides evidence that different types of chemical bonds exist?
8. What special chemical properties have chemists designed into materials such as: Teflon, space shuttle tiles, superglue, plastic, stainless steel?

Assessment Evidence

Performance Tasks:

1.Define and differentiate between the states of matter
2.Define and differentiate between different types of compounds
3. Define valence electrons
4. Explain and diagram ion formation
5.Use the octet rule to determine the oxidation number of ions
6.Define and name various ions
7.Use the crisscross method to write chemical formulas
8.Explain difference between covalent, ionic and metallic bonds
9.Explain how hydrogen bonding works
10.Name the major types of compounds
11.Name various ionic compounds
12. Name various covalent compounds
13. Describe how acids are named

Other Evidence:

1.Independent work
2.Section quizzes: 3.1-3.2, 3.3, 3.4-3.6,3.7
3.Lab notebook: writing and naming formula lab
4.Web quests: naming and writing formulas
5.Supplemental teacher materials as needed.
6.Peer evaluation
7.Self-evaluation
8.Section Tests 3.1-3.2, 3.3, 3.4-3.6,3.7

Benchmarks:

- Chapter 3 Test

Learning Plan

Learning Activities:

- Textbook Chapter 3 power point notes/lecture
- chapter 3 vocabulary
- 3.1 Matter: Classifications of Properties Notes
- Sample problem 3.1 "Distinguishing Pure Substances and Mixtures" page 79
- Sample problem 3.2 "Distinguishing Physical and Chemical Properties" page 79 and 80
- Textbook section 3.1 Checkpoint questions page 80
- 3.2 Ionic Bonding and Binary Ionic Compounds Notes
- Everyday Chemistry; Hard Water
- Sample Problem 3.3 "Determining Formulas for Binary Ionic Compounds: pages 82 and 83
- Sample Problem 3.4 Determining Formulas for Type II Binary Ionic Compounds, pg. 84
- Textbook Checkpoint – section 3.2 pg. 85
- Section 3.1-3.2 quiz review
- Section 3.1-3.2 quiz
- Section 3.1-3.2 test
- 3.3 Naming Ions and Binary Ionic Compounds Notes
- Sample problem 3.5 Naming Metal Cations, pg. 86
- Sample problem 3.6 Naming Binary Ionic Compounds, pg.88
- Textbook Checkpoint – section 3.3, pg. 89
- Section 3.3 quiz review
- Section 3.3 quiz
- 3.4 Compounds and Chemical Bond Notes
- How it works; Cement. Students learn how cement is made and why hydrates allow cement to be liquid enough to be poured and then solid when hardened.
- Sample Problem 3.7 Determining Molecular Formula Given a Molecular Model, pg. 93
- Sample problem 3.8 Determining Empirical Formula from Molecular Formula, pg. 95
- Textbook Checkpoint – section 3.4, pg. 96

- 3.5 Naming Binary Molecular Compound Notes
- Sample problem 3.9 Naming Binary Molecular Compounds, pg. 97
- Sample problem 3.10 Determining Molecular Formula Given a Compound's Name, pg. 98
- Textbook Checkpoint – section3.5, pg. 99
- 3.6 Covalent Bonding in Ionic Species: Polyatomic Ions Notes
- Sample problem3.11 Naming Ionic Compounds with Polyatomic Ions, pg. 103
- Sample problem 3.12 Determining Formulas from Compound Names, pg. 103
- Textbook Checkpoint – section 3.6, pg. 104-105
- Section 3.4-3.6 quiz review
- Section 3.4-3.6 quiz
- Section 3.4-3.6 test
- 3.7 Acids; Notes
- Sample problem 3.13 Naming Acids, pg. 107
- Textbook Checkpoint– section 3.7, pg. 107
- 3.8 Substances in Review Notes
- Key Skills Naming compounds, pg. 115
- Questions and Problems, pg. 117
- Teacher generated lab work
- Reinforcement materials tailored to fit student needs
- Teacher approved web quest
- Chapter 3 test review
- Chapter 3 test

Resources: Textbook:

