Black Horse Pike Regional School District
Highland Timber Creek Triton
Science Department Syllabus
Honors Chemistry

Course Content

Honors Chemistry is a college preparatory class designed to meet the needs of students with a strong background in mathematics and science. This course introduces the fundamental language, ideas and tools used in the study of chemistry. This advanced introductory high school chemistry course covers key topics such as chemical nomenclature, stoichiometry, the periodic table, chemical bonding, chemical reactions, thermodynamics, states of matter, nuclear chemistry, and common laboratory practices. Emphasis is placed on the use of chemistry in the natural world, the physical world and our daily lives. The course fosters skills necessary to describe chemical processes and behaviors and to solve numerical and verbal problems in chemistry. Students learn useful chemistry laboratory techniques, gain the ability to formulate experimental questions, design scientific experiments, effectively articulate scientific findings, conduct error and statistical analysis, and strengthen understanding of course material. Upon completion, students will have a solid foundation in chemistry. This course is designed to complement and prepare students for AP Chemistry.

1 - Introduction to Chemistry (2 weeks Sep)

This unit will introduce chemistry having students apply steps of the scientific method to a safe lab setting, which will be reinforced throughout the year. Once lab safety is established, students will utilize this to explore and classify the states of matter based on their physical and chemical properties/changes. Evidences of a chemical change (reaction) will be examined here. Measurements will be made of different quantities of matter and conversions will be made using factor-label method

- Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. (HS-ETS1-3**)**
- Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems to the relevant problem. (HS-ETS1-4)
- Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. (HS-PS1-7)

2 – Atomic Structure, Elements and the Periodic Table (6 weeks Sep-Oct)

This introductory unit will focus the history of atomic theory discussing the key contribution of each scientist and how that relates to the atom we study today. Subatomic particles including charge, location and mass will be discussed as well as electron configuration of both neutral atoms isotopes and ions. Average atomic mass of isotopes will be calculated. Periodic trends which dictate arrangement of electrons will be discussed. Moreover, the quantum mechanics behind the energy transfer when electrons go from ground to excited states will be explored. This atomic/sub-atomic particle approach leads well into the next unit on bonding among atoms.

- Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. (HS-PS1-1)
- Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electrons states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (HS-PS1-2)
- Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials (HS-PS2-6)

- Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. (HS-ETS1-3)
- Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems to the relevant problem (HS-ETS1-4)
- 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). (HS-PS3-4)

3 - Bonding/VSEPR theory (6 weeks Nov-Dec)

Atoms are held together in compounds by chemical bonds, which result from a sharing of electrons in the covalent bond and transfer of electrons in the ionic bond to form the octet. In ionic bonds, the focus will be placed on the transfer of electrons; charge bookkeeping will be completed to achieve an overall charge of zero for the compound. The strong electrostatic interactions will be discussed as the strongest intermolecular force. Focus then will be placed on how this affects the structure and function of these compounds. In covalent bonds, the focus will be placed on how many and how equally electrons are shared depending on the electronegativity difference. These compounds will then arrange themselves in accordance with the Valence Shell Electron Pair Repulsion (VSEPR) theory. Lewis structures will be drawn to model this theory with focus placed on the octet rule, formal charge and resonance. Upon examination the structure of one molecule, students will then investigate how these structures will arrange themselves due to intermolecular forces. Again focusing on how structure relates to function. Bonding theory related to atoms lays the groundwork for how chemical compounds interact in chemical reactions.

- Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. (HS-PS1-1)
- Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electrons states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (HS-PS1-2)
- Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (HS-PS1-3)
- Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS-ETS1-2)
- Plan and conduct an investigation of the properties of water and its effects on Earth's materials and surface processes. (HS-ESS2-5)

4 – Nomenclature (2 weeks Dec.)

Once students understand the structure of formula units, molecules and ions, they will write formulas and name compounds considering the following: law of conservation of mass, law of definite proportions, law of multiple proportions. Formula writing and naming will be focused on: binary and ternary ionic compounds using both the stock system and classical system, molecular compounds, binary and ternary acids, and hydrates.

- Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. (HS-PS1-1)
- Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (HS-PS1-3)

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

5 - Reactions (5 weeks Jan-Feb)

Since solubility is at the forefront as to why most reactions occur, this will be examined first. In order to have a thorough understanding of this, students will examine the anatomy of a solution, how compounds dissociate in a solution and strong/weak electrolytes and acids/bases. Next students will interpret evidence to conclude if a chemical reaction has occurred. Students will then examine the anatomy of a chemical equation, symbolic notation, classify the chemical reactions and balance the equations to obey the law of conservation of mass. The reasoning behind evidence of a chemical reaction will be explored through linking solubility to predict products and determine net ionic equations.

- Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electrons states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (HS-PS1-2)
- Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. (HS-PS1-4)
- Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. (HS-PS1-7)
- 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. (HS-PS1-5)
- Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or large carbon based molecules. (HS-LS1-6)
- Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. (HS-LS1-7)

6 - The Mole & Stoichiometry (4 weeks Feb-March)

In this unit, dimensional analysis will be revisited with an application of mole conversions. Students will use molar mass calculations in conjunction with balanced equations, nomenclature and solubility to translate a quantity (grams, liters of gas, particle {atoms, molecules or formula units}) of one substance to a quantity of another substance. To accurately navigate this pathway, students must be able to qualitatively as well quantitatively determine the limiting reagent, theoretical yield and percent yield. Students will also determine the percent composition of elements in compounds and use this principle to determine the empirical and molecular formulas.

- Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. (HS-PS1-6)
- Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction (HS-PS1-7)
- Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS-ETS1-2)
- Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electrons states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (HS-PS1-2)
- Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. (HS-PS1-4)

7 - Thermochemistry (4 weeks March-April)

Continuing the macroscopic approach this unit focuses specifically on energy transfer between chemicals and that which holds them together. Students use the first and second laws of thermodynamics to investigate the law of conservation of energy and how energy transfer between the system and surroundings. Students will gain and demonstrate a working understanding of the kinetic molecular theory of molecules as well as the driving force of the universe toward an increase in entropy. Students will examine heat transfer qualitatively and quantitatively using calorimetry. State function will be examined using enthalpy and energy of a reaction using stoichiometry. This will also translate to Hess's law.

- Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. (HS-PS1-4)
- Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known (HS-PS3-1)
- 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) (HS-PS3-4)

8 - States of Matter (Solutions & Gas Laws) – (5 weeks April-May)

During this unit students will examine the states of matter, properties of each and what conditions are needed transform from one state to another. After learning that all particles are in constant motion, students will relate kinetic energy to temperature, and phase changes. They will use kinetic molecular theory to discuss the differences in intermolecular forces of a solid, liquid and gas and what energy must be absorbed or released to change phase. Students will also examine heating curves to closer examine how energy, temperature and phase changes are related. Using phase diagrams, they will examine equilibrium and ability to change boiling points by changing pressure and how temperature and vapor pressure are related. Students will use the kinetic molecular theory to determine how gas molecules behave when conditions are varied, deriving gas laws from experimental data. Students quantitatively and qualitatively demonstrate an understanding of how solutions are made as well as how concentration is measured and how this concentration affects properties of the solution.

- Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (HS-PS1-3)
- Plan and conduct an investigation of the properties of water and its effects on Earth's materials and surface processes. (HS-ESS2-5)
- Evaluate competing design solutions or developing, managing and utilizing energy and mineral resources based on cost-benefit ratios. (HS-ESS3-2)
- Develop a quantitative model to describe the cycling among the hydrosphere, atmosphere, geosphere, and biosphere. (HS-ESS2-6)
- Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. (HS-ETS1-1)

9 - Nuclear (3 weeks May-Jun)

This course's culminating unit provides an opportunity to apply what has been learned to real world solutions. Students will discuss properties of radioactivity, the different particles emitted, the pathway in which they are emitted, how they are measured and what effects they have on the environment.

Students will balance nuclear reactions involving nuclear fission, fusion, and half-life. They will also discuss the uses of radiation in the real world such as medical application and nuclear plants for electricity.

