EGG HARBOR TOWNSHIP PUBLIC SCHOOLS
CURRICULUM

Honors (HN) Chemistry
High School

Length of Course:	Full Year
Elective / Required:	Refer to Program of Studies
Schools:	High School
Student Eligibility:	Grades 10 – 12
Credit Value:	5 credits
Date Submitted:	September 2016
Date Approved:	

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DISTRICT MISSION STATEMENT

Our mission in the Egg Harbor Township School District is to partner with the student, family, school, and community to provide a safe learning environment that addresses rigorous and relevant 21st Century standards and best practices which will develop academic scholarship, integrity, leadership, citizenship, and the unique learning style of students, while encouraging them to develop a strong work ethic and to act responsibly in their school community and every day society.

SCIENCE – PHILOSOPHY

We believe that ALL students regardless of race, ethnicity, socio-economic status, religious background, and/or any other classification are deserving of a holistic science education. This holistic approach would include an education that will allow them to fully discover themselves, their strengths and weaknesses, and benefit from science instruction.

> Scientific literacy assumes an increasingly important role in the context of globalization. The rapid pace of technological advances, access to an unprecedented wealth of information, and the pervasive impact of science and technology on day-to-day living require a depth of understanding that can be enhanced through quality science education. In the 21st century, science education focuses on the practices of science that lead to a greater understanding of the growing body of scientific knowledge that is required of citizens in an ever-changing world (NJCCCS-Science).

Science curricula are designed to reinforce 21st Century Learning, to maximize rigor, relevance, and relationships, and to engage students individually through differentiated instruction.

SCIENCE - STATEMENT OF PURPOSE

Education exists for the purpose of enabling each individual to realize and maintain her/his full potential. Scientifically literate students possess the knowledge and understanding of scientific concepts and processes required for personal decision-making, participation in civic and cultural affairs, and economic productivity.

> Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions, such as selecting among alternative medical treatments or determining how to invest public funds for water supply options. In addition, understanding science and the extraordinary insights it has produced can be

meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering (NJSLS-Science)

All students engage in science experiences that promote the ability to ask, find, or determine answers to questions derived from natural curiosity about everyday things and occurrences. The underpinning of the revised standards lies in the premise that science is experienced as an active process in which inquiry is central to learning and in which students engage in observation, inference, and experimentation on an ongoing basis, rather than as an isolated a process. When engaging in inquiry, students describe objects and events, ask questions, construct explanations, test those explanations against current scientific knowledge, and communicate their ideas to others in their community and around the world. They actively develop their understanding of science by identifying their assumptions, using critical and logical thinking, and considering alternative explanations (NJCCCS-Science).

Our school district provides an extensive science program, which will enable students to succeed and compete in the global marketplace using the New Jersey Student Learning Standards in Science as well as the Next Generation Science Standards.

INTRODUCTION

The most precious resource teachers have is time. Regardless of how much time a course is scheduled for, it is never enough to accomplish all that one would like. Therefore, it is imperative that teachers utilize the time they have wisely in order to maximize the potential for all students to achieve the desired learning.

High quality educational programs are characterized by clearly stated goals for student learning, teachers who are well-informed and skilled in enabling students to reach those goals, program designs that allow for continuous growth over the span of years of instruction, and ways of measuring whether students are achieving program goals.

THE EGG HARBOR TOWNSHIP SCHOOL DISTRICT CURRICULUM TEMPLATE

The Egg Harbor Township School District has embraced the backward-design model as the foundation for all curriculum development for the educational program. When reviewing curriculum documents and the Egg Harbor Township curriculum template, aspects of the backward-design model will be found in the stated enduring *understandings/essential questions, unit assessments,* and *instructional activities*. Familiarization with backward-design is critical to working effectively with Egg Harbor Township's curriculum guides.

GUIDING PRINCIPLES: WHAT IS BACKWARD DESIGN?
WHAT IS UNDERSTANDING BY DESIGN?

"Backward design" is an increasingly common approach to planning curriculum and instruction. As its name implies, "backward design" is based on defining clear goals, providing acceptable evidence of having achieved those goals, and then working 'backward' to identify what actions need to be taken that will ensure that the gap between the current status and the desired status is closed.

Building on the concept of backward design, Grant Wiggins and Jay McTighe (2005) have developed a structured approach to planning programs, curriculum, and instructional units. Their model asks educators to state goals; identify deep understandings, pose essential questions, and specify clear evidence that goals, understandings, and core learning have been achieved.

Programs based on backward design use desired results to drive decisions. With this design, there are questions to consider, such as: What should students understand, know, and be able to do? What does it look like to meet those goals? What kind of program will result in the outcomes stated? How will we know students have achieved that result? What other kinds of evidence will tell us that we have a quality program? These questions apply regardless of whether they are goals in program planning or classroom instruction.

The backward design process involves three interrelated stages for developing an entire curriculum or a single unit of instruction. The relationship from planning to curriculum design, development, and implementation hinges upon the integration of the following three stages.

Stage I: Identifying Desired Results: Enduring understandings, essential questions, knowledge and skills need to be woven into curriculum publications, documents, standards, and scope and sequence materials. Enduring understandings identify the "big ideas" that students will grapple with during the course of the unit. Essential questions provide a unifying focus for the unit and students should be able to answer more deeply and fully these questions as they proceed through the unit. Knowledge and skills are the *"stuff"* upon which the understandings are built.

Stage II: Determining Acceptable Evidence: Varied types of evidence are specified to ensure that students demonstrate attainment of desired results. While discrete knowledge assessments (e.g.: multiple choice, fill-in-the-blank, short answer, etc…) will be utilized during an instructional unit, the overall unit assessment is performance-based and asks students to demonstrate that they have mastered the desired understandings. These culminating (summative) assessments are authentic tasks that students would likely encounter in the real-world after they leave school. They allow students to demonstrate all that they have learned and can do. To demonstrate their

understandings students can explain, interpret, apply, provide critical and insightful points of view, show empathy and/or evidence self-knowledge. Models of student performance and clearly defined criteria (i.e.: rubrics) are provided to all students in advance of starting work on the unit task.