1. Introductory Chemistry An Atoms First Approach

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): 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.	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Construct an investigation to assess evidence of the structure of various substances macroscopically to draw a conclusion of the forces that exist between particles • Explain why certain substances possess characteristics based on the existing bond type.
2.0	**Students will be able to:** • Predict the type of bond utilizing specific vocabulary • Compare the various forces that hold molecules together.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Standard(s): HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Develop a logical argument why the molecular-level structure is crucial for the functionality of

	Synthetic materials. • Construct the formulas and names of various compounds based on the rules for writing and naming compounds.
2.0	**Students will be able to:** • Classify and predict the types of bonds formed based on the location of the ions or elements involved in the compound.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Unit Modifications for Special Population Students	
Advanced Learners	Critical thinking problems and applications of skills presented.
Struggling Learners	Copy notes using fill in notes, collaborative learning activities, utilize all learning styles (visual, audio, kinesthetic etc.)
English Language Learners	Translation of notes in their native language. http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504 Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.	

Interdisciplinary Connections

Indicators:
Embedded English Language Arts/Literacy and Mathematics Standards
English Language Arts/Literacy
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.
WHST.9-12.2, Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.9-12.5, Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
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.
WHST.11-12.8, Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
WHST.9-12.9, Draw evidence from informational texts to support analysis, reflection, and research.
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.

Mathematics
MP.2 Reason abstractly and quantitatively.
MP.4 Model with mathematics.

Integration of 21st Century Skills

Indicators:
Career Ready Practices
CRP2 – Apply appropriate academic and technical skills.
CRP5 – Consider the environmental, social and economic impacts of decisions.
CRP6 – Demonstrate creativity and innovation.
CRP7 – Employ valid and reliable research strategies.
CRP8 – Utilize critical thinking to make sense of problems and persevere in solving them.
CRP10 – Plan education and career paths aligned to personal goals.
CRP11 – Use technology to enhance productivity.
CRP12 – Work productively in teams while using cultural global competence.
9.2 Career Awareness, Exploration, and Preparation 9.2.12.C.1 – Review career goals and determine steps necessary for attainment. 9.2.12.C.3 – Identify transferable career skills and design alternate career plans. 9.2.12.C.6 – Investigate entrepreneurship opportunities as options for career planning and identify the knowledge, skills, abilities, and resources for owning and managing a business.

Unit Title: Unit 4 The Mole and Chemical Formulas (chapter 5)

Unit Description:

This unit will discuss how chemists count atoms and molecules by weighing macroscopic samples of matter.

Unit Duration: 5 weeks

Desired Results

Standard(s): HS-PS1-7, Conservation of Mass

Indicators: PS1.B, Chemical Reactions

Understandings:

Students will understand that…

1. The mole is an enormous number that allows chemists to count incredibly small atoms, ions and molecules by weighing and defining in terms of grams per mole.
2. The mole is known as Avogadro's number.
3. Converting between number of particles can be accomplished using Avogadro's number.
4. Molar mass is a conversion factor used to convert from mass to moles and vice versa.
5. Molar Mass of compound is used to calculate the number of moles of a compound.
6. Mass percent composition can be determined by the mass of each element the makes up a compound.

Essential Questions:

1. Why do chemists need to use the mole?
2. What can a Stoichiometry problem tell you?
3. What is mass percent of compounds?

Assessment Evidence

Performance Tasks:

1. Define Stoichiometry
2. Define Molar mass
3. Count atoms in compounds
4. Calculate Molar Mass
5. Covert from Moles to Grams, Volume, Atoms and all metric units

Other Evidence:

1. Independent work
2. Section quizzes 5.1-5.2 and 5.3
3. Lab notebook: Mole zoo lab
4. Web quests: investigating the mole
5. Supplemental teacher materials as needed.
6. Peer evaluation
7. Self-evaluation
8. Section quizzes 5.1-5.2 and 5.3
9. Section Tests 5.1-5.2 and 5.3
10. Midterm review
11. Project: "What's It All About?" Trifold

Benchmarks:

- Chapter 5 Test
- Mid-term exam

Learning Activities:

- MULTIMEDIA: The Amazing Mole Available in IMC 541 Ama
- Textbook Chapter 5 power point notes/lecture
- Chapter 5 vocabulary
- 5.1 Counting Atoms by Weighing notes
- Sample Problem 5.1 “Converting Between Moles of an Element and Number of Atoms” pg. 164
- Sample Problem 5.2 “Converting Between Mass of An Element and Number of Moles” pg. 167
- 5.2 Counting Molecules by Weighing
- LAB: Stoichiometry of a Chemical Equation demonstration