- 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. (HS-PS1-8)
- Develop a model based on evidence to illustrate the life span of the sun and role of nuclear fusion in the sun's core to release energy that eventually releases Earth in the form of radiation. (HS-ESS1-1)
- Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies and composition of matter in the universe. (HS-ESS1-2)
- Communicate scientific ideas about the way stars, over their life cycles, produce elements. (HS-ESS1-3)
- Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of the Earth's formation and early history. (HS-ESS1-6)

Course Expectations & Skills

1. Maintain class materials in an organized fashion
2. Use critical thinking skills to apply concepts while evaluating and solving real and theoretical problems
3. Safely & properly utilize lab equipment to design experiments and draw conclusions from observations and data regarding how matter interacts and changes
    a. Maintain a laboratory notebook that accurate records experiments and conclusions
4. Use modeling to demonstrate understanding of atomic and molecular behavior
5. Work collaboratively on activities such as inquiry-based experiments & group presentations

Resources

	Textbook	Author	Year	Publisher
Honors Chemistry	***Chemistry***	Wilbraham, Staley, Mata, Waterman	2012	Prentice –Hall

Grading Scale

	Major Assessments	Lab Activities	Practice	Minor Assessments
Honors Chemistry	50%	25%	15%	10%

Revised 12-2013

Course Name: Honors Chemistry
Course Number: 046100

PART I: UNIT 1 RATIONALE
WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Unit 1 ***Introduction to Chemistry***	**Unit Summary**: This unit will introduce chemistry having students apply steps of the scientific method to a safe lab setting, which will be reinforced throughout the year. Once lab safety is established, students will utilize this to explore and classify the states of matter based on their physical and chemical properties/changes. Evidences of a chemical change (reaction) will be examined here. Measurements will be made of different quantities of matter and conversions will be made using factor-label method
Grade Level(s): ***10-11***	
Essential Question(s): 1. How is the scientific method used to study real world natural phenomenal? 2. How do the properties of matter aid in its classification? 3. Why is there a need for a universal system of measurement?	**Enduring Understanding(s):** 1. The scientific method is a cyclic process used to investigate real world phenomena. 2. Physical and chemical properties of matter dictate how the matter can undergo physical and chemical changes. These properties also help in the process of classification of the matter. 3. The metric system is used around the world to communicate measurement universally. In order to use the metric system, one must be able to convert between units using dimensional analysis.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES
DESCRIBE THE LEARNING TARGETS.
After each target, identify the NGSS that are applicable

Learning Target	**NGSS**
● Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. ● Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems to the relevant problem ● Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	**1.** HS-ETS1-3 **2.** HS-ETS1-4 **3.** HS-PS1-7

Inter-Disciplinary Connections:

- Material presented in this section will connect with material in Math, History, Language Arts and 21st Century Life and Careers. Students will interact with text, and will be asked to read and draw inferences, cite specific evidence, follow procedures/tasks, translate word problems into mathematical problems, and assess text for use in forming arguments or comparing/contrasting arguments.
- Summer packet will involve reading comprehension, as well as technical writing. Most concepts presented in this unit will incorporate algebra and problem solving skills.

Students will engage with the following text:

1. Textbook
    a. Honors Chemistry: Chemistry - Prentice-Hall
2. Web quest metric conversions

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to: reading specific passages aloud to address auditory learners, have students read captions under pictures to assist students in comprehending material, rewrite specific passages to address readability levels, write formulas in various colors to point out the compounds used in the formulas (Lance,2004).

Students will write:

Warm ups:

1. Students given the packets in June before summer recess.
2. Teachers sat to see if they had any questions and were open for students during Tartan/Mustang/Charger time for any review sessions needed.

Closing activity:

1. First day of school the assignment will be collected
2. Assignment will be reviewed as a class

Activities:

1. Summer Assignment packet
2. Web Quest – metric system conversions

Labs: Lab reports involve technical writing

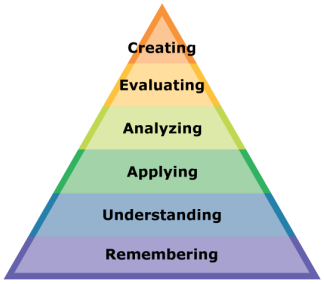
1. How to write a lab report. They will summarize in each section the important points that should be there and writing in the 3rd person passive voice.

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to: provide prewriting outline for students to organize their thoughts, provide a review sheet of punctuation marks and their uses, review how to write chemical formulas using subscripts and coefficients correctly

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
<u>How</u> will students uncover content and build skills?

1. **Teacher – centered approach**
    a. Direct Instruction – When students come for help and review (PowerPoint slides, fill in notes, Cornell notes) guided practice and independent practice
2. **Learner(Student) approach**
    a. Journals- lab notebooks
    b. Summer Packet
    c. Review videos – Khan academy

PART IV: EVIDENCE OF LEARNING
IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.



<u>Formative Assessments</u>:

1. **Weekly check in**
    a. During Tartan/Mustang/Charger Time see how students are doing
2. Vee Maps/Lab Report – *analyzing, evaluating*
3. Completion of **independent practice** worksheets and problem sets *understanding, analyzing, evaluating*
4. **Writing samples** used to relate material to a real world application through demonstrations analyzing, *evaluating*
5. **Electronic** – Google Classroom, Oncourse website- Remembering, Understanding, Applying, Analyzing, Creating

<u>Accommodations/Modifications</u>:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.

The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.
The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

Summative Assessments:

1. **Questions on Assessment –** safety, the scientific method, classification of matter, and dimensional analysis problems.
2. **Pre-assessment for the course** (not graded but will be used to determine how much growth has occurred over the year)

(Benchmarks & final assessments)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.
The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

Performance Assessments:

1. Create a lab safety map of the room. (creating, applying)
2. Make a flow chart of classification of matter (Understanding, Applying, Analysis)
3. Design a method of solving a problem and reporting out the findings (Applying, Analysis, Understanding, Remembering)
4. Use dimensional analysis to convert units (Applying, Understanding)

(Projects, presentations, final writing projects)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.

The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.

The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance, 2004)

PART I: UNIT 2 RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title: Unit 2
Atoms, Elements & the Periodic Table

Grade Level(s):
10-11</td><td>Unit Summary:
This introductory unit will focus the history of atomic theory discussing the key contribution of each scientist and how that relates to the atom we study today. Subatomic particles including charge, location and mass will be discussed as well as electron configuration of both neutral atoms isotopes and ions. Average atomic mass of isotopes will be calculated. Periodic trends which dictate arrangement of electrons will be discussed. Moreover, the quantum mechanics behind the energy transfer when electrons go from ground to excited states will be explored. This atomic/sub-atomic particle approach leads well into the next unit on bonding among atoms.</td></tr>
<tr><td>Essential Question(s):
1. How did the periodic table evolve over time and how can student discern important information about elements using the periodic table?
2. Who were the scientists and what were their contributions to the current model of the atom?
3. What are the major components of the atom and why are they important?
4. What are the importance of isotopes and their relative abundance? What is the importance of an ion?
5. How do the atomic spectra correlate with the energy levels of an atom?
6. How can students draw orbital diagrams and write electron configurations and how can these explain periodic trends?</td><td>Enduring Understanding(s):

1. The periodic table is useful for discovering, learning, and remembering the different properties of the elements.

2. The contributions of the various scientists led to the current development of the periodic table. The current atomic model is based on the past history of the atom.

3. The major components of the atom led to the understanding of atomic number, mass number, ions, and isotopes. The nuclear atom is based on the principle of protons, neutrons and electrons.

4. The electromagnetic spectrum describes the wavelength of radiation and its energy. By studying the electromagnetic spectrum, the wavelength of radiation can be compared with its energy.

5. Atoms are composed of specific sublevels and orbitals, which fill in order of increasing energy. Electron configurations and orbital diagrams can help to explain periodic trends</td></tr>
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PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES
DESCRIBE THE LEARNING TARGETS.
After each target, identify the NGSS that are applicable

Learning Target	**NGSS**
● 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 and revise an explanation for the outcome of a simple chemical reaction based on the outermost electrons states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. ● Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials ● Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. ● Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems to the relevant problem ● 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).	**1.** HS-PS1-1 **2.** HS-PS1-2 **3.** HS-PS2-6 **4.** HS-ETS1-3 **5.** HS-ETS1-4 **6.** HS-PS3-4

Inter-Disciplinary Connections:

- Material presented in this section will connect with material in Math, History, Language Arts and 21st Century Life and Careers. Students will interact with text, and will be asked to read and draw inferences, cite specific evidence, follow procedures/tasks, translate word problems into mathematical problems, and assess text for use in forming arguments or comparing/contrasting arguments.
- Lab reports will involve reading comprehension, as well as technical writing. Most concepts presented in this unit will incorporate algebra and problem solving skills. Additional math focus will be to incorporate graphing analysis. Technological advancements (and their impact on society) utilizing concepts will also be incorporated in this unit.
- Additionally, the uses of computer technology (Pasco, LoggerPro, Vernier, Microsoft Office or Google Apps) may be used to supplement lessons and investigations in this unit.

Students will engage with the following text:

3. Text book
    a. Honors Chemistry: Chemistry - Prentice-Hall
4. Current Science Magazine- reading and writing
5. Chem Matters- reading and writing

6. Web quest atomic spectra

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to: reading specific passages aloud to address auditory learners, have students read captions under pictures to assist students in comprehending material, rewrite specific passages to address readability levels, write formulas in various colors to point out the compounds used in the formulas (Lance,2004).

Students will write:

Warm ups:

3. List the scientists involved in the development of the atom and one word associated with them
4. Diagram the Cathode ray tube
5. What is the Zig Zag line on the periodic table?

Closing activity:

3. Give the name of the positive (negative or neutral) charge particle
4. Hand in a metal or nonmetal on a card
5. Give the name of the scientist who discovered the (proton, neutron, electron)

Activities: *(All activities listed below can be found in the honors chemistry activities folder on Google Drive)*

3. Color a periodic table
4. Adopt an Element Activity
5. Web Quest – atomic spectra
6. Atomic Structure activity
7. Periodic Trend Activity
8. Alien Periodic Table
9. Elements of Chemistry: The Periodic Table

Labs: Lab reports involve technical writing

a. a pre lab write-up including purposes and procedures.
b. conclusions in which students will restate the purpose, summarize the procedure (identify constants and variables) report results and their significance and source of error including ways to reduce or eliminate error.
c. Students will formulate a connection to classroom material and relate the purpose of the experiments to the conclusion, where necessary changing a hypothesis and sometimes synthesizing a new procedure.