Stage III: Designing Learning Activities: Instructional tasks, activities, and experiences are aligned with stages one and two so that the desired results are obtained based on the identified evidence or assessment tasks. Instructional activities and strategies are considered only once stages one and two have been clearly explicated. Therefore, congruence among all three stages can be ensured and teachers can make wise instructional choices.

At the curricular level, these three stages are best realized as a fusion of research, best practices, shared and sustained inquiry, consensus building, and initiative that involves all stakeholders. In this design, administrators are instructional leaders who enable the alignment between the curriculum and other key initiatives in their district or schools. These leaders demonstrate a clear purpose and direction for the curriculum within their school or district by providing support for implementation, opportunities for revision through sustained and consistent professional development, initiating action research activities, and collecting and evaluating materials to ensure alignment with the desired results. Intrinsic to the success of curriculum is to show how it aligns with the overarching goals of the district, how the document relates to district, state, or national standards, what a high quality educational program looks like, and what excellent teaching and learning looks like. Within education, success of the educational program is realized through this blend of commitment and organizational direction.

INTENT OF THE GUIDE

This guide is intended to provide teachers with course objectives and possible activities, as well as assist the teacher in planning and delivering instruction in accordance with the New Jersey Core Curriculum Content Standards. The guide is not intended to restrict or limit the teacher's resources or individual instruction techniques. It is expected that the teacher will reflectively adjust and modify instruction and units during the course of normal lessons depending on the varying needs of the class, provided such modified instruction attends to the objectives and essential questions outlined below.

N.J.A.C. 6A:8-3.1 Required Curriculum Components

Code Language	Evident in Curriculum YES/NO	Comments
Interdisciplinary Connections	**Yes**	**Via lab activities. STEM units in development 1 per marking period**
A pacing guide	**Yes**	**By Unit approximately 2-4 units per marking period**
A list of core instructional materials, including various levels of text at each grade level	**Yes**	**Suggested Activities Labs**
Benchmark assessments	**Yes**	**Teacher-developed and common via pre/post and benchmark assessments**
Modifications for special education students, for ELLs in accordance with N.J.A.C. 6A:15, and for gifted students. (As appropriate) – See Appendix A	**Yes**	**As directed by student's Individual Education Plan**

Unit Name: Matter, Change, Measurement, and Calculations (Chapters 1 and 2)

Time Frame: Summer work / 2 weeks of in class review and activities
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: **Egg Harbor Township High School**

Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

Chapter 1 defines the field of chemistry and distinguishes between different branches of chemistry. This chapter also defines matter and contrasts major physical and chemical changes that matter can undergo. This section also outlines the basic form of a chemical equation and describes how matter is classified. The last section introduces the periodic table as a classification scheme for the elements with descriptions of metals, nonmetals, and metalloids.
Chapter 2 covers the scientific method and its component activities, such as observing, collecting data, formulating and testing hypotheses, and theorizing. Section 2 presents SI units of measurement, the concepts of mass and density, and the use of conversion factors. Section 3 describes accuracy and precision, percent error, the use of significant figures and scientific notation, and steps to use in solving problems.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*
- *Video clips*
- *Distillation teacher demo*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

All chapters:

HS-PS1-1.	**Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.**
HS-PS2-6.	**Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.**
HS-PS1-7.	**Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.**
HS-PS1-3.	**Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.**

ENDURING UNDERSTANDINGS

1. Chemistry explains the natural world.
2. Properties can be used to classify, identify, separate matter, and explain structure and function.
3. Matter has characteristic properties that are relate to the structure and function of the matter.
4. Solving problems requires an appreciation of the big picture.
5. Dimensional Analysis is a useful tool.

ESSENTIAL QUESTIONS

1. Are all laboratory activities approached in the same manner?
2. Why is Chemistry important?
3. Why is it necessary to use a common set of measurement units?
4. How do scientists express the degree of uncertainty in their measurements?
5. To what extent is data reliable?
6. How is dimensional analysis used to solve problems in Chemistry?
7. What properties are used to describe matter?
8. How can matter change its form?

KNOWLEDGE AND SKILLS

SWBAT:

1. Appropriately use measurement tools in the laboratory.
2. Record measurements to the correct number of sig figs, use rules for sig figs in calculations to correctly round off numbers.
3. Identify and use SI units in calculations.
4. Identify and describe physical properties like density.
5. Identify chemical properties.
6. Classify matter: solid, liquid, gas, plasma.
7. State the Law of Conservation of Energy and of Mass.
8. Distinguish between mixtures, compounds, and pure elements.
9. Classify matter as homogeneous or heterogeneous.
10. List observations that suggest a chemical change.
11. Solve problems by Dimensional Analysis.
12. Apply Conversion Factors to solve problems.

STAGE TWO

PERFORMANCE TASKS

- Use of ruler and graduated cylinder during significant figure activity.
- Students will also need to identify and classify different elements, compounds, homogeneous or heterogeneous mixtures.

- Students will work together to solve significant figure, scientific meditation, and metric problems.
- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.
To maximize student understanding significant figures is taught earlier than in the textbook sequence, this is to give students maximum time learning these difficult concepts before the summative assessment.

Common Misconceptions

One common misconception in chapter 1 is students often think that science and technology are the same science includes knowledge in its major disciplines, such as biology, chemistry, and physics. Technology is the application of that knowledge for practical purposes.
Students often think that all metals are the same. Because they are familiar with rusting as a corrosive property of iron, they may think that all metals rust. Make sure they understand

that the definition and characteristics of metals are based on their functional properties and not just their appearance.
A common misconception in chapter 2 is the term scientific method may lead students to think that there is a single, unique sequence of steps that is always used in science. Point out that the scientific method is a general approach to problem solving and that the order of the steps may vary with the problem. Also emphasized that the independent verification of findings by other scientists is what lends credibility to scientific discoveries.
The term precision is often misunderstood as meaning the same thing as accuracy. Make sure students understand what precision is, and take the time to reinforce the concept throughout the course.
Significant figures often give students difficulty, use real world examples to help them visualize what significant figures me. The graduated cylinder and ruler demos help.

