

EGG HARBOR TOWNSHIP PUBLIC SCHOOLS CURRICULUM

College Prep. (CP) 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: _____

TABLE OF CONTENTS

Mission Statement.....	3
Philosophy.....	3
Statement of Purpose.....	3
Introduction.....	4
District Curriculum Template.....	4
Guiding Principles.....	5
Intent of the Guide.....	6
N.J.A.C. 6A:8-3.1 Required Curriculum Components.....	7
Unit 1 – Chemistry and Matter.....	8
Unit 2 – Scientific Measurements.....	11
Unit 3 – Atomic Theory and Electrons	14
Unit 4 – Periodic Table.....	17
Unit 5 – Ionic & Molecular Compounds and Nomenclature	20
Unit 6 – Chemical Quantities.....	23
Unit 7 – Chemical Reactions.....	26
Unit 8 – Stoichiometry.....	29
Unit 9 – States of Matter and Gas Laws.....	31
Unit 10 – Solutions.....	35
Unit 11 – Acids, Bases and pH.....	38
Unit 12 – Thermochemistry.....	41
Unit 13 – Equilibrium.....	44
Appendix A – Curriculum Resources – Differentiated Instruction (Special Education, ELL, G&T and 21 st Century Learning.....	47

This curriculum guide was prepared by:

Ashle Cocca – High School
Michael Dannenhauer – High School
Christa Delaney – High School
Michelle Fitzgerald – High School
Kimberly Herman – High School
Kyle Herman – High School
Jonelle Scardino – High School

Coordinated by: **Rodney Velardi – Supervisor of Science, K-12**

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 (NJSL-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: Chemistry and Matter

Time Frame: 2 weeks (6-8 lecture days)

Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry

Country: USA

Course/Grade: 10-12

State/Group: NJ

School: Egg Harbor Township High School

UNIT SUMMARY

The purpose of this unit is to introduce students to Chemistry and explain some of the many things done with and possible with Chemistry. Students will also learn what matter is, how to classify it and the difference between a chemical and physical change.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

- 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.

ENDURING UNDERSTANDINGS

- Chemistry explains the natural world.
- Properties can be used to classify, identify, separate matter, and explain structure and function.

- Matter has characteristic properties that are related to the structure and function of the matter.
- Solving problems requires an appreciation of the big picture.

ESSENTIAL QUESTIONS

- Why is it important to study so many subjects in school? (1)
- Why is it important to study chemistry? (1)
- Why is it useful to learn problem solving skills? (1)
- How do chemists solve problems? (1)
- What properties are used to describe matter? (2)
- How can matter change its form? (2)

KNOWLEDGE AND SKILLS

- Explain why the scope of chemistry is so vast. (1)
- Identify five traditional areas of study in chemistry. (1)
- Identify the central themes of chemistry (1)
- Describe the steps in the scientific method. (1)
- Evaluate the difference between a scientific law and a theory. (1)
- Explain why all samples of a substance have the same intensive property. (2)
- Classify physical changes (2)
- Explain how mixtures are classified (2)
- Describe how mixtures can be separated (2)
- Explain the difference between an element and a compound (2)
- Distinguish between a substance and a mixture (2)

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 college prep students.

Unit Name: Scientific Measurements

Time Frame: 3 weeks (11-12 lecture days)

Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry

Country: USA

Course/Grade: 10-12

State/Group: NJ

School: Egg Harbor Township High School

UNIT SUMMARY

The purpose of this unit is to introduce students to scientific measurement. Students will learn how to use scientific notation, the difference between accuracy and precision, how to make and read measurements in English and SI units, how to use significant figures, the density formula and how to make conversions using dimensional analysis.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

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

ENDURING UNDERSTANDINGS

- Measurements are not exact.
- Significant Figures identify how accurate a measurement is.

- Dimensional Analysis is a useful tool.

ESSENTIAL QUESTIONS

- When you make a measurement, what are some possible sources of uncertainty?
- How do scientists express the degree of uncertainty in their measurements?
- How is dimensional analysis used to solve problems?

KNOWLEDGE AND SKILLS

- Express numbers in scientific notation
- Evaluate accuracy and precision
- Explain why measurements must be reported to the correct number of significant figures
- Demonstrate why metric units are easy to use
- Calculate the density of a substance
- Explain the process when using a conversion factor
- Describe the type of problems that use dimensional analysis

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 college prep students.