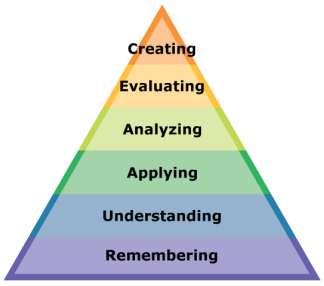
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to: provide prewriting outline for students to organize their thoughts, provide a review sheet of punctuation marks and their uses, review how to write chemical formulas using subscripts and coefficients correctly

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
How will students uncover content and build skills?

3. **Teacher – centered approach**
    a. Demonstration –
    b. Direct Instruction – Introduction to atoms (PowerPoint slides, fill in notes, Cornell notes) guided practice and independent practice
    c. Lecture – Intro to atoms and periodic table (Power point and Cornell notes)
    d. Lecture –discussion- Teacher questioning of students, Socratic Method
    e. Virtual Field trips - YouTube etc.
    f. Videos
        i. Elements of Chemistry: The Periodic Table (Lessons & Video)
4. **Learner(Student) approach**
    a. Cooperative learning – Observing visible light spectra with spectroscopes
    b. Discovery Learning – atomic emission lab, flame test lab, Periodic Trends POGIL, Alien Periodic Table
    c. Journals- lab notebooks
    d. Learning centers – work in small groups on lab activities
    e. Simulations- Gizmos, PHET - (Build an Atom) Chem Lab Pro -

(Activities, instructional strategies & assignments)

PART IV: EVIDENCE OF LEARNING
IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

6. **Weekly quizzes** that include both conceptual questions and mathematical problems *understanding, applying*
    a. atomic structure – Understanding
7. Vee Maps– *analyzing, evaluating*
8. Completion of **independent practice** worksheets and problem sets *understanding, analyzing, evaluating*
    a. Atom activity – diagram parts of atoms and color – Analysis
    b. Homework Cornell notes, summaries, -Understanding and Applying
9. **Writing samples** used to relate material to a real world application through demonstrations analyzing, *evaluating*
    a. Reading scientific articles - Analysis

10. **Electronic** – Google Classroom, On course website- Remembering, Understanding, Applying, Analyzing, Creating
    a. Build an Atom PhET activity

Labs: *(All lab activities listed below can be found in the honors chemistry labs folder on Google Drive)*

b. Isotopes Lab
c. Quantum Leap Lab
d. Kitchen Chemistry Lab
e. Conservation of Mass lab
f. *Atomic spectra Lab*
g. Flame test Chemistry (Addison and Wesley) Lab Manual page 151
h. S before D Lab
i. Periodic law Lab

(Quizzes, tests, homework, class discussion, individual conferences)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.

The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.

The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

Summative Assessments:

Test Atomic theory, electron configuration (multiple choice and free response) – Understanding, Applying, Evaluation *(All assessments listed can be found in the honors chemistry assessments folder on Google Drive)*

(Benchmarks & final assessments)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
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The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

Performance Assessments:

1. Create a chart of the discoveries of the major scientists (dead scientist project) (Understanding, Applying, Analysis)
2. Make a table of the metals, metalloids, and nonmetals (Understanding, Applying, Analysis)
3. Design a method of determining mass of a number of an unknown element (Applying, Analysis, Understanding, Remembering)
4. Use bar magnets to explain the Pauli Exclusion Principle (Creating, Applying, Understanding)
5. Write a letter to a friend to explain how atoms fill their electron shells (Creating, Applying, Understanding)
6. Research different colors used for "Neon Signs". Design your own sign. (Creating, Applying, Analysis, Understanding)
7. Build models of Isotopes. (Understanding)

(Projects, presentations, final writing projects)

Accommodations/Modifications:

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PART I: UNIT 3 RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title: Unit 3
Bonding/VSEPR</td><td rowspan="2">Unit Summary:
Atoms are held together in compounds by chemical bonds, which result from a sharing of electrons in the covalent bond and transfer of electrons in the ionic bond to form the octet. In ionic bonds, the focus will be placed on the transfer of electrons; charge bookkeeping will be completed to achieve an overall charge of zero for the compound. The strong electrostatic interactions will be discussed as the strongest intermolecular force. Focus then will be placed on how this affects the structure and function of these compounds. In covalent bonds, the focus will be placed on how many and how equally electrons are shared depending on the electronegativity difference. These compounds will then arrange themselves in accordance with the Valence Shell Electron Pair Repulsion (VSEPR) theory. Lewis structures will be drawn to model this theory with focus placed on the octet rule, formal charge and resonance. Upon examination the structure of one molecule, students will then investigate how these structures will arrange themselves due to intermolecular forces. Again focusing on how structure relates to function. Bonding theory related to atoms lays the groundwork for how chemical compounds interact in chemical reactions.</td></tr>
<tr><td>Grade Level(s):
10-11</td></tr>
<tr><td>Essential Question(s):
1. What factors determine whether ionic bonding or covalent bonding will take place and how is each represented?
2. How does VSEPR theory dictate the arrangement of atoms in molecules and dictate the molecule’s intermolecular behavior?</td><td>Enduring Understanding(s):
1. The octet rule is used to form ionic and covalent bonds.
2. Lewis structures are diagrams that use dots as electrons.
3. The three – dimensional structure of a molecule or polyatomic ion can be predicted by the arrangement of the electrons
4. Compounds can be classified as either polar or non-polar.
5. The attractive forces between ions, polar covalent molecules, and nonpolar covalent molecules are called intermolecular forces, such as dispersion forces, Dipole interactions, Vander Waals forces and hydrogen bonds.</td></tr>
</table>

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES
DESCRIBE THE LEARNING TARGETS.
After each target, identify the NGSS that are applicable

Learning Target	NGSS
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 atom. **2.** Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electrons 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.** Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. **5.** Plan and conduct an investigation of the properties of water and its effects on Earth's materials and surface processes.	**1.** HS-PS1-1 **2.** HS-PS1-2 **3.** HS-PS1-3 **4.**HS-ETS1-2 **5.**HS-ESS2-5

Inter-Disciplinary Connections:

- Material presented in this section will connect with material in Math, History, Language Arts and 21st Century Life and Careers. Students will interact with text, and will be asked to read and draw inferences, cite specific evidence, follow procedures/tasks, translate word problems into mathematical problems, and assess text for use in forming arguments or comparing/contrasting arguments.
- Lab reports will involve reading comprehension, as well as technical writing. Most concepts presented in this unit will incorporate algebra and problem solving skills. Additional math focus will be to incorporate graphing analysis. Technological advancements (and their impact on society) utilizing concepts will also be incorporated in this unit.
- Additionally, the uses of computer technology (Pasco, LoggerPro, Vernier, Microsoft Office or Google Apps) may be used to supplement lessons and investigations in this unit.

Students will engage with the following text:

1. Text book
    a. Honors Chemistry: Chemistry - Prentice-Hall
2. Current Science Magazine- reading and writing
3. Chem Matters- reading and writing
4. Article on permanent waves - reading & writing - comprehension

Accommodations and modifications for reading: rewrite specific passages to address students' independent readability levels, use captions under pictures to aide in comprehension, decrease reading as necessary

Students will write:

1. **Warm ups:**
    a. Why are non-valence electrons not used in electron dot diagrams?
    b. What is the octet rule?
    c. Diagram the Lewis dot structure of Nitrogen
2. **Closing activity:**
    a. Make a model of methane, ammonia, and water
    b. Diagram the methane or carbon tetrachloride molecule.
3. **Activities**: *(All activities listed below can be found in the honors chemistry activities folder on Google Drive)*
    a. Electronic Cereal
    b. Crystal demonstrations
    c. Permanent wave article – read and write summary
    d. Water as a polar molecule reading activity
    e. When water is hard to deal with article.
    f. Ionic Bonding Puzzle
4. **Labs:** Lab reports involve technical writing
    a. a pre lab write-up including purposes and procedures.
    b. conclusions in which students will restate the purpose, summarize the procedure (identify constants and variables) report results and their significance and source of error including ways to reduce or eliminate error.
    c. Students will formulate a connection to classroom material and relate the purpose of the experiments to the conclusion, where necessary changing a hypothesis and sometimes synthesizing a new procedure.

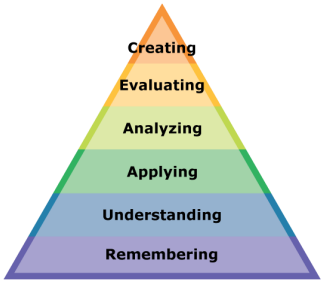
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to: providing a prewriting outline to help students organize their thoughts, provide a punctuation review outlining the uses of various punctuation marks and their uses, assist students with self- editing, allow student to e-mail the teacher for constructive criticism before handing in a final draft, allow students to use a dictionary while writing a hard copy.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
How will students uncover content and build skills?