Unit Name: UNIT 2 The History of Atomic Theory (Chapter 3 and Chapter 5)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: **Egg Harbor Township High School**

Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

Chapter 3 begins with section 1 which covers the history and development of atomic theory, from Democritus to Dalton to the modern era. Section 2 covers the experiments that led to the discovery of the electron and the nucleus as well as the principal properties of these subatomic particles. Section 3 outlines the manner in which the number of atoms of an element and the number of an Adam's subatomic particles can be expressed and measured.
Chapter 5 section 1 covers the work of Mendeleyev and other chemists in developing the periodic table and explains how the periodic law is used to predict elements' physical and chemical properties.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*
- *Video clips*
- *Review worksheet*
- *Density lab*
- *Percent composition of water in popcorn.*

Demo – use a CRT monitor to demonstrate: bring in a old computer monitor. Show how the image on the screen seems to be distorted by a magnetic field, which alters the path of electrons as they approach the screen.
Alternative Assessment - Timeline project – have students build a timeline for the major events in the development of the modern atomic theory. Start with the events in the text, and then award extra credit for events not mentioned in the text that contribute to a more complete chronology.
Alternative Assessments – divide the class into groups of three or four, and assign each group one chemical family. Select from groups one, two, 13, 14, 15, 16, 17, or 18. Have students use the text, the CRC handbook, and other resources to determine six properties of their chemical family. Each group should write their findings on the board in order to compile a class list of properties of all the families of the periodic table.

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/

- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

ENDURING UNDERSTANDINGS

1. The modern model of the atom has evolved over a long period of time through the work of many scientists.
2. All matter is made of atoms.
3. The majority of the mass of an atom is in the nucleus.
4. Each electron has its own distinct amount of energy.

ESSENTIAL QUESTIONS

1. How has the model of the atom evolved?
2. How does the structure and composition of the atom influence its chemical and physical properties?
3. How are atoms of one element different from atoms of another element?
4. How does the electron behave?

KNOWLEDGE AND SKILLS

SWBAT:

1. Explain the structure of matter using Dalton's Theory and Bohr's Model.
2. Deduce and infer atomic structure data from the periodic table.
3. Compare protons, neutrons, and electrons with regard to mass, charge, and location in the atom.

STAGE TWO

PERFORMANCE TASKS

- Active participation in building a periodic table from scratch
- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice
-

OTHER EVIDENCE

- Chapter Test
- Open Ended Responses
- Review Game
- Quizzes on scientists, elements, properties, and calculations

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Common Misconceptions

Make it clear to students that the identity of the atom is determined by the number of protons, not the number of electrons or neutrons. The number of electrons and the number of neutrons can eat you very and the atom will still be the same element. But if the number of protons changes, then the atom becomes an atom of a different element.
Many students think that the protons and neutrons have the same mass as individual particles as they do his part of the nucleus of an atom. However, the mass of the nucleus is less than the sum of the masses of the protons and neutrons making up the nucleus. The difference is due to the binding energy that holds the nucleus together.
Explain to students that something does not need to vary uniformly in order to very periodically. For example, although the spaces between the water waves shown in figure 1 on page 133 are not equal, the wingspread in the periodic manner: as each wave spreads outward, it follows the same pattern as that of the preceding wave.

Unit Name: UNIT 3 Nomenclature (Chapter 7 section 1)
Time Frame: 2 weeks including test and practice test in class
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10^{th}-12^{th}
School: **Egg Harbor Township High School**

Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

This unit describes the meaning of binary ionic and molecular compounds. Section 2 goes over complex meaning including polyatomic ions and transition metals (not in text). Section 3 includes naming of complex polyatomic ions and their derivatives. Section 4 covers naming acids and bases.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Teaching tip- the textbook uses the convention of writing ion charges with the number preceding the sign, n+ and n-; this is done to distinguish ion charges from oxidation numbers, introduced later in this chapter, which are written as +n and –n.

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS
NGSS

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

ENDURING UNDERSTANDINGS

5. Explain how ionic compound formulas are constructed.

6. Explain the exceptions to the rules with polyatomic ions and transition metals.
7. Explain naming rules for molecular compounds.
8. Explain naming rules for acids and bases.

ESSENTIAL QUESTIONS

1. What are the rules for naming ionic and molecular compounds?
2. What is important about transition metals when it comes to naming them?
3. Why is it important to balance charges for ionic formulas but not for molecular formulas?

KNOWLEDGE AND SKILLS

SWBAT:

- Explain how ionic compound formulas are constructed.
- Explain the exceptions to the rules with polyatomic ions and transition metals.
- Explain naming rules for molecular compounds.
- Explain naming rules for acids and bases.

STAGE TWO

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups

- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Common Misconceptions

Students often misinterpret some of scripts that appear after a closing parenthesis in chemical formulas as applying only to the immediately preceding atom. Point out that such subscripts multiply the subscripts of all the atoms within the preceding parentheses. Give students adequate practice in interpreting formulas that contain such subscripts.
Students often think that, like an Ionic formula, a correctly written molecular formula should show the simplest ratio of atoms in the compound that the formula represents. However, a molecular formula represents the actual numbers of individual atoms in a molecule of the compound. Thus, the subscripts in such formulas are not always reduced to the simplest possible ratio. For example, the molecular formulas for ethyne and benzene are C_2H_2 and C_6H_6, respectively. Reducing the subscripts to the smallest possible ratios would produce CH in these two cases, although the compounds are completely different.

Unit Name: UNIT 4 The Mole (Chapter 9 section 1 and section 3)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: **Egg Harbor Township High School**
Country: **USA**
State/Group: **NJ**

UNIT SUMMARY
Chapter 9 section 1 defines the mole ratio and introduces molar mass as a conversion factor in solving stoichiometric problems. Students are exposed to various methods for converting to and from the mole. Students calculate percent composition, empirical formula and molecular formula. Students calculate hydrate formulas from empirical formulas.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

ENDURING UNDERSTANDINGS
The mole is an important unit of measurement that aides in the quantification of matter. Students will be able to convert between units to prepare them for stoichiometry. They will also strive to understand that the mass differences between types of atoms have a large effort on their formula mass.