- Sample problem 5.4 “Converting Mass, Moles, and Molecules (or Formula Units) by combining Conversions in a single Calculation” page 172
- Textbook Checkpoint section 5.2 page 175
- Section 5.1-5.2 quiz review
- Section 5.1-5.2 quiz
- Section 5.1-5.2 test
- 5.3 Mass Percent Composition notes
- Sample Problem 5.7 “Determining Mass Percent Composition Using Chemical Formula” page 176
- Textbook: Checkpoint section 5.3 page 177
- Section 5.3 quiz review
- Section 5.3 quiz
- Section 5.3 test
- Suggested Web quest links related to the Mole
- Investigating the mole and Calculating with it! http://zunal.com/webquest.php?w=175927
- Teacher generated lab work
- Reinforcement materials tailored to fit student needs
- Teacher approved web quest
- LAB: Mole Zoo lab
- Chapter 5 test review
- Chapter 5 test
- Project: "What's It All About?" Trifold
- Midterm Review
- Midterm

Resources: Textbook:

- Introductory Chemistry, An Atoms First Approach

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Assess the number of atoms of each element in a compound. • Formulate the molar mass of various compounds. • Construct a dimensional analysis chart to convert moles to mass and vice versa. • Assess the percent composition of various compounds.
2.0	**Students will be able to:** • Relate molar mass to Avogadro's number. • Classify various conversions by examining the type of classifications involved.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Unit Modifications for Special Population Students	
Advanced Learners	Critical thinking problems and applications of skills presented.
Struggling Learners	Copy notes using fill in notes, collaborative learning activities, utilize all learning styles (visual, audio, kinesthetic etc.)

English Language Learners	Translation of notes in their native language. http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
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Mathematics
MP.2 Reason abstractly and quantitatively.
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.

Integration of 21st Century Skills

Indicators:
Career Ready Practices
CRP2 – Apply appropriate academic and technical skills.
CRP5 – Consider the environmental, social and economic impacts of decisions.
CRP6 – Demonstrate creativity and innovation.
CRP7 – Employ valid and reliable research strategies.
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Unit Title: Unit 5 Molecular Shape (Chapter 6)

Unit Description:

This unit discusses how to draw Lewis structures for molecules and polyatomic ions. Also, identifying polar chemical bonds and the attractive forces that hold the molecules together in a pure substance. Shapes of molecules will also be discussed in detail.

Unit Duration: 5 weeks

Desired Results

Standard(s): HS-PS1-1, Patterns of Electrons

Indicators: PS1.A, Structure of Matter, PS2.B, Types of Interactions

Understandings:
Students will understand that…
1. Lewis structures are used to predict the shape of molecules.
2. The octet rule states that atoms will lose or gain electrons so that each atom is surrounded by eight electrons.
3. Atoms form covalent bonds by sharing electrons.
4. Shared electron pairs are represented by dashed lines, unshared pairs are represented by dots.
5. Polar chemical bonds can be identified.
6.There are attractive forces that hold molecules and atoms together.

Essential Questions:
1.How are Lewis structures drawn?
2.What is the octet rule and how is it used to draw Lewis structures?
3.What are the various shapes of molecules?
4.How are Lewis structures used to predict the shape of molecules?
5.How can one identify polar chemical bonds?
6. What are the attractive forces that hold molecules and atoms together in a pure substance?

Assessment Evidence

Performance Tasks:

- Draw Lewis dot structures
- Determine the types of bonds that are formed in various molecules
- Determine the shape of various molecules
- Classify various bonds as nonpolar, polar, or ionic

Other Evidence:

1. Independent work
2. Lab notebook quiz
3. Lab notebook: Models of Molecules
4. Web quests: shapes of molecules
5. Projects: Lewis Structure poster
7. Supplemental teacher materials as needed.
8. Peer evaluation
9. Self-evaluation
10. Section quizzes 6.1-6.2 and 6.4-6.5 quiz

Benchmarks:

- Chapter 6 Test
- SGO Post-Assessment

Learning Plan

Learning Activities:

- Safari Montage: Lewis Dot Structure
- Textbook Chapter 6 power point notes/lecture
- Chapter 6 vocabulary
- Chapter 6 Molecular shape notes
- 6.1 Drawing Simple Lewis Structures
- SAMPLE PROBLEM 6.1 Drawing Lewis Structures for Molecules and Polyatomic Ions, pg. 197
- Textbook: CHECKPOINT – SECTION 6.1, pg. 198
- 6.2 Lewis Structures Continued notes
- SAMPLE PROBLEM 6.2 Drawing Lewis Structures with Double or Triple Bonds, 199
- Textbook: CHECKPOINT – SECTION 6.2, pg. 201
- Sections 6.1-6.2 quiz review
- Sections 6.1-6.2 quiz
- 6.4 Molecular Shape notes
- SAMPLE PROBLEM 6.4 Determining Shapes and Bond Angles for Molecules and Polyatomic Ions, pg. 208
- Textbook: CHECKPOINT – SECTION 6.4, pg. 210
- 6.5 Electronegativity and Polarity notes
- SAMPLE PROBLEM 6.5 Comparing Electronegativity Values Using the Periodic Table, pg. 212
- SAMPLE PROBLEM 6.6 Classifying Bonds as Ionic, Polar Covalent, or Covalent, pg. 214
- SAMPLE PROBLEM 6.7 Assessing Molecular Polarity, pg. 216
- Textbook: CHECKPOINT – SECTION 6.5, pg. 217

- KEY SKILLS PROBLEMS, pg. 230
- Lab: Models of Molecules
- Teacher generated lab work
- Reinforcement materials tailored to fit student needs
- Teacher approved web quest
- Sections 6.4-6.5 quiz review
- Sections 6.4-6.5 quiz
- Chapter 6 test Review
- Chapter 6 test

Resources:

- **Textbook;** Introductory Chemistry, An Atoms First Approach

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): 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.	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Construct an investigation to obtain data to compare the structure of substances at the macroscopic level to discuss the intermolecular forces among particles • draw conclusions on why the molecular-level structure is important in the functioning of materials • Construct various Lewis diagrams of compounds
2.0	**Students will be able to:** • Classify the shape of various molecules based on bond angles • Interpret /Lewis diagrams • Summarize the various vocabulary within the chapter
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Unit Modifications for Special Population Students	
Advanced Learners	Critical thinking problems and applications of skills presented.
Struggling Learners	Copy notes using fill in notes, collaborative learning activities, utilize all learning styles (visual, audio, kinesthetic etc.)
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Mathematics
MP.2 Reason abstractly and quantitatively.
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.

Integration of 21st Century Skills

Indicators:
Career Ready Practices
CRP2 – Apply appropriate academic and technical skills.
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Unit Title: Unit 6 (Chapter 7 and 8) Solids, Liquids, Gases and Phase Changes

Unit Description:

This unit discusses and develops an understanding of the attractive forces that hold atoms, molecules, or ions together in liquids and solids and how the magnitudes of those attractive forces affect the observable physical properties of substances in the condensed phases**.** Properties of gases will also be discussed, along with the units of pressure.

Unit Duration: 5 weeks

Desired Results

Standard(s): HS-PS3-4, Thermal Energy, HS-PS1-3, Particle Forces

Indicators: PS1.A, Properties of Matter, PS1.B, Bond Energy, PS2.B, Intramolecular Forces

Understandings:
Students will understand that…
1.There are different types of solids and physical properties associated with them.
2.Viscosity, surface tension, vapor pressure, and boiling point are physical properties of liquids.
3.Phases changes are associated with energy absorbed or emitted by substances.
4.Gases have different properties.
5.The kinetic molecular theory explains the nature of gases.
6.Standard atmospheric pressure can be expressed in various units.

Essential Questions:
1. What are the types of solids?
2. What are the physical properties of solids and liquids?
3. How are energy changes related to phase changes?
4. What are the names of the phase changes.
5. What is pressure and the units of pressure?
6. What devices are utilized to measure pressure?