Unit Name: Atomic Theory and Electrons

Time Frame: 2 Weeks (8 lecture days)

Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry

Country: USA

Course/Grade: 10-12

State/Group: NJ

School: Egg Harbor Township High School

UNIT SUMMARY

The purpose of this unit is to introduce students to the Bohr model of the atom and explain the discoveries that led us to this model. Students will also be introduced to different models of the atom with a focus on the location and importance of the electrons.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

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-PS4-1. Use mathematical representations to support a claim regarding relationships 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

4. 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

- What components make up an atom?
- Why do you think it is important to understand the structure of an atom?
- How are atoms of one element different from atoms of another?
- Can you predict ways that one atom might differ from another atom? Why do you think we use probability?
- How does the quantum mechanical model describe the arrangement of electrons in atoms?
- How do you think atoms will gain or release energy?
- What happens when electrons in atoms absorb or release energy?

KNOWLEDGE AND SKILLS

- Explain how Democritus and John Dalton describe atoms
- Identify instruments used to observe atoms
- Identify and describe the three types of subatomic particles
- Describe the structure of an atom using modern atomic theory
- Explain what makes one element different than another.
- Explain how isotopes of the same element differ
- Calculate the average atomic mass of an element
- Revise the atomic model
- Describe what Bohr proposed in his model of the atom
- Describe what the quantum mechanical model determines about electrons in an atom
- Explain how sublevel of principle energy levels differ
- List and explain the 3 rules for writing an electron configuration
- Explain what causes an atomic emission spectra
- Describe and diagram the photoelectric effect
- Explain how frequencies of light are related to changes of electron energies
- Explain how ions form

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 college prep students.

Unit Name: Periodic Table **Time Frame:** 2 weeks (6-8 lecture days)
Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry
Course/Grade: 10-12
School: Egg Harbor Township High School

Country: USA
State/Group: NJ

UNIT SUMMARY

The purpose of this unit is to introduce students to the periodic table and its usefulness. Students will also learn about the trends of the periodic table and how these trends can be used to make accurate predictions.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

- 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

- What are some ways that elements are different from one another?
- What information does the periodic table provide?
- How can periodic trends be explained?

KNOWLEDGE AND SKILLS

- Explain how chemist began to organize known and unknown elements
- Describe how Mendeleev organized his periodic table
- Explain how the modern periodic table is organized
- Identify the three broad classes of elements
- Classify elements according to their electron configuration
- Describe and explain different trends on the periodic table

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 college prep students.

Unit Name: Ionic & Molecular Compounds and Nomenclature
Time Frame: 3 Weeks (12 lecture days)
Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry
Course/Grade: 10-12
School: Egg Harbor Township High School

Country: USA
State/Group: NJ

UNIT SUMMARY

The purpose of this unit is to introduce students to bonding. This unit will explain the difference between an ionic bond and a molecular bond. This unit will also explain how to name simple compounds.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

- 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-PS1-2. 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 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

- What is an ion?
- How does the periodic table help you determine the names and formulas of ions and compounds?
- What is the difference between an ionic and a molecular compound?
- Other than gaining or losing electrons, how do atoms attain noble gas configuration?
- How is the bonding of molecular compounds different from ionic compounds?
- How do electrons affect the shape of a molecule?
- What factors affect molecular properties?
- How does the charge of an atom change if it gains or loses an electron?
- How do ionic compounds form?
- How does metallic bonding affect the properties of metals?

KNOWLEDGE AND SKILLS

- Determine the number of valence electrons for an element using the periodic table
- Identify the trend whether an element is losing or gaining electrons
- Describe how cations and anions form
- Explain the electrical charge of an ionic compound
- Describe three properties of ionic compounds
- Model the valence electrons of a metal atom
- Explain the importance of metal alloys
- Identify the information a molecular compound provides
- Explain the result of electron sharing in a covalent bond
- Identify exceptions to the octet rule
- Relate the strength of bonds between ionic and covalent bonds
- Describe how resonance structures are used
- Describe the relationship between atomic and molecular orbitals
- Predict VSEPR shapes from given molecules
- Calculate electronegativity differences for molecular compounds
- Evaluate whether the molecule is polar or non-polar
- Explain how to determine the charges of monatomic ions
- Describe how polyatomic ions differ from monatomic ions
- Apply the rules of naming for ionic compounds
- Put into action naming ionic compounds with polyatomic ions and transition metals

- Assign the correct prefix for naming molecular compounds

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 college prep students.

Unit Name: Chemical Quantities **Time Frame:** 3 weeks (12 lecture days)
Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry
Course/Grade: 10-12
School: Egg Harbor Township High School

Country: USA
State/Group: NJ

UNIT SUMMARY

The purpose of this unit is to introduce the mole and use it to calculate chemical quantities. Students will use the mole to perform conversions between mass, particles, mols and volume.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

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 mole is a grouping similar to a dozen
- Dimensional analyses can be used to convert between given quantities
- Empirical formulas are simplified molecular formulas

ESSENTIAL QUESTIONS

- When is it more convenient to count items in groups?
- Why is the mole an important measurement in chemistry?
- What information does a molecular formula tell you?