ESSENTIAL QUESTIONS

- *How do chemist use moles as a mean of counting?*
- How do elements combine to create compounds?
- How do chemist use moles as a mean for counting?
- put into action the rules of ionic and molecular compounds through a practice test. TLWBAT calculate molar mass and use it as a conversion factors. TLWBAT combine Avogadro's number with molar mass conversions.

KNOWLEDGE AND SKILLS

SWBAT:

- *put into action mole <--> atoms/molecule conversions.*
- *Differentiate between a problem going straight to atoms versus going through molecules.*
- put into action the rules of ionic and molecular compounds through a practice test.
- calculate molar mass and use it as a conversion factors.
- combine Avogadro's number with molar mass conversions.
- Convert between mass in grams and amount in moles of a chemical compound, using molar mass. Calculate the percentage composition of a given chemical compound.
- Explain the relationship between the empirical formula and the molecular formula of a given compound.

STAGE TWO

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations

- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: UNIT 5 Chemical Equations and Reactions (Chapter 8)
Time Frame: 3 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: **Egg Harbor Township High School**
Country: **USA**
State/Group: **NJ**

UNIT SUMMARY
Chapter 8 starts with section 1 covering the writing in balancing of chemical equations and lists the information contained in an equation.
Section 2 describes five basic types of chemical reactions: synthesis, decomposition, single-displacement, double-displacement, and combustion.
Section 3 presents activity series for metals and the halogens and explains how they are used in writing chemical equations.
We also go over using solubility charts and ionic equations in this unit.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

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

ENDURING UNDERSTANDINGS

Matter is conserved in a chemical reaction.

Balanced equations allow you to determine the amount of product produced from a given amount of reactant or activity series of the reactivity of elements can be used to predict if reactions will occur.

ESSENTIAL QUESTIONS

- *How do chemical reactions obey the law of conservation of matter?*
- *How can you predict the products of a chemical reaction?*
- *How does the chemical equation illustrate the Law of Conservation of Matter?*
- *How can we determine if a chemical change has taken place?*
- *To what extent are all chemical reactions the same?*

KNOWLEDGE AND SKILLS

SWBAT:
Balance chemical reactions
Write word equations and formula equations for a given chemical reaction.
Predict the products of simple reactions given the reactants.
Use the activity series of metals and some nonmetals to predict the products of single replacement reactions.
Predict if a reaction will occur and what the products will be using an activity series.
Write net ionic equations and use the solubility chart to predict whether or not reactions take place.

STAGE TWO

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations

- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: UNIT 6 Stoichiometry (Chapter 9)
Time Frame: 3 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10^{th}-12^{th}
School: **Egg Harbor Township High School**

Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

Chapter 9 begins in section 1 where we define the mole ratio and introduce molar mass as a conversion factor in solving stoichiometric problems.
Section 2 demonstrates solutions to problems involving conversions from moles of given to moles of unknown, conversions from moles to mass, from mass to moles, and from mass to mass.
Section 3 explains the concepts of limiting reagent and percentage yield and provides strategies for solving problems based on these concepts.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

HS-PS1- **Use mathematical representations to support the claim that atoms, and therefore**

7. mass, are conserved during a chemical reaction.

ENDURING UNDERSTANDINGS

- Chemical formulas can provide much information about the amount of chemicals that can be used or produced during a reaction.
- Quantities of all reactants are not always completely consumed.
- Not every combination of reactants will produce a chemical reaction.

ESSENTIAL QUESTIONS

- *How is stoichiometry used to obtain quantitative information from balanced equations?*
- *How can you determine which reactant will be used up first?*
- *How are balanced chemical equations used in stoichiometric calculations?*
- *How can you calculate amounts of reactants and products in a chemical reaction?*

KNOWLEDGE AND SKILLS

SWBAT:

- *Solve various types of stoichiometric problems by balancing equations using moles, mass, representative particles, and volumes of gases (at standard temperature and pressure).*
- *Identify the limiting reactant for a reaction and use it to calculate theoretical yield.*
- *Calculate the amount reactant remaining after a reaction is complete.*
- *Calculate percent yield.*

STAGE TWO

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions

- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: UNIT 7 solubility and molarity (Chapter 12 pg 414-415 and chapter 12 section 3)
Time Frame: 2 weeks

Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: **Egg Harbor Township High School**

Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

The first section covers how temperature affects solubility.
The second half of the unit explains concentration as molarity and molality. This includes how to make the calculations and prepare solutions.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

HS-PS1-1.	**Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.**
HS-PS2-6.	**Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.**

ENDURING UNDERSTANDINGS

ESSENTIAL QUESTIONS

What information can you obtain from a solubility curve?

How can you quantify the concentration of a solution?
How would you prepare a specific concentration of a salt solution from a crystal of that salt?

KNOWLEDGE AND SKILLS

SWBAT:

- *Determine the factors that affect the solubility of a substance.*
- *Calculate precipitate formed or dissolved when solubility changes.*
- *Calculate the molarity and molality of a solution.*
- *Prepare a solution of various salts from crystalline salts and water.*

STAGE TWO

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: UNIT 8 Periodic Trends (Chapter 5: The period law)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: **Egg Harbor Township High School**

Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

Section 1 covers the work of Mendeleyev and other chemists in determining the periodic table and explains how the periodic law is used to predict elements' physical and chemical properties.
Section 2 explains the relationship between electron configuration and the arrangement of elements in groups, blocks, and periods of the periodic table, as well as the elements' general properties.
Section 3 further explores the relationship between the periodic law and electron configuration, including trends in the properties of electron affinity, electronegativity, ionization energy, atomic radii, and ionic radii.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

HS-PS1-1.	**Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.**
HS-PS2-6.	**Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.**

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

ENDURING UNDERSTANDINGS

- The Periodic Table is a patterned system of organized groups of related elements.
- Manipulation and graphing data help to recognize and identify patterns.
- Understanding of regularities and patterns in the periodic table allows for predictions of interactions among the elements.
- An atom's electron configuration determines who it interacts with to form bonds.