Assessment Evidence

Performance Tasks:

1. Define and discuss the different types of solids
2. Discuss how the physical properties of solids effect the phase change.
3. Define and give examples of allotropes.
4. Discuss how the physical properties of liquids effect phase changes.
5. Explain why different cooking instructions are specified for areas of high altitude
6. Define specific heat or specific heat capacity
7. Calculate the energy required to raise or lower the temperature of various substances
8. Discuss Kinetic Molecular Theory Gases
9. Define pressure and convert units of pressure

Other Evidence:

1.Independent work

3.Lab notebook: Phase Change lab

4.Web quests: States of matter

5.Project: Science fair project

6.Independent work

7.Supplemental teacher materials as needed.

8.Peer evaluation

9.Self-evaluation

10. Section quizzes 7.1 - 7.5 and 8.1-8.2

Benchmarks:

- Chapter 7 and 8 Test

Learning Plan

Learning Activities:

- Textbook Chapter 7 and 8 power point notes/lecture
- Chapter 7 and 8 vocabulary
- Multimedia: Heat and Temperature DVD 536.56 Abs (available on IMC)
- 7.1 General Properties of the Condensed Phases notes
- 7.2 Types of Solids notes
- Sample Problem 7.1 Using Chemical Formula to Determine Crystalline Solid Type page 242
- 7.3 Physical Properties of Solids notes
- Sample Problem 7.2 Comparing Vapor Pressures of Different Solids page 244
- Sample Problem 7.3 Comparing Melting Points of Different Solids page 246
- Textbook Checkpoint Section 7.3 page 246-247
- 7.4 Physical Properties of Liquids notes
- Sample problem 7.4 Comparing Surface Tensions of Different Liquids page 252
- Textbook Checkpoint Section 7.4 page 253
- 7.5 Energy and Physical Changes notes
- Lab: States of Matter
- 7.1-7.5 quiz review
- 7.1 - 7.5 quiz
- Gases and states of matter-standard deviants 540 Gas (available on IMC)

- 8.1 Properties of Gases notes
- 8.2 Pressure notes
- Sample 8.1 Converting between Different Units of Pressure page 274
- Textbook Checkpoint Section 8.2 page 277
- Teacher generated lab work
- Reinforcement materials tailored to fit student needs
- Teacher approved web quest
- 8.1-8.2 quiz review
- 8.1-8.2 quiz
- Science Fair project
- Chapter 7 and 8 test review
- Chapter 7 and 8 test

Resources

1.Textbook- Introductory to Chemistry; An Atoms First Approach

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): HS-PS3-4. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Differentiate between the different types of solids, liquids and gases. • Cite evidence of how various physical properties of solids affect the phase change. • Develop a logical argument of the cooking instructions for locations of high altitude.
2.0	**Students will be able to:** • Relate energy required to phase changes of substances**.**
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Standard(s): 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	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • 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. • Construct models to represent the solid, liquid and gas phases of various materials.
2.0	**Students will be able to:** • Categorize various samples of materials into their phase of matter based on diagrams of the particles. • Predict phase changes of various materials.

1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Unit Modifications for Special Population Students	
Advanced Learners	Critical thinking problems and applications of skills presented.
Struggling Learners	Copy notes using fill in notes, collaborative learning activities, utilize all learning styles (visual, audio, kinesthetic etc.)
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MP.2 Reason abstractly and quantitatively.
MP.4 Model with mathematics.
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Integration of 21st Century Skills

Indicators:
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Unit Title: Unit 7 (Chapter 10 and 11) Chemical Reactions and Chemical Equations

Unit Description:

This unit will introduce chemical reactions. How to represent chemical reactions with chemical equations and symbols. Using chemical equations to solve problems will be explored. Types of chemical reactions are discussed.

Unit Duration: 5 weeks

Desired Results

Standard(s): HS-PS1-2, Chemical Reactions, HS-PS1-7, Conservation During Chemical Reactions

Indicators: PS1.A, Structure and Properties of Matter, PS1.B, Chemical Reactions

Understandings:

Students will understand that…

1. Balanced chemical equations represent chemical reactions.
2. There are five types of chemical reactions: synthesis, decomposition, single displacement, double displacement, and combustion reactions.
3. Every chemical reaction involves a change in energy which results from the difference in the potential energy of the chemical bonds of the reactants and products. This energy can be measured/calculated and used in stoichiometric calculations
4. The conservation of matter is demonstrated by balancing chemical equations that are properly written.
5. Balanced equations are used to solve quantitative problems.