- How can the molecular formula of a compound be determined experimentally?

KNOWLEDGE AND SKILLS

- Explain how chemist count the number of atoms molecules, or formula units of a substance
- Determine the molar mass of an element and a compound
- Describe the process to convert mass to moles; and moles to mass.
- Put into action converting between moles, molecules, and atoms
- Calculate the percent by mass of element in a compound
- Distinguish between empirical and molecular formulas

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 college prep students.

Unit Name: Chemical Reactions **Time Frame:** 3 weeks (12 lecture days)
Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry
Course/Grade: 10-12
School: Egg Harbor Township High School

Country: USA
State/Group: NJ

UNIT SUMMARY

The purpose of this unit is to explain why chemical equations must be balanced. Students will also learn how to identify the type of reaction and predict the products of a given reaction (if the reaction will occur).

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

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

- 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

- What does the law of conservation of mass mean?
- How do chemical reactions obey the law of conservation of mass?
- What would this mean for a chemical reaction?
- How can you predict the products of a chemical reaction?

KNOWLEDGE AND SKILLS

- Show how to write a skeleton chemical reaction
- Describe the steps for writing and balancing a chemical equation
- Identify the 5 general types of reactions
- Use the metal activities series to determine whether a reaction occurs
- Describe the information found in a net ionic equation
- Predict the formation of a precipitate in a double replacement reaction

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 college prep students.

Unit Name: Stoichiometry

Time Frame: 2-3 weeks (8-12 lecture days)

Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry

Country: USA

Course/Grade: 10-12

State/Group: NJ

School: Egg Harbor Township High School

UNIT SUMMARY

At the end of this unit students will be able to use balanced chemical equations to create mole ratios. Building off of mole ratios students will begin to convert from moles/mass of reactants to moles/mass of products; eventually being able to identify the limiting and excess reactant. With that skilled mastered, students will be able to calculate the theoretical yield; thus completing the percent yield formula and explaining their result.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

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

- 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.

- 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

- What is conserved in a balanced chemical equation?
- How are balanced chemical equations used in stoichiometric calculations?
- What information do you need to calculate the amount of reactant and product?
- How can you calculate amounts of reactants and products in a chemical reaction?

KNOWLEDGE AND SKILLS

- Show how chemist use balanced chemical equations
- Describe the quantities you can use to interpret a balanced chemical equation
- Explain how mole ratios are used in chemical calculations
- Put into action the steps for solving a stoichiometric problem
- Explain how the amount of product in a reaction is affected by a limiting reactant
- Calculate the percent yield for given situations

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 college prep students.

Unit Name: States of Matter and Gas Laws

Time Frame: 2 Weeks (8 lectures)

Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry

Country: USA

Course/Grade: 10-12

State/Group: NJ

School: Egg Harbor Township High School

UNIT SUMMARY

This unit will guide students through the properties of solids, liquids, and gases and how they change with pressure and temperature through phase diagrams. The rest of the unit will focus on gases and how they behave under certain conditions.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

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

- 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.
- The hydrogen bonding in water accounts for its unique properties.
- 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

- Compared to solids and liquids, what is unique about gases?
- How do gases respond to changes in pressure, volume, and temperature?
- Why do you suppose we study ideal gases?
- Why is the ideal gas law useful even though ideal gases do not exist?

KNOWLEDGE AND SKILLS

- Explain why gases are easier to compress than solids or liquids
- Describe three factors that affect gas pressure
- Explain the relationship and calculate problems between pressure, volume, and temperature of gas through the gas laws
- Relate the total pressure to the partial pressures of gases contained in a mixture
- Use Graham's diffusion rate to calculate the rate of diffusion of given gases.

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 college prep students.

Unit Name: Solutions

Time Frame: 1-2 weeks (4 to 8 lectures)

Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry

Country: USA

Course/Grade: 10-12

State/Group: NJ

School: Egg Harbor Township High School

UNIT SUMMARY

Students begin to learn about solutions and their properties to build a firm foundation. Students will then build upon prior knowledge to understand concentrated and diluted solutions; thus calculating and interpreting the molarity of solutions. Molarity skills will be tested within lab through acid/base titration in the next unit.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

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

- Water is vital to life because of its unique properties.
- 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

- In a solution of salt water, what are the solute and the solvent?
- Are parts of the solution chemically or physically combined?
- What properties are used to describe the nature of solutions?
- In what ways can you quantify the concentration of a solution?

KNOWLEDGE AND SKILLS

- Identify factors that affect how fast a substance dissolves
- Describe equilibrium with a saturated solution
- Describe factors that affect the solubility of a substance
- Calculate the molarity of a solution
- Compare and contrast a concentrated and a dilute solution
- Put into action the dilution equation ($M_1V_1=M_2V_2$)

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 college prep students.