ESSENTIAL QUESTIONS

- *How and why was the periodic table developed and what is the basis of the arrangement of the elements?*
- *How can properties of elements be predicted using the periodic table?*
- *How does chemical bonding determine the properties of a substance?*
- *How do the electronic structures of atoms determine the way in which they form chemical compounds?*

KNOWLEDGE AND SKILLS

SWBAT:

- Explain how atomic radii, ionization energy, and electron affinities vary within a group and within a period on the PT.
- Predict the charge of an ion given its position on the periodic table and its electron configuration.
- Draw electron dot structures of the representative elements.
- Name binary inorganic compounds.
- Describe the process of forming an ionic bond.
- Name cations, anions, and ionic compounds.
- Use periodic table to identify a compound as having ionic bonds.

  Use the theory of metallic bonding to explain the physical properties of metals.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: UNIT 9 Physics (Chapter 4: The arrangement of electrons)
Time Frame: 3 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: **Egg Harbor Township High School**

Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

Section 1 describes the principles of electromagnetic radiation and the development of the Bohr model of the atom.
Section 2 describes the location of electrons around the nucleus from the wave mechanical, or quantum, perspective using quantum numbers.
Section 3 discusses the rules used to determine the electron configurations of the elements and introduces electronic configuration notations.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

HS-PS1-1.	**Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.**
HS-PS1-8.	**Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.**
HS-PS4-	**Use mathematical representations to support a claim regarding relationships**

1.	**among the frequency, wavelength, and speed of waves traveling in various media.**
HS-PS4-3.	**Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.**
HS-PS4-4.	**Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.**

ENDURING UNDERSTANDINGS

- The modern model of the atom has evolved over a long period of time through the work of many scientists.
- All matter is made of atoms.
- The majority of the mass of an atom is in the nucleus.
- Each electron has its own distinct amount of energy.

ESSENTIAL QUESTIONS

- How has the model of the atom evolved?
- How does the structure and composition of the atom influence its chemical and physical properties?
- How are atoms of one element different from atoms of another element?
- How does the electron behave?

KNOWLEDGE AND SKILLS

SWBAT:

- Explain the structure of matter using Dalton's Theory and Bohr's Model.
- Deduce and infer atomic structure data from the periodic table.
- Compare protons, neutrons, and electrons with regard to mass, charge, and location in the atom.
- Given the wavelength of an electromagnetic wave, calculate the frequency, and vice versa.
- Calculate the energy of a photon associated with a given wavelength or frequency.
- Write the electron configuration of elements.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework

- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: UNIT 10 Chemical Bonding (Chapter 6)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: **Egg Harbor Township High School**

Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

Section 1 defines chemical bonding and uses electronegativity values to contrast polar-covalent, nonpolar-covalent, and ionic bonding.
Section 2 covers the characteristics of covalent bonding, including the relationship between bond length and bond strength and the use of Lewis structures.
Section 3 covers the characteristics of ionic bonding.
Section 4 covers the characteristics of metallic bonding and the resulting properties of metals.
Section 5 covers theories of molecular geometry, and discusses how intermolecular attraction is affected by molecular geometry.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

HS-PS1-1.	**Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.**
HS-PS1-3.	**Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.**
HS-PS2-6.	**Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.**
HS-PS1-	**Construct and revise an explanation for the outcome of a simple chemical reaction**

2. based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

ENDURING UNDERSTANDINGS

- The octet rule is used to determine how atoms bond covalently with one another by sharing electrons.
- Lewis dot structures are drawn to help predict shapes of molecules.
- Electronegativity can determine the polarity of atoms, their type of bond, and the strength of intermolecular forces.
- The electron domain placement determines the shapes and therefore the properties of molecules.

ESSENTIAL QUESTIONS

- How does the Periodic Table help you determine the names and formulas of ions and compounds?
- How do electrons affect the shape of the molecule?
- How does the molecular structure influence the properties of a substance?
- How does the degree of polarity between two different atoms affect bonding?

KNOWLEDGE AND SKILLS

SWBAT:

- Differentiate between polar covalent, non-polar covalent, and ionic bonds using electronegativity differences as well as location of elements on the periodic table.
- Explain the role and location of electrons in a covalent bond.
- Draw electron dot structures of the representative elements.
- Use electron dot structures to show covalent bond formation.
- Draw electron dot structures for simple covalent molecules containing single, double and triple bonds.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: UNIT 11 States of Matter (Chapter 10)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry Country: **USA**

Course/Grade: 10th-12th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY
Section 1 introduces the kinetic-molecular theory of matter and explains how the theory accounts for certain physical properties of ideal gases, which differ from real gases.
Section 2 uses the kinetic – molecular theory to describe properties of liquids and explain changes of state involving liquids.
Section 3 describes the properties of solids, contrasts them with liquid properties, and explains them on the basis of the kinetic – molecular theory.
Section 4 covers changes of state and the factors that determine them.
Section 5 covers the structure, physical properties, and changes of state of water.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

HS-PS1-3.	**Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.**
HS-PS2-6.	**Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.**

ENDURING UNDERSTANDINGS

- The gas laws can predict, analyze, and explain the properties of gases.
- Math formulas can be used to predict the outcome of an experiment involving gases.

- The combined gas law is used to relate initial conditions of pressure, volume, and temperature of a gas to the final conditions.
- Intermolecular forces affect the properties of all states of matter.
- The phase of a substance is determined by distances between the particles and motions of the particles in that substance.
- Temperature affects the properties and behavior of matter.

ESSENTIAL QUESTIONS

- How can the physical state of a substance be predicted?
- How do substances change from one state to another?
- How can we predict the behavior of gases?
- Why is the ideal gas law useful?