Essential Questions:

1. How do chemical equations describe chemical reactions?
2. How are chemical reactions balanced by changing coefficients?
3. How are the five major types of chemical reactions classified?
4. What are the characteristics of the five major types of chemical reactions?
5. What are limiting reactants?
6. What is percent yield?

Assessment Evidence

Performance Tasks:

dentify and or label various chemical equations by type.
Construct chemical equations and use coefficients to
ance them.
Define Stoichiometry.
Calculate Molar Mass.
Conert from Moles to Grams, Atoms and all metric units.
Solve Mass to Mass type Stoichiometry problems.
Solve limiting reactant type Stoichiometry problems.

Other Evidence:

1.Independent work

2.Lab notebook: Rice Krispy Lab

3.Web quests: Limiting reactant

4.Supplemental teacher materials as needed.

5.Peer evaluation

6.Self evaluation

7.Section Quizzes Section 10.1-10.4 and 11.1-11.3

8.Section Tests 10.1-10.4 and 11.1-11.3

Benchmarks:

- Chapter 10 and 11 Test

Learning Plan

Learning Activities:

- Demo: observe a chemical reaction
- Chapter 10 vocabulary
- Textbook Chapter 10 and 11 power point notes/lecture
- 10.1 Recognizing Chemical Reactions notes
- Multimedia- Chemical Reaction-Bill Nye. DVD 541 Che
- Sample problem 10.1 "Identifying Chemical Reactions" pages 346-347
- Textbook Checkpoint Section 10.1 pages 347-348
- 10.2 Representing Chemical Reactions with Chemical Equations notes
- 10.3 Balancing Chemical Equations notes
- Sample Problem 10.2 Writing and Balancing Chemical Equations pages 351-352
- Textbook Checkpoint Section 10.3 pages 354-355
- 10.4 Types of Chemical Reactions notes
- Create a foldable study organizer for the types of chemical reactions
- Sample Problem 10.8 Identifying Various Types of Redox Reactions page 369
- Section 10.1-10.4 Quiz Review
- Section 10.1-10.4 Quiz
- Section 10.1 - 10.4 test
- Chemical Reactions and Equilibrium. DVD 541 Che
- Chapter 11 vocabulary
- 11.1 Mole to Mole Conversions notes
- Sample problem 11.1 "Using a Balanced Equation to Convert from Moles of Reactant to Moles of Product" pages 384-385
- Textbook Checkpoint Section 11.1 page 385
- 11.2 Mass to Mass Conversions notes
- Sample Problem 11.2 "Using a Balanced Equation to Convert Between Reactant Mass and Product Mass" Pages 386-387
- Textbook Checkpoint Section 11.2 Page 387
- 11.3 Limitations on Reaction Yield notes
- Sample Problem 11.3 "Determining Limiting Reactant, Mass of Product, and Mass of Excess Reactant Remaining After Reaction" pages 389-390
- Teacher generated lab work
- Rice Krispy Lab (limited reactant lab)
- Reinforcement materials tailored to fit student needs.
- Teacher approved web quest
- Sections 11.1-11.3 quiz review
- Sections 11.1-11.3 quiz
- Section 11.1-11.3 test
- Chapter 10 and 11 test review

Resources:

1. Textbook- Introductory to Chemistry; An Atoms First Approach

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): 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.	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:**

	• 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 • Differentiate between the five types of reactions. • Investigate why equations are balanced. • Compare the differences between subscripts and coefficient.
2.0	**Students will be able to:** • Predict types of reaction • classify equations • Demonstrate how to balance equations**.**
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Standard(s): HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction • Calculate the moles of an unknown substance when provided moles of a given substance in a balanced chemical equation. • Calculate the moles of an unknown substance when provided mass of a given substance in a balanced chemical equation. • Calculate the mass of an unknown substance when provided mass of a given substance in a balanced chemical equation.
2.0	**Students will be able to:** • Recognize or recall specific vocabulary (for example, atom, atomic mass, molar mass, mole, gram, mass, conserve, product, reactant, energy, percent yield, actual yield, theoretical yield, limiting reactant, excess reactant, mole ratio, stoichiometry.)
1.0	**With help, partial success at level 2.0 content and level 3.0 content**
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Unit Modifications for Special Population Students	
Advanced Learners	Critical thinking problems and applications of skills presented.