Unit Name: Acid, Bases, and pH

Time Frame: 2-3 weeks (8-12 lectures)

Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry

Country: USA

Course/Grade: 10-12

State/Group: NJ

School: Egg Harbor Township High School

UNIT SUMMARY

Students will compare and contrast acids and bases according to the three major acid/base theories. Building upon this, students will learn about the self ionization of water (K_w) and how it is related to the concentration of hydrogen ion and hydroxide ion. Once mastered, students will begin to calculate pH and determine whether it is a strong/weak acid or base from its pH. Lastly, using molarity students will have hands on experience with an acid/base neutralization through a titration.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

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

- What are some properties of acids?
- What are the different ways chemist define acids and bases?
- What does pH of a solution mean?
- How do chemists use acid/base reactions?

KNOWLEDGE AND SKILLS

- Define acids and bases according to the Arrhenius, Bronsted-Lowry, and Lewis definitions
- Describe the relationship between $[\text{OH}^-]$ and $[\text{H}^+]$ in a solution
- Compare and contrast between strong/weak acids/bases.
- Classify a solution as acidic or basic using its $[\text{OH}^-]$ or $[\text{H}^+]$
- Compute the pH for given solutions and determine whether acid, base, or neutral
- Identify the products of an acid/base neutralization
- Describe a the process and procedure of a titration

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 college prep students.

Unit Name: Thermochemistry

Time Frame: 2 weeks (8 Lectures)

Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry

Country: USA

Course/Grade: 10-12

State/Group: NJ

School: Egg Harbor Township High School

UNIT SUMMARY

Within this unit students will learn the flow of energy within a chemical reaction system and its surroundings. Building off of this understanding, students will then begin to calculate specific heat of various substances and compare it to known properties. The use of calorimeter will be used to demonstrate the flow of energy and allow students to complete enthalpy, entropy, Hess' law, and Gibbs free energy equations. Lastly, students will use their knowledge of water's properties to complete a molar heat of fusion diagram.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

- 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

- System and the surrounding are explained with heat loss or gained
- Temperature and heat are different
- There are two driving forces in nature- entropy and enthalpy.
- Entropy of the universe is always increasing.

ESSENTIAL QUESTIONS

- How is energy conserved in a chemical or physical process?
- What is meant by “energy is conserved”?
- How is energy absorbed or released in a reaction?
- How can you determine the amount of energy absorbed or released in a chemical or physical process?

KNOWLEDGE AND SKILLS

- Explain the different between energy and heat
- Define system and surroundings; give examples.
- Define heat capacity, enthalpy, entropy, thermochemical equation, Hess’s law.
- Identify 2 factors on which the heat capacity of an object depends
- Describe how you can measure the change of enthalpy in a reaction
- Express the enthalpy change for a given reaction
- Write and solve thermochemical equations for enthalpy

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 college prep students.

Unit Name: Equilibrium

Time Frame: 2 weeks (8 lectures)

Author: Egg Harbor Township High School Science Department

UNIT

Subject: CP Chemistry

Country: USA

Course/Grade: 10-12

State/Group: NJ

School: Egg Harbor Township High School

UNIT SUMMARY

Students will create reaction rates of chemical reactions and be able to implement them with given concentrations of reactants or products to solve for k values. Reaction rate stresses will be discussed on how it will shift chemical reaction's equilibrium and Le Chatelier's principle.

UNIT RESOURCES

- Textbook- Pearson Chemistry 2011
- Pearson Work books
- Lab Manuals and materials

Internet Resource Links:

- Discovery: www.unitedstreaming.com
- NBC Learn Videos: www.nbclearn.com
- eLibrary science: <http://science.bigchalk.com/sciweb/science/do/search>
- Online textbook: Pearson Chemistry
- Web simulators: www.pHET.colorado.edu
- Web Video Clips: www.Learning4mastery.com (Flipped Learning)

STAGE ONE

GOALS AND STANDARDS

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

- An equilibrium constant will be created with only aqueous and gas reactants or products.
- 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

- How does raising the temperature of a substance affect particle movement?
- How can the rate of a chemical reaction be controlled?
- What is the role of energy in chemical reactions?
- Why do some reactions occur naturally and others do not?

KNOWLEDGE AND SKILLS

- Express the rate of a reaction
- Identify four factors that influence the rate of a chemical reaction
- Describe a system in equilibrium
- Identify three stresses that can shift equilibrium
- Compare large and small “k’s” and the factors that each occurs
- Define k , k_{sp} , k_a , k_b , and k_w .
- Determine the spontaneity of a reaction according to its entropy and its free energy.

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 college prep 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>