KNOWLEDGE AND SKILLS

SWBAT:

- Describe general characteristics and properties of gases.
- Determine the relationship between volume, temp, and pressure through analyzing experimental data.
- Relate the Kinetic molecular theory to pressure, temperature and volume relationships and effusion properties of an ideal gas.
- Calculate pressure-volume changes using Boyles Law
- Calculate temperature-volume changes using Charles Law.
- Calculate temperature-pressure changes using Gay-Lussacs Law.
- Use Grahams Law of diffusion experimentally or theoretically to determine relative speed of diffusion and molecular mass of an unknown gas.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice

- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: Unit 12: Gases (Chapter 11)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10^{th}-12^{th}
School: Egg Harbor Township High School

Country: USA
State/Group: NJ

UNIT SUMMARY

Section 1 will reintroduce kinetic molecular theory of gases, and will have students define pressure in terms of force, explain how pressure is measured, and be able to convert with pressure units. The second section will introduce gas laws and their relationships between pressure, volume, and temperature. Section three continues to develop their mathematical skills through the ideal gas law and revisit the mole concept. Lastly, section four will show how mass and effusion rates are dependent on one another through Graham's effusion law.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS
NGSS

HS-PS1-3.	**Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.**
HS-PS1-1.	**Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.**
HS-PS2-6.	**Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.**

ENDURING UNDERSTANDINGS

- The kinetic molecular theory can conceptually predict, analyze, and explain the properties of gases.
- The gas laws can predict, analyze and explain many everyday occurrences involving gases.

ESSENTIAL QUESTIONS

- How can we predict the behavior of gases?
- *How do gases behave with changes of pressure, temperature, or volume?*
- To what extent can a gas be classified as ideal?
- *How do diffusion/effusion rates differ do to molecular masses?*

KNOWLEDGE AND SKILLS

SWBAT:

- Determine the relationship between volume, temp, and pressure through analysis of experimental data.
- Relate the Kinetic molecular theory to pressure, temperature and volume relationships and effusion properties of an ideal gas.
- Use Boyle, Charles, Ideal and Gay-Lussac Laws to calculate unknown gas variables.
- Use Grahams Law of diffusion experimentally or theoretically to determine relative speed of diffusion and molecular mass of an unknown gas.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: Unit 13: Colligative Properties and Solutions (Chapter 12 pg 414-415 and chapter 12 section 3)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: Egg Harbor Township High School
Country: USA
State/Group: NJ

UNIT SUMMARY

This unit introduces the four colligative properties and their calculations to students. Students will learn osmosis and reverse osmosis mechanisms due to osmotic pressure and a semi-permeable membrane. As this unit progresses, students will be able to distinguish between different types of solutions, such as: colloids, suspensions, etc. With this knowledge students will cover physical and chemical factors that affect solubility.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

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

ENDURING UNDERSTANDINGS

- Colligative properties are based on concentration, not solute.
- Solutions concentration can be described mathematically in a variety of terms.
- Adding solute to a pure solution will have an effect on the properties.

ESSENTIAL QUESTIONS

- How can you quantify the concentration of a solution?
- Why is predicting the solubility of a substance difficult?

- Of what use is a solubility curve in describing the effect of temperature on solubility and the saturation level?
- To what extent does the polarity of a substance determine its solubility in a particular solvent?
- How are Colligative properties useful?

KNOWLEDGE AND SKILLS

SWBAT:

- Identify the factors that affect how fast a substance dissolves.
- Describe the equilibrium in a saturated solution.
- Determine the factors that affect the solubility of a substance.
- Compare the properties of solutions, colloids and suspension.
- Calculate the molarity of a solution.
- Determine the formation of a precipitate in a reaction and write the net ionic reaction.
- Perform calculations relating freezing point depression and boiling point elevation.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion

- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: Unit 14: Acid and Bases (Chapter 14)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10^{th}-12^{th}
School: Egg Harbor Township High School
Country: USA
State/Group: NJ

UNIT SUMMARY

Section one describes the Arrhenius acid/base theory and defines strong and weak acids or bases. Within section one, students will complete acid nomenclature for binary and oxyacids compounds. Students will have to memorize the strong acids and bases for this unit. Section two will define and explain the two remaining acid/base theorist: Bronsted-Lowry and Lewis. Section three will use prior knowledge to define and observe conjugate base pairs according to the Bronsted-Lowry definition. Neutralization reactions between acids and bases will be introduced.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

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

ENDURING UNDERSTANDINGS

- Acids and bases play a major role in our everyday lives.
- Acid-Base reactions do not always produce neutral results.

ESSENTIAL QUESTIONS

- How do we see acids and bases in our daily lives?
- Why do chemists define acid and bases in different ways?

- To what extent can the strengths of acids and bases be quantified?

KNOWLEDGE AND SKILLS

SWBAT:

- *Distinguish between an acid and base due to its properties.*
- *Name acids due to their anion.*
- *Differentiate between a strong and weak acid/base.*
- Use the Brønsted Lowery theory to classify substances as acids, hydrogen donors, or bases, hydrogen acceptors.
- Identify conjugate acid base pairs in acid base reactions.
- Classify substances as Lewis acids or bases.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information

pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: Unit 15: Acids, Bases, and pH (Chapter 15)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
Country: USA
State/Group: NJ

School: Egg Harbor Township High School

UNIT SUMMARY

Section one covers the self ionization of water and introduces "k" and the dissociation equation. Using this knowledge students begin to form a scale with increasing/decreasing [H+] or [OH-]. This scale will be known as the pH scale and students will use their mathematical knowledge on log and antilog. Within section two, students will explore different ways to calculate pH, such as: indicators, pH meter, and titrations. Students will have the ability to demonstrate these methods within a laboratory setting.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

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

ENDURING UNDERSTANDINGS

- Acids and bases play a major role in our everyday lives.
- Acid-Base reactions do not always produce neutral results.
- It is possible for a chemical system to resist a pH change.

ESSENTIAL QUESTIONS

- Why is pH important?
- How does [H+] and [OH-] relate to a substances pH?
- How can scientist measure pH?
- How is it possible for a buffered solution to use up both excess acid and excess base to maintain a constant pH?
- To what extent are the characteristics of all titration the same?