1. **Teacher – centered approach**
    a. Demonstration –
    b. Direct Instruction – Ionic bonding and covalent bonding properties (PowerPoint slides, fill in notes, Cornell notes) guided practice and independent practice by writing and naming variety of compounds
    c. Lecture – discussion- Teacher questioning of students, gives a molecule and ask for type of bond, Socratic Method
    d. Virtual field trips - (YouTube etc.)
    e. Videos
2. **Learner(Student) approach**
    a. Cooperative learning – Sunblock & Bonds activity, Completion of collaborative worksheets, modeling
    b. Discovery Learning – Labs; Paper chromatography, Mini-Lab Strength of covalent Bonds, Molecular Geometry POGIL
    c. Journals- lab notebooks
    d. Learning centers – work in small groups on lab activities
    e. Simulations- Gizmos, Covalent Bonds, Ionic Bonds, PHET - Chem Lab Pro - cation & anion activity, Intermolecular forces

(Activities, instructional strategies & assignments)

PART IV: EVIDENCE OF LEARNING
IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

1. **Weekly quizzes** that include both conceptual questions and mathematical problems *understanding, comprehension, applying*
    a. *Ionic bonds, covalent bonds, polarity of molecules*
2. Vee Maps – *analyzing, evaluating*
3. Completion of **independent practice** worksheets and problem sets *understanding, analyzing, evaluating*
    a. Homework Cornell notes, summaries, -Understanding and Applying
4. **Writing samples** used to relate material to a real world application through demonstrations analyzing, *evaluating*
    a. Article- Taste –It's the structure that counts- read article about sugar and sweeteners. - Understanding

5. **Electronic** – Google Classroom assignments, Oncourse website- Remembering, Understanding, Applying, Analyzing, Creating
    a. Gizmos, Covalent Bonds, Ionic Bonds
6. **Labs** *(All activities listed below can be found in the honors chemistry labs folder on Google Drive)*

    a. Formation of Ionic Bonds
    b. Cations and Anions (page 171 Chemistry (Addison and Wesley) Text
    c. Molecular Models page 177 Chemistry (Addison and Wesley) Lab Manual
    d. Copper into Gold (the alchemists dream) or Gold Penny
    e. Molecular Modeling Lab
    f. Gum Drop Lab

(Quizzes, tests, homework, class discussion, individual conferences)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.
The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class.(Lance,2004

Summative Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. **Test** Ionic bonds and covalent bonds multiple choice and free response (diagram types of bonds, diagram water molecules and polarity) Evaluation

(Benchmarks & final assessments)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
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Performance Assessments: *(All activities listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. Research artificial sweeteners and write a report on how the triangle theory operates. (Analyzing, Applying, Understanding)
2. Research how chemists determine bond lengths in a compound. Prepare a brief descriptive report (Analyzing, Understanding)
3. Write a short explanation of why magnetic fields are intense in the vicinity of stars as researching on the internet. Cite the sources. (Analyzing, Applying, Understanding)
4. Hold a comb near ionic and non-ionic solutions and describe what is happening (attraction toward the ions) (Applying, Understanding)
5. Make a diagram of the bonding orbitals in an atom such as lithium, determining the number of electrons in the orbitals (Creating, Applying)

(Projects, presentations, final writing projects)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
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comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.
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PART I: UNIT 4 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Unit 4 ***Nomenclature***	**Unit Summary**: Once students understand the structure of formula units, molecules and ions, they will write formulas and name compounds considering the following: law of conservation of mass, law of definite proportions, law of multiple proportions. Formula writing and naming will be focused on: binary and ternary ionic compounds using both the stock system and classical system, molecular compounds, binary and ternary acids, and hydrates.
Grade Level(s): ***10-11***	
Essential Question(s): 1. What does the nomenclature of a compound tell about how the compound is bonded together? 2. How does each compound achieve a net charge of zero and how does this affect formula writing?	**Enduring Understanding(s):** 1. Chemical symbols, formulas, and equations are understood internationally and are written based upon universally accepted guidelines. 2. Chemists use knowledge of the molecular model to create new reactions. 3. Chemists use combinations of chemical reactions to create new substances and materials designed to meet social needs.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES
DESCRIBE THE LEARNING TARGETS.
After each target, identify the NGSS that are applicable

Learning Target	**NGSS**
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.	1. HS-PS1-1
2. 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.	2. HS-PS1-3
3. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.	3. HS-PS2-6

Inter-Disciplinary Connections:

- Material presented in this section will connect with material in Math, History, Language Arts and 21st Century Life and Careers. Students will interact with text, and will be asked to read and draw inferences, cite specific evidence, follow procedures/tasks, translate word problems into mathematical problems, and assess text for use in forming arguments or comparing/contrasting arguments.
- Lab reports will involve reading comprehension, as well as technical writing. Most concepts presented in this unit will incorporate algebra and problem solving skills. Additional math focus will be to incorporate

graphing analysis. Technological advancements (and their impact on society) utilizing concepts will also be incorporated in this unit.

- Additionally, the uses of computer technology (Pasco, LoggerPro, Vernier, Microsoft Office or Google Apps) may be used to supplement lessons and investigations in this unit.

Students will engage with the following text:

1. Text book
    a. Honors Chemistry: Chemistry - Prentice-Hall
2. Current Science Magazine- reading and writing
3. Chem Matters- reading and writing

Accommodations and modifications for reading: rewrite specific passages to address students' independent readability levels, use captions under pictures to aide in comprehension, decrease reading as necessary

Students will write:

2. **Warm-ups**
    a. Given a formula, write the name of the substance
    b. Given a name, write the formula of a substance
3. **Closing**
    a. Draw a model that accurately shows the transfer or sharing of atoms in a molecule/formula unit. Have students name the substance and relate this back to the bonding unit.
4. **Activities:** *(All activities listed below can be found in the honors chemistry activities folder on Google Drive)*
    a. Write a short-story describing a what happens to electrons when they come into different situations. For example, if an element has low ionization energy and comes close to an element with high electronegativity, the element will lose that electron and then the positive and negative ions will be attracted. Students will use a metaphor to describe how electrons can be transferred or shared. They will give formulas and names to the substances created.
5. **Labs** will include
    a. a pre lab write-up including purposes and procedures.
    b. conclusions in which students will restate the purpose, summarize the procedure (identify constants and variables) report results and their significance and source of error including ways to reduce or eliminate error.
    c. Students will formulate a connection to classroom material and relate the purpose of the experiments to the conclusion, where necessary changing a hypothesis and sometimes synthesizing a new procedure.

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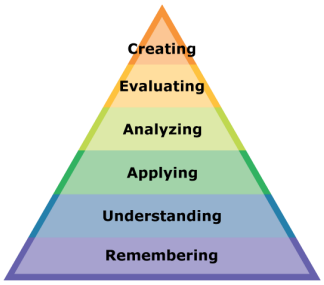
PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
<u>How</u> will students uncover content and build skills?

1. **Teacher – centered approach**
    a. Demonstration –
    b. Direct Instruction – PowerPoint slides, fill in notes, Cornell notes) guided practice and independent practice with balancing chemical equations
    c. Lecture – discussion- Teacher questioning of students an equation and ask for type of reaction, Socratic Method
    d. Virtual field trips - (YouTube etc.)
2. **Learner(Student) approach**
    a. Cooperative learning – Completion of collaborative worksheets, modeling
    b. Discovery Learning – inquiry based
    c. Journals- lab notebooks
    d. Learning centers – work in small groups on lab activities
    e. Simulations- Gizmos, PHET - (Rates & Reactions) Chem Lab Pro -

(Activities, instructional strategies & assignments)

PART IV: EVIDENCE OF LEARNING
IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.



<u>Formative Assessments</u>:

1. **Weekly quizzes t**hat include both conceptual questions and mathematical problems *understanding, applying*
2. Vee Maps – *analyzing, evaluating*
3. Completion of **independent practice** worksheets and problem sets *understanding, analyzing, evaluating*
    a. Homework Cornell notes, summaries, -Understanding and Applying
4. **Writing samples** used to relate material to a real world application through demonstrations analyzing*, evaluating*

6. Laboratory investigations *(All activities listed below can be found in the honors chemistry <u>activities</u> folder on Google Drive)*

- (ability to properly collect data and perform calculations pertaining to activity. Some examples might include:
    a. Classifying Compounds Activity *understanding, analyzing*
    b. Formula of Ionic Compound Lab

c. Family of Elements Lab
d. Differences Between Ionic and Molecular Compounds Lab
e. Ionic Compounds Lab

(Quizzes, tests, homework, class discussion, individual conferences)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
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The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class.(Lance,2004)

Summative Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. **Unit Test** which includes multiple choice, problem solving as well as free response (ex. in District Shared/Chemistry Curriculum/Reactions, stoichiometry) *understanding, applying, analyzing, evaluating*
2. **Labs report**s based on the material in this unit. u*nderstanding, applying*

(Benchmarks & final assessments)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
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Performance Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. Students will be required to turn in homework and lab reports based on the material in this unit. These assignments will be graded *understanding, applying*
2. Ability to perform lab activities and perform calculations pertaining to activity *applying, analyzing, evaluating*
3. Ability to differentiate between different types of compounds. *analyzing, evaluating*
4. Ability to write the formula and name different types of compounds. *applying, analyzing, evaluating, creating*

(Projects, presentations, final writing projects)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
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The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