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Unit Title: Unit 8. The Impact of Chemistry on the Environment.

Unit Description:

This unit will describe how the environment is affected by chemistry and how human activity adversely impacts the environment and various species.

Unit Duration: 4 weeks

Desired Results

Standard(s)

HS-LS2-7, Impact of Human Activity on the Environment, HS-LS4-6, Test a Solution to Mitigate Impact, HS-LS2-3, Cycling of Matter and Energy Flow

Indicators:

LS2.B, Energy Transfer, LS2.C, Ecosystem Dynamics and Resilience LS2.D, Social Interactions, PS3.D, Energy in Chemical Processes

Understandings:

Students will understand that…

1. Chemistry impacts life in many different facets.
2. Organisms are classified according to their scientific classification.
3. Organisms may be found in their specific biome
4. Organisms obtain energy in different ways.
5. Organisms are capable of reproduction at various rates
6. Organisms have different roles in the ecosystem; producer, herbivore, omnivore, carnivore, decomposer.
7. A species is subjected to a variety of threats and solutions that impact their survival.

Essential Questions:

1. What is the classification of a specific species?
2. What biome is the organism found in?
3. What are the main characteristic of the biome? (abiotic factors, dominant plants, wildlife, geographical distribution).
4. What is the distribution of the organism within the World Biome?
5. Does the organism have a migration pattern?
6. How does the organism obtain energy?
7. How often does the organism reproduce?
8. What is the gestation period?
9. How many offspring are born at once?
10. Is the organism a producer, herbivore, omnivore, carnivore or decomposer?
11. What threats does the organism face within its ecosystem due to the introduction of chemicals into the environment?
12. What measures are being taken to protect the organism?

Assessment Evidence

Performance Tasks:

1. Choose an endangered species
2. Research animal
3. Create a live binder
4. Write a research paper
5. Create a power point presentation of endangered species
6. Present endangered species power point
7. Collect data on other projects from peer's class presentations

Other Evidence:

1. Independent Practice.
2. Vocabulary quizzes
3. Web quests: Endangered Species
4. Independent work
5. Measured Student achievement based on provided project rubric
6. Supplemental teacher materials as needed.
7. Peer evaluation
8. Self evaluation

Benchmarks:

- Endangered Species Project
- Final Exam

Learning Plan

Learning Activities:

- Environmental Science Vocabulary
- Vocabulary Quiz
- Choose an endangered species
- Research animal
- Students will create a resource binder
- Students generated research paper
- Student will create a power point presentation of endangered species for class presentation
- Presentation of endangered species power point by students
- Students will collect data on other projects from peer's class presentations
- Teacher approved web quest

- Final Exam review
- Final Exam

Resources:

1. Textbook
2. Video clips;
   - Safari Montage- The Endangered Species Act.
   - Safari Montage- America's Endangered Species List
3. Various electronic resources
4. IMC- (to be utilized for independent research)
5. Teacher generated project guideline and rubric

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Use scientific knowledge, student generated sources of evidence, evaluate and refine a solution for reducing the environmental impact of human activities, such as urbanization, construction of dams and dissemination of invasive species.
2.0	**Students will be able to:** • Recognize and recall specific vocabulary (ex: kingdom, biome, family, genus, species, chemistry, phylum, class, order). • Describe how technological, or social methods have attempted to reduce the impact of human activities, specifically chemistry.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Standard(s): HS-LS4-6 Create or revise a simulation to test a solution to mitigate adverse impacts of human activity.	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Create or revise a simulation to test a solution to mitigate adverse impacts of human activity/chemistry.
2.0	**Students will be able to:** • Recognize or recall specific vocabulary. • Describe ways in which human activity/chemistry has had an adverse impact on biodiversity**.**
1.0	**With help, partial success at level 2.0 content and level 3.0 content:**
0.0	**Even with help, no success**

Standard(s): HS-LS2-3 Ecosystems, Interactions, Energy and Dynamics.

Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	
4.0	**Students will be able to:** • In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.
3.0	**Students will be able to:** • Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
2.0	**Students will be able to:** • Recognize and recall specific vocabulary such as; producer, herbivore, omnivore, carnivore, decomposer and food web.
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