KNOWLEDGE AND SKILLS

SWBAT:

- *Explain water's self ionization.*
- *Define and put into action kw and pH calculations.*
- Use pH to classify a solution as neutral, acidic, or basic.
- Determine the point in a titration that neutralization occurs.
- S*olve pH and pOH problems.*
- *Compare and contrast various indicators.*
- *Solve and justify titration calculation.*

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions

- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: Unit 16: Equilibrium (Chapter 18)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: Egg Harbor Township High School
Country: USA
State/Group: NJ

UNIT SUMMARY

Section 1 will describe reactions as reversible and will relate equilibrium with its k value and the equilibrium constant. Within section two, students will look at different stresses that cause an equiblibrium to temporary shift until it can restore its original conditions. The four major stresses with be examined: temperature, concentration, pressure, and the common ion effect. Section three and four discuss different equilibrium constants that are used Ka and Ksp. Students will use mathematical models to solve for Ka and Ksp using prior knowledge from other units.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

HS-PS1-6. **Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.**

ENDURING UNDERSTANDINGS

- Equilibrium is a physical state in which forces and changes occur in opposite and off-setting directions.
- At any temperature there are infinite equilibrium positions, however only one equilibrium constant.

ESSENTIAL QUESTIONS

- *What is equilibrium?*
- What constitutes a state of dynamic equilibrium?
- Why are reactant and product concentration not necessarily equal at equilibrium?

- *Why is important to organize equilibrium problems with an ICE chart?*
- *How does an ICE chart help organize information for an equilibrium problem?*
- To what extent can the strengths of acids and bases be quantified?

KNOWLEDGE AND SKILLS

SWBAT:

- Use Le Chatelier's Principle to predict the changes in equilibrium position due to changes in temperature, pressure and/or concentrations.
- Calculate the numerical value for the equilibrium constant for a reaction, given experimental data.
- Convert between K_p and K_c for a gaseous equilibrium.
- Calculate equilibrium concentrations for a reaction, given the K_{eq}, initial concentrations and some piece of information about the equilibrium.
- Calculate the numerical value of K_{sp} for a chemical reaction from molar solubility, or the numerical value of molar solubility given K_{sp}.
- Predict whether a precipitate will form when two solutions are mixed based on K_{sp} values and concentrations and volumes of the two solutions.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups

- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: Unit 17: Thermochemistry (Chapter 17 Reaction Kinetics)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Country: USA
Course/Grade: 10^{th}-12^{th}
State/Group: NJ
School: Egg Harbor Township High School

UNIT SUMMARY

Section one introduces thermochemistry and important terms, such as: heat, temperature, calorimeter, enthalpy, etc. These terms are imperative and will help evolve student's

knowledge throughout the rest of the unit. Temperature conversions will be reviewed within this unit. Specific heat will be discussed in mathematical terms and observed within the lab. Section two will begin to explain reactions spontaneity through enthalpy, entropy, and Gibb's free energy. Students will begin to organize these and apply through a series of chemical reactions and decide which way is favored.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

HS-PS1-4.	**Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.**
HS-PS1-3.	**Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.**
HS-PS3-1	**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-PS3-4.	**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).**

ENDURING UNDERSTANDINGS

- There are two driving forces in nature- entropy and enthalpy.
- Entropy of the universe is always increasing.

ESSENTIAL QUESTIONS

- What is a calorimeter?
- How is temperature and heat different?
- How do enthalpy and entropy drive natural events?
- *How can we graph the heat of fusion and solidification?*
- *How does heat of solution relate to Hess's Law?*
- To what extent does temperature predict the spontaneity of a reaction?

KNOWLEDGE AND SKILLS

SWBAT:

- *Demonstrate the law of conservation of energy.*
- *Solve calorimetry problems through lab.*
- Relate changes in entropy to a change in state, change in temperature, and/or change in the number of product particles compared to reactant particles.
- Use standard tables of entropies, enthalpies and free energies to calculate the change in entropy, enthalpy and/or free energy of a reaction.
- *Graph the heat of fusion/solidification with data acquired*
- *Complete heat of solution problems with Hess's Law.*
- Explain how changes in enthalpy and entropy both influence the spontaneity of a reaction.
- Determine the spontaneity of a reaction by calculating the change in free energy of the reaction (from tables of standard free energies or form the Gibbs equation).

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: Unit 18: Electrochemistry (Chapter 20)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Country: USA
Course/Grade: 10^{th}-12^{th}
State/Group: NJ
School: Egg Harbor Township High School

UNIT SUMMARY

Section one gives background on electrochemical complete cells and half cells. Within section two students begin to learn different types of electrochemical cells and their uses,

benefits, etc. To wrap up this unit, real life examples of electrochemical cells will be discussed.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

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

ENDURING UNDERSTANDINGS

- There are beneficial and practical uses for radioisotopes.
- Hydrocarbons with the same molecular formula but different molecular structures have different properties.
- The addition of functional groups to carbon chains affects the intermolecular forces present and the properties of molecules.
- Many chemical changes involve the transfer of electrons.

ESSENTIAL QUESTIONS

- What happens when an unstable nucleus decays?
- Why are carbon based molecules versatile as chemical building blocks?
- How will the addition of a functional group affect a molecule?

- How can chemical changes be produced or caused by electrical energy?

KNOWLEDGE AND SKILLS

SWBAT:

- Use Einstein's relationship to calculate the energy or mass changes of a reaction.
- Predict the type of decay that a nucleus will undergo based on its composition.
- Use the half life of a substance to predict the amount of the radioisotope present after a given period if time.
- Distinguish among the structure and properties of alkanes, alkenes, alkynes and aromatic hydrocarbons.
- Explain the relationships between the properties and structures of compounds with various functional groups.
- Use standard electrode potential to calculate cell voltage and draw cell diagrams.
- Differentiate between products from voltaic, and electrolytic cells.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information

pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: Unit 19: Oxidation and Reduction Reactions (Chapter 20)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Course/Grade: 10th-12th
School: Egg Harbor Township High School
Country: USA
State/Group: NJ

UNIT SUMMARY

Within section one; students will have to be able to define oxidation and reduction in their own words. Once established, the rules on how to calculate oxidation numbers will be

provided and students will then calculate oxidation numbers. Section two will set up guidelines on how to correctly balance a redox reaction by using the half-reaction method. Lastly, real life examples and the roles of redox reactions will be discussed.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

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

ENDURING UNDERSTANDINGS

- Oxidation numbers are assigned to an element when they react a specific way
- Redox reactions occur around us daily
- Redox reactions can be spontaneous.