PART I: UNIT 5 RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title: Unit 5
Chemical Reactions</td><td rowspan="2">Unit Summary:
Since solubility is at the forefront as to why most reactions occur, this will be examined first. In order to have a thorough understanding of this, students will examine the anatomy of a solution, how compounds dissociate in a solution and strong/weak electrolytes and acids/bases. Next students will interpret evidence to conclude if a chemical reaction has occurred. Students will then examine the anatomy of a chemical equation, symbolic notation, classify the chemical reactions and balance the equations to obey the law of conservation of mass. The reasoning behind evidence of a chemical reaction will be explored through linking solubility to predict products and determine net ionic equations.</td></tr>
<tr><td>Grade Level(s):
10-11</td></tr>
<tr><td>Essential Question(s):
1. What are chemical reactions and why do they occur?
2. How can chemical reactions be represented?
3. How does a balanced chemical equation demonstrate the law of conservation of mass?
4. What are the four general types of chemical reactions?
5. What characteristics identify each type of chemical reaction?</td><td>Enduring Understanding(s):
1. Chemical symbols, formulas, and equations are understood internationally and are written based upon universally accepted guidelines.
2. Chemists use knowledge of the molecular model to create new reactions.
3. Chemists use combinations of chemical reactions to create new substances and materials designed to meet social needs.</td></tr>
</table>

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES
DESCRIBE THE LEARNING TARGETS.
After each target, identify the NGSS that are applicable

Learning Target	NGSS
1. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electrons states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	1. HS-PS1-2
2. 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.	2. HS-PS1-4
3. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	3. HS-PS1-7
4. 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.	4. HS-PS1-5
5. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or large carbon based molecules.	5. HS-PS1-6
6. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.	6. HS-LS1-7

Inter-Disciplinary Connections:

- Material presented in this section will connect with material in Math, History, Language Arts and 21st Century Life and Careers. Students will interact with text, and will be asked to read and draw inferences, cite specific evidence, follow procedures/tasks, translate word problems into mathematical problems, and assess text for use in forming arguments or comparing/contrasting arguments.
- Lab reports will involve reading comprehension, as well as technical writing. Most concepts presented in this unit will incorporate algebra and problem solving skills. Additional math focus will be to incorporate graphing analysis. Technological advancements (and their impact on society) utilizing concepts will also be incorporated in this unit.
- Additionally, the uses of computer technology (Pasco, LoggerPro, Vernier, Microsoft Office or Google Apps) may be used to supplement lessons and investigations in this unit.

Students will engage with the following text:

1. Text book
    a. Honors Chemistry: Chemistry - Prentice-Hall
2. Current Science Magazine- reading and writing
3. Chem Matters- reading and writing

Accommodations and modifications for reading: rewrite specific passages to address students' independent readability levels, use captions under pictures to aide in comprehension, decrease reading as necessary

Students will write:

1. **Warm-ups**
    a. How is a chemical change different from a physical change?
2. **Closing**
    a. Draw a model that accurately shows the rearrangement of atoms before and after a chemical reaction
3. **Activities** *(All activities listed below can be found in the honors chemistry activities folder on Google Drive)*
    a. Write a short-story describing a family of chemicals on vacation that must decide which type of reaction is the one they all would most enjoy.
4. **Labs** will include
    a. a pre lab write-up including purposes and procedures.
    b. conclusions in which students will restate the purpose, summarize the procedure (identify constants and variables) report results and their significance and source of error including ways to reduce or eliminate error.
    c. Students will formulate a connection to classroom material and relate the purpose of the experiments to the conclusion, where necessary changing a hypothesis and sometimes synthesizing a new procedure.

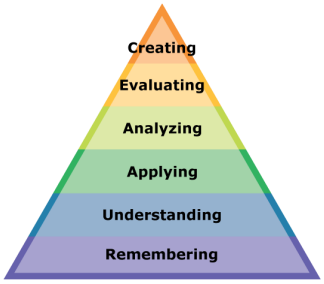
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to: providing a prewriting outline to help students organize their thoughts, provide a punctuation review outlining the uses of various punctuation marks and their uses, assist students with self- editing, allow student to e-mail the teacher for constructive criticism before handing in a final draft, allow students to use a dictionary while writing a hard copy.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
How will students uncover content and build skills?

1. **Teacher – centered approach**
    a. Demonstration –
    b. Direct Instruction – PowerPoint slides, fill in notes, Cornell notes) guided practice and independent practice with balancing chemical equations
    c. Lecture – discussion- Teacher questioning of students an equation and ask for type of reaction, Socratic Method
    d. Virtual field trips - (YouTube etc.)
2. **Learner(Student) approach**
    a. Cooperative learning – Completion of collaborative worksheets, modeling
    b. Discovery Learning – Greenhouse Gases (virtual Lab)
    c. Journals- lab notebooks
    d. Learning centers – work in small groups on lab activities
    e. Simulations- Gizmos, PHET - (Rates & Reactions) Chem Lab Pro -

(Activities, instructional strategies & assignments)

PART IV: EVIDENCE OF LEARNING
IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

1. **Weekly quizzes t**hat include both conceptual questions and mathematical problems *understanding, applying*
2. Vee Maps– *analyzing, evaluating*
3. Completion of **independent practice** worksheets and problem sets *understanding, analyzing, evaluating*
    a. Homework Cornell notes, summaries, -Understanding and Applying
4. **Writing samples** used to relate material to a real world application through demonstrations analyzing*, evaluating*
5. **Laboratory investigations** *(All activities listed below can be found in the honors chemistry labs folder on Google Drive)*

- (ability to properly collect data and perform calculations pertaining to activity. Some examples might include:
    a. Classifying Reactions Activity *understanding, analyzing*
    b. Precipitation reactions (Addison Wesley lab manual Experiment #7) *applying, analyzing, evaluating*
    c. Types of Chemical Reactions (Addison Wesley lab manual –experiment #11) *applying, analyzing, evaluating*
    d. Quantitative Analysis (Addison Wesley lab manual- experiment # 12) *analyzing, evaluating*
    e. Conductivity of Solutions Lab
    f. Chemical Changes Lab
    g. Single Replacement Lab
    h. Activity Series Lab
    i. Types of Chemical Reactions Lab
    j. Conservation of Mass Lab

(Quizzes, tests, homework, class discussion, individual conferences)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.
The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class.(Lance,2004)

Summative Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. **Unit Test** which includes multiple choice, problem solving as well as free response (ex. in District Shared/Chemistry Curriculum/Reactions, stoichiometry) *understanding, applying, analyzing, evaluating*
2. **Labs report**s based on the material in this unit. u*nderstanding, applying*

(Benchmarks & final assessments)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.
The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

Performance Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. Students will be required to turn in homework and lab reports based on the material in this unit. These assignments will be graded *understanding, applying*
2. Ability to perform lab activities and perform calculations pertaining to activity *applying, analyzing, evaluating*
3. Ability to differentiate between different types of chemical reactions. *analyzing, evaluating*
4. Ability to predict products of chemical reactions. *applying, analyzing, evaluating, creating*

(Projects, presentations, final writing projects)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.

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The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

PART I: UNIT 6 RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Unit 6 ***The Mole & Stoichiometry***	**Unit Summary**:
Grade Level(s): ***10-11***	In this unit, dimensional analysis will be revisited with an application of mole conversions. Students will use molar mass calculations in conjunction with balanced equations, nomenclature and solubility to translate a quantity (grams, liters of gas, particle {atoms, molecules or formula units}) of one substance to a quantity of another substance. To accurately navigate this pathway, students must be able to qualitatively as well quantitatively determine the limiting reagent, theoretical yield and percent yield. Students will also determine the percent composition of elements in compounds and use this principle to determine the empirical and molecular formulas.
Essential Question(s): 1. What is a mole and describe its importance in chemistry? 2. What is molar mass and why is it important in chemical calculations? 3. How can you convert among the number of moles, the mass of a sample, the volume of a gas, and the number of particles? 4. What is the percent composition of a substance and how is it calculated? 5. What is the difference between an empirical formula and a molecular formula and how are they calculated? 6. What is stoichiometry? 7. How are molar relationships represented in balanced chemical equations? 8. What are the main types of stoichiometry problems? 9. What determines the amount of products	**Enduring Understanding(s):** 1. The concept of the mole can be used to connect the concepts of volume, mass and number of particles. 2. Molar mass can be determined from the periodic table. 3. Mass percentage of each element in a compound can be calculated. 4. Chemical compounds have empirical and molecular formulas. 5. The interactions of substances with one another create new products in a predictable, quantifiable way. 6. The amount of matter in the universe is essentially constant. It is only rearranged 7. The role of the mole in chemical calculations, and the application of dimensional analysis in their solutions enable chemists to quantify the results of chemical reactions.

formed in a chemical reaction? 10. How is the percent yield of a chemical reaction determined?	

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES
DESCRIBE THE LEARNING TARGETS.
After each target, identify the NGSS that are applicable

Learning Target	**NGSS**
1. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	1. HS-PS1-7
2. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.	2. HS-PS1-6
3. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	3. HS-ETS1-2
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.	4. HS-PS1-4

Inter-Disciplinary Connections:

- Material presented in this section will connect with material in Math, History, Language Arts and 21st Century Life and Careers. Students will interact with text, and will be asked to read and draw inferences, cite specific evidence, follow procedures/tasks, translate word problems into mathematical problems, and assess text for use in forming arguments or comparing/contrasting arguments.
- Lab reports will involve reading comprehension, as well as technical writing. Most concepts presented in this unit will incorporate algebra and problem solving skills. Additional math focus will be to incorporate graphing analysis. Technological advancements (and their impact on society) utilizing concepts will also be incorporated in this unit.
- Additionally, the uses of computer technology (Pasco, LoggerPro, Vernier, Microsoft Office or Google Apps) may be used to supplement lessons and investigations in this unit.