ESSENTIAL QUESTIONS

- How are oxidation and reduction reactions related?
- What is meant by a redox reaction?
- Why does copper turn blue-green left in the elements?
- How is balancing a redox reaction similar to a typical chemical equations?

- How do we use oxidizer and reducing agents in our daily lives?

KNOWLEDGE AND SKILLS

SWBAT:

- Assign oxidation numbers to reactant and products
- Define oxidation and reduction
- Explain a redox reaction
- Explain what must be conserved during a redox reaction
- Balance redox reactions by using the half-reaction method
- Relate chemical activity to oxidizing and reducing strength
- Explain the concept of disproportionation

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: Unit 20: Reaction Kinetics (Chapter 17)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Country: USA
Course/Grade: 10^{th}-12^{th}
State/Group: NJ
School: Egg Harbor Township High School

UNIT SUMMARY

Section one revisits the collision theory and uses activation energy to describe how chemical reactions take place. Activation energy diagrams will be discussed and interpreted by

students. Sections two will review factors that influence reaction rate and show how it affect the chemical reaction through experimental data. Students will use experimental data to complete reaction rate problems using the rate law.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

ESSENTIAL QUESTIONS

- How will changing conditions affect the rate of chemical reactions?
- What role does the thermodynamics of a reaction play in the kinetics?
- To what extent can the rate of a reaction be predicted?

KNOWLEDGE AND SKILLS

SWBAT:

- Use the collision theory to explain how the rate of a chemical reaction is influenced by temperature, particle size of reactants, concentration, and of the nature of the reactants.
- Given a potential energy diagram, determine whether a reaction is endothermic or exothermic, determine the heat of reaction for the forward and reverse reaction. And determine the activation energy for the forward an reverse reactions (both catalyzed and uncatalyzed).
- Determine the order of reactants using experimental date and write the rate law.

- Use and write reactions mechanisms, identifying intermediates, catalyst, rate determining step and writing the observed rate law.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Unit Name: Unit 21: Organic Chemistry (Chapter 22)
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Chemistry
Country: USA
Course/Grade: 10th-12th
State/Group: NJ
School: Egg Harbor Township High School

UNIT SUMMARY

Section one; students will describe how carbon bonds in a variety of organic compounds to produce structural formulas and isomers. Section two will begin to discuss the different types of hydrocarbons. Properties, naming system, structures, and formulas will also be discussed. Once, hydrocarbons are mastered students will begin to model organic models with different functional groups. Lastly, within this unit the different type of organic chemical reactions will be discussed.

UNIT RESOURCES

- *Textbook (Modern Chemistry 2009),*
- *Study guide manual (Modern Chemistry 2009),*
- *Lecture outline and PowerPoint*

Internet Resource Links:

- Teacher websites, www.ptable.com
- CRC handbook online - http://www.hbcpnetbase.com
- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: http://science.bigchalk.com/sciweb/science/do/search
- Online textbook: Modern Chemistry: http://my.hrw.com/
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

NGSS

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

ENDURING UNDERSTANDINGS

- Many molecules pertaining to life have carbon rings, chains and networks at their core.
- The ability of carbon to form long chains has produced the element of all life.

- Carbon always produces four covalent bonds.
- Hydrocarbons with the same molecular formula but different molecular structures have different properties.
- The addition of functional groups to carbon chains affects the intermolecular forces present and the properties of molecules.
- Chemical reactions can be used to change the structure of organic compounds.

ESSENTIAL QUESTIONS

- Why are carbon based molecules versatile as chemical building blocks?
- What are the general properties of hydrocarbons?
- How do isomers differ from one another?
- How will the addition of a functional group affect a molecule?
- How are organic reactions used in chemistry?

KNOWLEDGE AND SKILLS

SWBAT:

- Explain how the structure and bonding of carbon lead to the diversity and number of organic compounds.
- Distinguish among the structure and properties of alkanes, alkenes, alkynes and aromatic hydrocarbons.
- Identify and name molecules containing functional groups.
- Explain the relationships between the properties and structures of compounds with various functional groups.
- Describe and distinguish between the organic reactions.
- Draw, name and classify various types of isomers.

PERFORMANCE TASKS

- Laboratory investigations within small groups
- Constructed response
- Graphic organizers or models
- Do nows and/or exit slips
- Individual, small, and large group work
- Homework
- Guided practice

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Curriculum Resources - Differentiated Instruction

Special Education Interventions in General Education

Visual Supports
Extended time to complete tests and assignments
Graphic Organizers
Mnemonic tricks to improve memory
Study guides
Use agenda book for assignments
Provide a posted daily schedule
Use of classroom behavior management system
Use prompts and model directions
Use task analysis to break down activities and lessons into each individual step needed to complete the task
Use concrete examples to teach concepts
Have student repeat/rephrase written directions
Heterogeneous grouping

Resources:

Do to Learn:
http://www.do2learn.com/

Sen Teacher:
http://www.senteacher.org/

Intervention Central:
http://www.interventioncentral.org/

Learning Ally:
https://www.learningally.org/

English Language Learners Interventions in Regular Education
Resources:

FABRIC - Learning Paradigm for ELLs (NJDOE)
www.nj.gov/education/bilingual/pd/**fabric**/**fabric**.pdf

Guide to Teaching ELL Students
http://www.colorincolorado.org/new-teaching-ells

Edutopia - Supporting English Language Learners
https://www.edutopia.org/blog/strategies-and-resources-supporting-ell-todd-finley

Reading Rockets
http://www.readingrockets.org/reading-topics/english-language-learners

Gifted and Talented Interventions in Regular Education
Resources:

Who are Gifted and Talented Students
http://www.npr.org/sections/ed/2015/09/28/443193523/who-are-the-gifted-and-talented-and-what-do-they-need

Hoagies Gifted Education Page
http://www.hoagiesgifted.org/programs.htm

21st Century Learning
Resources:

Partnership for 21st Century Learning
http://www.p21.org/

Career Ready Practices (NJDOE)
http://www.nj.gov/education/cte/hl/CRP.pdf