Students will engage with the following text:

1. Text book
    a. Honors Chemistry: Chemistry - Prentice-Hall
2. Current Science Magazine- reading and writing
3. Chem Matters- reading and writing

Accommodations and modifications for reading: rewrite specific passages to address students' independent readability levels, use captions under pictures to aide in comprehension, decrease reading as necessary

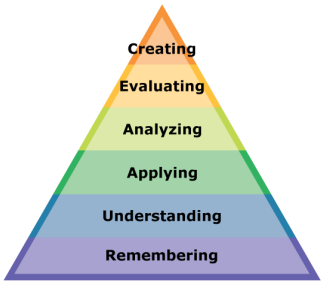
Students will write:

1. **Warm-ups**
    a. List all the ways you think a chemical mole can be used then compare it with your neighbor
2. **Closing**
    a. Use what you of the mole to write out your own unique mole analogy explaining what a chemistry mole is to a 6th grader.
3. **Activities** *(All activities listed below can be found in the honors chemistry activities folder on Google Drive)*
    a. As a class use lab equipment to calculate how many grains of rice would fit in your classroom and how many classrooms of that size it would take a hold a mole of rice.
4. **Labs** will include
    a. a pre lab write-up including purposes and procedures.
    b. conclusions in which students will restate the purpose, summarize the procedure (identify constants and variables) report results and their significance and source of error including ways to reduce or eliminate error.
    c. Students will formulate a connection to classroom material and relate the purpose of the experiments to the conclusion, where necessary changing a hypothesis and sometimes synthesizing a new procedure.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
How will students uncover content and build skills?

1. **Teacher – centered approach**
    a. Demonstration –
    b. Direct Instruction – PowerPoint slides, fill in notes, Cornell notes) guided practice and independent practice, stoichiometry flow chart, factor label method
    c. Lecture – discussion- Teacher questioning of students, Socratic Method
    d. Virtual field trips - (YouTube etc.)
2. **Learner(Student) approach**
    a. Cooperative learning – Completion of collaborative worksheets, modeling
    b. Discovery Learning – Labs;
    c. Journals- lab notebooks
    d. Learning centers – work in small groups on lab activities
    e. Simulations- Gizmos, Limiting Reactants, Balancing Chemical Equations, PHET - (Reactants Products & Leftovers) Chem Lab Pro -

    (Activities, instructional strategies & assignments)



PART IV: EVIDENCE OF LEARNING
IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

1. **Weekly quizzes** that include both conceptual questions and mathematical problems (*Understanding, Evaluating)*
2. Vee Maps – *analyzing, evaluating*
3. Completion of **independent practice** worksheets and problem sets (*Understanding, Analyzing)*
    a. Homework Cornell notes, summaries, -Understanding and Applying
4. **Writing samples** used to relate material to a real world application through demonstrations *(Applying, Analyzing)*
5. **Laboratory investigations** *(All activities listed below can be found in the honors chemistry labs folder on Google Drive)*
    - (ability to properly collect data and perform calculations pertaining to activity. Some examples might include:
        a. Empirical and Molecular Formula (Understanding, Analyzing, Evaluating)
        b. Analysis of Baking Soda (Addison Wesley textbook, p. 251 applying, evaluating
        c. Mole Ratio Lab
        d. Determining Moles of Different Metals Lab
        e. Iron Filings / Copper Sulfate Mole Lab
        f. Moles of Iron Nails and Copper Lab
        g. Stoich Determining Mass of Products Lab
        h. Limiting Reagent Lab
        i. Reaction Stoich and Percent Yield Lab
        j. Determining Empirical Formula Lab

(Quizzes, tests, homework, class discussion, individual conferences)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.

The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

Summative Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. Unit **Test** which includes multiple choice, problem solving as well as free response (ex. in District Shared/Chemistry Curriculum/Reactions, stoichiometry) *understanding, applying, analyzing, evaluating*
2. **Labs report**s based on the material in this unit. u*nderstanding, applying*

(Benchmarks & final assessments)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.

The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.

The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

Performance Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. Students will be required to turn in homework and lab reports based on the material in this unit. These assignments will be graded (U*nderstanding*)
2. Ability to perform lab activities and perform calculations pertaining to activity (*Understanding,* Evaluating, Analyzing, Applying
3. Ability to quantify different types of chemical reactions. understanding, applying, analyzing
4. Ability to predict quantity of products of chemical reactions. applying, analyzing, evaluating

(Projects, presentations, final writing projects)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.

The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.

The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class.(Lance,2004)

PART I: UNIT 7 RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Unit 7 ***Thermochemistry***	**Unit Summary**:
Grade Level(s): ***10-11***	Continuing the macroscopic approach this unit focuses specifically on energy transfer between chemicals and that which holds them together. Students use the first and second laws of thermodynamics to investigate the law of conservation of energy and how energy transfer between the system and surroundings. Students will gain and demonstrate a working understanding of the kinetic molecular theory of molecules as well as the driving force of the universe toward an increase in entropy. Students will examine heat transfer qualitatively and quantitatively using calorimetry. State function will be examined using enthalpy and energy of a reaction using stoichiometry. This will also translate to Hess's law.
Essential Question(s): 1. Why do you put salt on ice in the winter to melt it? 2. What are the forms of energy and how is it conserved? 3. How can students determine the difference between endothermic and exothermic reactions? 4. What is a calorimeter and how does it determine heats of reactions?	**Enduring Understanding(s):** 1. Real world applications of energy exchange and law of conservation of energy are observed every day, such as putting a metal spoon in a cup of hot coffee. 2. Reactions involving heat can be exothermic or endothermic. The heat exchange is measured using a calorimeter.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES
DESCRIBE THE LEARNING TARGETS.
After each target, identify the NGSS that are applicable

Learning Target	**NGSS**
1. 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. **2.** Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known **3.** 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)	**1.** HS-PS1-4 **2.**HS-PS3-1 **3.**HS-PS3-4

Inter-Disciplinary Connections:

- Material presented in this section will connect with material in Math, History, Language Arts and 21st Century Life and Careers. Students will interact with text, and will be asked to read and draw inferences, cite specific evidence, follow procedures/tasks, translate word problems into mathematical problems, and assess text for use in forming arguments or comparing/contrasting arguments.
- Lab reports will involve reading comprehension, as well as technical writing. Most concepts presented in this unit will incorporate algebra and problem solving skills. Additional math focus will be to incorporate graphing analysis. Technological advancements (and their impact on society) utilizing concepts will also be incorporated in this unit.
- Additionally, the uses of computer technology (Pasco, LoggerPro, Vernier, Microsoft Office or Google Apps) may be used to supplement lessons and investigations in this unit.

Students will engage with the following text:

1. Text book
    a. Honors Chemistry: Chemistry - Prentice-Hall
2. Current Science Magazine- reading and writing
3. Chem Matters- reading and writing

Accommodations and modifications for reading: rewrite specific passages to address students' independent readability levels, use captions under pictures to aide in comprehension, decrease reading as necessary

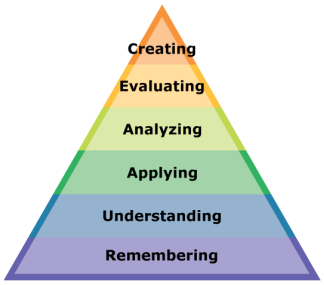
Students will write:

1. **Warm-ups**
    a. Which type of chemical reaction is most likely to release the largest amount of energy?
2. **Closing**
    a. Construct a visual model comparing a high energy molecule to a low energy molecule
3. **Activities** *(All activities listed below can be found in the honors chemistry activities folder on Google Drive)*
    a. Collect data to construct a cooling/heating curve in small groups before attempting to explain the differences in melting/freezing point extrapolations
4. **Labs** will include
    a. a pre lab write-up including purposes and procedures.
    b. conclusions in which students will restate the purpose, summarize the procedure (identify constants and variables) report results and their significance and source of error including ways to reduce or eliminate error.
    c. Students will formulate a connection to classroom material and relate the purpose of the experiments to the conclusion, where necessary changing a hypothesis and sometimes synthesizing a new procedure.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
How will students uncover content and build skills?

1. **Teacher – centered approach**
    a. Demonstration – Fireproof Balloon, Ice Melting Blocks
    b. Direct Instruction – PowerPoint slides, fill in notes, Cornell notes) guided practice and independent practice
    c. Lecture – discussion- Teacher questioning of students, Socratic Method
    d. Virtual field trips - (YouTube etc.)
    e. Videos
2. **Learner(Student) approach**
    a. Cooperative learning – Completion of collaborative worksheets, modeling
    b. Discovery Learning – Calorimetry POGIL, Marine Ration Heaters
    c. Journals- lab notebooks
    d. Learning centers – work in small groups on lab activities
    e. Simulations- Gizmos, PHET - Chem Lab Pro - Concord Consortium - Making and Breaking Bonds, Evaporative Cooler

    (Activities, instructional strategies & assignments)



PART IV: EVIDENCE OF LEARNING
IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

1. **Weekly quizzes** that include both conceptual questions and mathematical problems (*Understanding, Evaluating)*
2. Vee Maps – *analyzing, evaluating*
3. Completion of **independent practice** worksheets and problem sets (*Understanding, Analyzing)*
    a. Homework Cornell notes, summaries, -Understanding and Applying
4. **Writing samples** used to relate material to a real world application through demonstrations *(Applying, Analyzing)*
5. **Laboratory investigations** *(All activities listed below can be found in the honors chemistry labs folder on Google Drive)*

- (ability to properly collect data and perform calculations pertaining to activity. Some examples might include:
    a. Heat of Fusion of Ice
    b. Specific Heat of Metals Lab
    c. Heats of Reaction Lab
    d. Hess's Law Lab
    e. Standardization of Base and Titration Lab

(Quizzes, tests, homework, class discussion, individual conferences)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
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Summative Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. Unit **Test** which includes multiple choice, problem solving as well as free response (ex. in District Shared/Chemistry Curriculum/Reactions, stoichiometry) *understanding, applying, analyzing, evaluating, creating*
2. **Labs reports** based on the material in this unit. u*nderstanding, applying*

(Benchmarks & final assessments)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.
The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

Performance Assessments:

1. Ability to perform lab activities and perform calculations pertaining to activity - *remembering, understanding, applying, analyzing evaluating*
2. Ability to design, construct and analyze models of abstract concepts in concrete methods (ex. Periodic table project) *remembering, understanding, applying, analyzing evaluating*
3. Creating analogies to demonstrate full mastery of material learned through colloquialisms. *remembering, understanding, applying, analyzing evaluating, creating*
4. Ability to construct a procedure to measure heat transfer and calculate the specific heat of a substance *remembering, understanding, applying, analyzing evaluating, creating*

(Projects, presentations, final writing projects)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.

The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.

The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

PART I: UNIT 8 RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Unit 8 ***States of Matter (Solutions & Gas Laws)***	**Unit Summary**: During this unit students will examine the states of matter, properties of each and what conditions are needed transform from one state to another. After learning that all particles are in constant motion, students will relate kinetic energy to temperature, and phase changes. They will use kinetic molecular theory to discuss the differences in intermolecular forces of a solid, liquid and gas and what energy must be absorbed or released to change phase. Students will also examine heating curves to closer examine how energy, temperature and phase changes are related. Using phase diagrams, they will examine equilibrium and ability to change boiling points by changing pressure and how temperature and vapor pressure are related. Students will use the kinetic molecular theory to determine how gas molecules behave when conditions are varied, deriving gas laws from experimental data. Students quantitatively and qualitatively demonstrate an understanding of how solutions are made as well as how concentration is measured and how this concentration affects properties of the solution.
Grade Level(s): ***10-11***	
Essential Question(s): 1. What are the three types of intermolecular forces of attraction? 2. What is involved in a change in phase? 3. What information is provided by heating curves and phase diagrams? 4. What is the kinetic molecular theory of gases? 5. What are some distinctive properties of gases? 6. How is gas pressure measured? 7. What is solubility and how do you determine if a substance is soluble? How do you interpret a solubility curve? 8. How can concentrations be calculated? 9. What factors affect the rate of dissolving? 10. What are colligative properties?	**Enduring Understanding(s):** 1. The physical properties of solids, gases, liquids are different, dependent upon intermolecular attraction. 2. Changes in state can be described in terms of energy changes involved. 3. Heating, cooling curves, phase diagrams can be interpreted to identify phase of matter. 4. The kinetic molecular theory can be used to describe the properties of gases. 5. Gas pressure can be measured and derived, and gas pressure units can be converted using dimensional analysis. 6. Solubility depends on the intermolecular forces between solute and solvent 7. Solubility curves are used to determine the capacity which a solute can dissolve in a solvent. Using this, it is possible to determine if a solution is saturated, unsaturated or supersaturated. 8. Concentration of a solution can be calculated in different ways such as molarity and molality. 9. Solubility of a gas or solid is dependent upon pressure and temperature conditions 10. Using molality, it is possible to determine how solute dissolved affects colligative properties. 11. Use the gas laws to explain behavior of gases. 12. Mathematically determine one variable in gas law word problems. 13. Derive the ideal gas law.

11. How do the gas laws relate the variables pressure, volume, moles, and temperature? 12. What is the ideal gas law and how is it applied? 13. What is a real gas? 14. How is gas density related to molar mass and temperature? 15. How is Avogadro's law used to describe the relationship between the amount of a gas and its volume? 16. How is total pressure calculated, given the partial pressures of a gas mixture?	14. Use the ideal gas law to describe behavior of ideal gases and compare to behavior of real gases.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NGSS that are applicable

Learning Target	**NGSS**
1. 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. 2. Plan and conduct an investigation of the properties of water and its effects on Earth's materials and surface processes. 3. Evaluate competing design solutions or developing, managing and utilizing energy and mineral resources based on cost-benefit ratios. 4. Develop a quantitative model to describe the cycling among the hydrosphere, atmosphere, geosphere, and biosphere. 5. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	**1.** HS-PS1-3 **2.** HS-ESS2-5 **3.** HS-ESS3-2 **4.** HS-ESS2-6 5. HS-ETS1-1

Inter-Disciplinary Connections:

- Material presented in this section will connect with material in Math, History, Language Arts and 21st Century Life and Careers. Students will interact with text, and will be asked to read and draw inferences, cite specific evidence, follow procedures/tasks, translate word problems into mathematical problems, and assess text for use in forming arguments or comparing/contrasting arguments.

- Lab reports will involve reading comprehension, as well as technical writing. Most concepts presented in this unit will incorporate algebra and problem solving skills. Additional math focus will be to incorporate graphing analysis. Technological advancements (and their impact on society) utilizing concepts will also be incorporated in this unit.
- Additionally, the uses of computer technology (Pasco, LoggerPro, Vernier, Microsoft Office or Google Apps) may be used to supplement lessons and investigations in this unit.

Students will engage with the following text:

1. Text book
    a. Honors Chemistry: Chemistry - Prentice-Hall
2. Current Science Magazine- reading and writing
3. Chem Matters- reading and writing

Accommodations and modifications for reading: rewrite specific passages to address students' independent readability levels, use captions under pictures to aide in comprehension, decrease reading as necessary

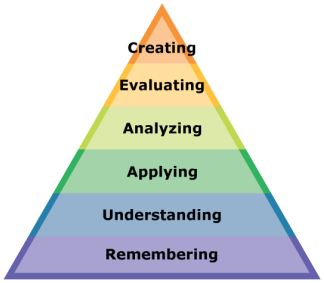
Students will write:

1. **Warm-ups**
    a. Compare and contrast the 3 states of matter in a Venn Diagram
2. **Closing**
    a. Correct your picture model that demonstrates the difference between saturated, unsaturated and supersaturated solutions.
3. **Activities** *(All activities listed below can be found in the honors chemistry activities folder on Google Drive)*
    a. Use your knowledge of the gas laws to explain a current day technology which applies one of more those laws.
4. **Labs** will include
    a. a pre lab write-up including purposes and procedures.
    b. conclusions in which students will restate the purpose, summarize the procedure (identify constants and variables) report results and their significance and source of error including ways to reduce or eliminate error.
    c. Students will formulate a connection to classroom material and relate the purpose of the experiments to the conclusion, where necessary changing a hypothesis and sometimes synthesizing a new procedure.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
How will students uncover content and build skills?

1. **Teacher – centered approach**
    a. Demonstration – Electrolytes in Solution, Acetone/Alcohol/H2O investigations
    b. Direct Instruction – PowerPoint slides, fill in notes, Cornell notes) guided practice and independent practice
    c. Lecture – discussion- Teacher questioning of students, Socratic Method
    d. Virtual field trips - (YouTube etc.)
2. **Learner(Student) approach**
    a. Cooperative learning – Completion of collaborative worksheets, modeling
    b. Discovery Learning – Labs; Classification of Matter POGIL, Interpreting Solubility Curves POGIL, Drops on a Penny Activity, Phase Diagram Chemquest
    c. Journals- lab notebooks
    d. Learning centers – work in small groups on lab activities
    e. Simulations- Gizmos, PHET - (States of Matter) Chem Lab Pro -

(Activities, instructional strategies & assignments)



PART IV: EVIDENCE OF LEARNING
IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.
Formative Assessments:

1. **Weekly quizzes** that include both conceptual questions and mathematical problems (*Understanding, Evaluating)*
2. Vee Maps– *analyzing, evaluating*
3. Completion of **independent practice** worksheets and problem sets (*Understanding, Analyzing)*
    a. Homework Cornell notes, summaries, -Understanding and Applying
4. **Writing samples** used to relate material to a real world application through demonstrations *(Applying, Analyzing)*
5. **Laboratory investigations** *(All activities listed below can be found in the honors chemistry labs folder on Google Drive)*
    - (ability to properly collect data and perform calculations pertaining to activity. Some examples might include:
    a. Colligative Properties Lab
    b. Kinetic Theory in Action (lab activity- Addison Wesley textbook p. 273 *understanding, analyzing*
    c. Sublimation mini lab- Addison Wesley textbook p. 286 *applying, analyzing*

d. Determining the Melting Point of water- Heath Laboratory Experiment book p. 219 *understanding, applying, analyzing*
e. Changes in Physical State experiment- Addison-Wesley laboratory manual p. 107 (exp. # 14) understanding, applying, analyzing
f. Ice Cream Lab
g. Molarity Lab
h. Chemistry of Popcorn (see district shared: gas laws) *applying, analyzing, evaluating*
i. The Molar Volume of a Gas (Heath Laboratory manual- p. 101 (exp. # 7-1) *applying, analyzing*
j. Carbon Dioxide from Antacid Tablets (mini lab- Addison-Wesley textbook p. 346 *applying, analyzing, evaluating*

(Quizzes, tests, homework, class discussion, individual conferences)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.
The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

Summative Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. Unit **Test** which includes multiple choice, problem solving as well as free response (ex. in District Shared/Chemistry Curriculum/Reactions, stoichiometry) *understanding, applying, analyzing, evaluating, creating*
2. **Labs reports** based on the material in this unit. u*nderstanding, applying*

(Benchmarks & final assessments)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.
The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class. (Lance,2004)

Performance Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. Students will be required to turn in homework and lab reports based on the material in this unit. These assignments will be graded *understanding, applying*
2. Ability to perform lab activities and perform calculations pertaining to activity *understanding, applying,* analyzing
3. Ability to graph data collected both manually and using probes. Applying, analyzing
4. Ability to interpret graphed data. Applying, analyzing, evaluating
5. Ability to construct a procedure to titrate and an acid with a base solution - remembering, understanding, applying, analyzing evaluating, creating
6. Ability to determine the cost effectiveness of antacid tablets using a titration - remembering, understanding, applying, analyzing evaluating

(Projects, presentations, final writing projects)

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.
Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:
Extended time, step-by-step problem set-up, and alternative evaluation (such as project based assessment), modifying directions for clarity, chunking test items, modifying lab reports, and homework assignments as needed.
The Special Education teacher will be available for additional support in reading test items and questions for understanding, modify labs based upon a student's learning style, read and help student self-edit lab reports for understanding of meaning, modify tests/quizzes by rewording directions, using colored pencils to aid in comprehension of chemical formulas and equations, chunk lab reports where writing is minimized, assess students on main topics covered in class as opposed to ancillary material.
The Special Education teacher will work with students after school if multiple step lab is too long to complete in lab period, The Special Education teacher will assist students with providing formulas and lab review guides in order for students to perform the lab successfully, provide mock lab presentations to model how the lab should be performed in class.(Lance,2004)

PART I: UNIT 9 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Unit 9 ***Nuclear Chemistry***	**Unit Summary**: This course's culminating unit provides an opportunity to apply what has been learned to real world solutions. Students will discuss properties of radioactivity, the different particles emitted, the pathway in which they are emitted, how they are measured and what effects they have on the environment. Students will balance nuclear reactions involving nuclear fission, fusion, and half-life. They will also discuss the uses of radiation in the real world such as medical application and nuclear plants for electricity.
Grade Level(s): ***10-11***	
Essential Question(s): 1. How does fusion on our sun work? 2. How is energy generated in our nuclear power plants and what are the risks? 3. What is carbon dating and how is it used?	**Enduring Understanding(s):** 1. Fusion is a process that combines two smaller nuclei into a larger one. It requires incredibly hot temperatures to start which makes the fact that it is used on the sun and stars logical. 2. Fission splits a nucleus apart into two smaller nuclei. This is used by our power plants creating nuclear waste. If controls are not met, it can be disastrous (Chernobyl, Three Mile Island) 3. The energy released during nuclear decay can be in different forms such as alpha particles, beta particles, gamma rays. 4. The half live of a substance is how long it takes half the atoms in a given sample to decay. This is used in Carbon dating

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES
DESCRIBE THE LEARNING TARGETS.
After each target, identify the NGSS that are applicable

Learning Target	**NGSS**
1. 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.	**1.** HS-PS1-8
2. Develop a model based on evidence to illustrate the life span of the sun and role of nuclear fusion in the sun's core to release energy that eventually releases Earth in the form of radiation.	**2.** HS-ESS1-1
3. Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies and composition of matter in the universe.	3.HS-ESS1-2
4. Communicate scientific ideas about the way stars, over their life cycles, produce elements.	4. HS-ESS1-3
5. Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of the Earth's formation and early history.	5. HS-ESS1-6

Inter-Disciplinary Connections:

- Material presented in this section will connect with material in Math, History, Language Arts and 21st Century Life and Careers. Students will interact with text, and will be asked to read and draw inferences, cite specific evidence, follow procedures/tasks, translate word problems into mathematical problems, and assess text for use in forming arguments or comparing/contrasting arguments.
- Lab reports will involve reading comprehension, as well as technical writing. Most concepts presented in this unit will incorporate algebra and problem solving skills. Additional math focus will be to incorporate graphing analysis. Technological advancements (and their impact on society) utilizing concepts will also be incorporated in this unit.
- Additionally, the uses of computer technology (Pasco, LoggerPro, Vernier, Microsoft Office or Google Apps) may be used to supplement lessons and investigations in this unit.
- The Move Fat Man & Little Boy can be shown to connect this unit to the end of World War II

Students will engage with the following text:

1. Text book
    a. Honors Chemistry: Chemistry - Prentice-Hall
2. Current Science Magazine- reading and writing
3. Chem Matters- reading and writing

Accommodations and modifications for reading: rewrite specific passages to address students' independent readability levels, use captions under pictures to aide in comprehension, decrease reading as necessary

Students will write:

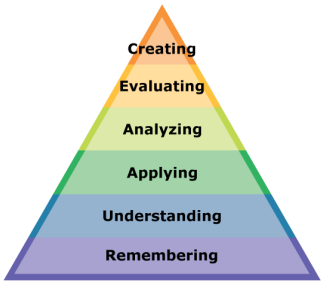
1. **Warm-ups**
    a. Where do you think the energy in a nuclear reactor comes from?
2. **Closing**
    a. Draw a model of nuclear reactor that explains how the nuclear energy is used to generate electricity
3. **Activities** *(All activities listed below can be found in the honors chemistry activities folder on Google Drive)*
    a. Write an opinion essay stating both the pros and cons of nuclear energy and your preference for or against.
4. **Labs** will include
    a. a pre lab write-up including purposes and procedures.
    b. conclusions in which students will restate the purpose, summarize the procedure (identify constants and variables) report results and their significance and source of error including ways to reduce or eliminate error.
    c. Students will formulate a connection to classroom material and relate the purpose of the experiments to the conclusion, where necessary changing a hypothesis and sometimes synthesizing a new procedure.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
How will students uncover content and build skills?

1. **Teacher – centered approach**
    a. Demonstration – Nuked Salt
    b. Direct Instruction – PowerPoint slides, fill in notes, Cornell notes) guided practice and independent practice
    c. Lecture – discussion- Teacher questioning of students, Socratic Method
    d. Virtual field trips - (YouTube etc.)
    e. Videos
        i. Savage Sun (Discovery Education)
2. **Learner(Student) approach**
    a. Cooperative learning – Completion of collaborative worksheets, modeling
    b. Discovery Learning – POGIL on Nuclear Fission & Fusion, Half-life of pennies lab
    c. Journals- lab notebooks
    d. Learning centers – work in small groups on lab activities
    e. Simulations- Gizmos, PHET - (Radioactive Dating Game, Alpha Decay, Beta Decay, Nuclear Fission) Chem Lab Pro -
    f. Real World Application - History of Manhattan Project

(Activities, instructional strategies & assignments)

PART IV: EVIDENCE OF LEARNING
IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

1. **Weekly quizzes** that include both conceptual questions and mathematical problems (*Understanding, Evaluating)*
2. Vee Maps – *analyzing, evaluating*
3. Completion of **independent practice** worksheets and problem sets (*Understanding, Analyzing)*
    a. Homework Cornell notes, summaries, -Understanding and Applying
4. Writing samples used to relate material to a real world application through demonstrations *(Applying, Analyzing)*
5. **Laboratory investigations** *(All activities listed below can be found in the honors chemistry labs folder on Google Drive)*
    - (ability to properly collect data and perform calculations pertaining to activity. Some examples might include:
    a. Half-Life of Pennies

(Quizzes, tests, homework, class discussion, individual conferences)

Accommodations/Modifications:

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Summative Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. **Unit Test** which includes multiple choice, problem solving as well as free response (ex. in District Shared/Chemistry Curriculum/Reactions, stoichiometry) *understanding, applying, analyzing, evaluating, creating*
2. **Labs reports** based on the material in this unit. u*nderstanding, applying*

(Benchmarks & final assessments)

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Performance Assessments: *(All assessments listed below can be found in the honors chemistry assessments folder on Google Drive)*

1. Ability to perform lab activities and perform calculations pertaining to activity - *remembering, understanding, applying, analyzing evaluating*
2. Ability to design, construct and analyze models of abstract concepts in concrete methods (ex. Periodic table project) *remembering, understanding, applying, analyzing evaluating*
3. Creating analogies to demonstrate full mastery of material learned through colloquialisms. *remembering, understanding, applying, analyzing evaluating, creating*
4. Ability to construct a procedure (lab) *remembering, understanding, applying, analyzing evaluating, creating*

(Projects, presentations, final writing projects)

Accommodations/Modifications:

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Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

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