Washington Township Public Schools
Office of Curriculum & Instruction

Course: Honors Chemistry

Written By: Andrew Holmes

Under the Direction of: Patricia A. Hughes

Description: The Honors Chemistry course is designed for students with intentions of pursuing a science degree at the collegiate level. This course will provide students with a challenging and thorough course encompassing both fundamental and advanced chemistry topics. Academic success will require students to merge classroom instruction and materials with independent textbook research and problem solving. Student progress will be assessed through evaluation of both qualitative and quantitative knowledge. Qualitative knowledge within each unit will focus on the recognition and use of vocabulary terms, chemical nomenclature, and cause and affect reasoning. Quantitative knowledge within each unit will focus on organized problem solving methods, stoichiometry, and graphical analysis. In addition, the Honors Chemistry course is supported by a weekly laboratory section that will focus on discovery based activities with connections to the curriculum. The weekly laboratory section will also present valuable instruction related to laboratory equipment, techniques and safety. Finally, each marking period a major research project will be completed in order for students to develop and enhance both independent and cooperative research and presentation skills. Project topics will focus on modern connections and applications related to the science of chemistry.

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BOE Approval: AUGUST 2011

DEMONSTRABLE PROFICIENCIES

COURSE TITLE: Honors Chemistry

I. CLASSWORK REQUIREMENTS

A. Organized 3-Ring Binder Notebook for in-class notes and handouts
B. Organized Quad-Rule, Bound Composition Notebook for laboratory activities
C. Completion and submission of regularly assigned class work and homework activities
D. Completion of Unit Quizzes: 4-6 per marking period
E. Completion of Unit Tests: 2-3 per marking period
F. Completion of Laboratory Assignments and Lab Quizzes: 4-5 per marking period
G. Completion of Project Research and Presentation: 1 per marking period

II. ATTITUDE & BEHAVIOR

A. Students will be respectful of the teacher and of all students in the classroom
B. Students will come to class prepared with required classroom materials
C. Students will come to class prepared to participate and focus on each day's lesson
D. Students will work both independently and cooperatively to solve problems
E. Students will follow directions and follow safety procedures during laboratory work
F. Students will complete assignments with the highest levels of academic integrity

III. COURSE OBJECTIVES/OVERVIEW

A. COURSE CONTENT
1. Matter: Measurements and Problem Solving
2. Atoms and Elements
3. Molecules, Compounds, and Chemical Equations
4. Chemical Quantities and Aqueous Reactions
5. Gases
6. Thermochemistry
7. The Quantum-Mechanical Model of the Atom
8. Periodic Properties of the Elements
9. Chemical Bonding I: Lewis Theory and Valence Bond Theory
10. Chemical Bonding II: Molecular Shapes and Molecular Orbital Theory
11. Liquids, Solids, and Intermolecular Forces
12. Solutions
13. Chemical Kinetics
14. Chemical Equilibrium
15. Acids and Bases
16. Aqueous Ionic Equilibrium
17. Free Energy and Thermodynamics
18. Electrochemistry
19. Radioactivity and Nuclear Chemistry
20. Organic Chemistry
21. Biochemistry
22. Chemistry of the Non-Metals
23. Metals and Metallurgy
24. Transition Metals and Coordination Compounds

B. SKILLS

1. Students will follow and apply all rules related to chemical nomenclature
2. Students will follow and apply all rules related to writing chemical formulas
3. Students will use knowledge of the mole to solve quantitative problems
4. Students will use knowledge of chemical reactions to do stoichiometry
5. Students will use proper and safe laboratory measurement skills and technique
6. Students will understand and connect knowledge within the Periodic Table
7. Students will identify and use periodic property trends of matter
8. Students will differentiate among properties of solids, liquids and gases
9. Students will discover cause and affect behind solubility and dissolving
10. Students will use molarity to understand and work with solution concentration
11. Students will extend solutions knowledge to include colligative properties
12. Students will use gas law relationships to determine properties of gas samples
13. Students will connect knowledge of gas chemistry to the Earth's atmosphere
14. Students will compare and contrast various bond types and bond properties
15. Students will use VSEPR theory to extend knowledge of molecular geometry
16. Students will understand roles and impact of intermolecular forces
17. Students will realize the impact and importance of energy in chemical changes
18. Students will analyze enthalpy, entropy and free energy changes in reactions
19. Students will discover and explain factors affecting rates of chemical reactions
20. Students will use rate law expressions to solve kinetics calculation problems
21. Students will determine the definition of chemical equilibrium
22. Students will study LeChatlier's Principle and factors affecting equilibrium
23. Students will understand facts and figures differentiating acids from bases
24. Students will use acid / base knowledge to calculate and analyze pH values
25. Students will extend acid / base knowledge through titration techniques
26. Students will be introduced to fundamental organic chemistry knowledge

C. APPRECIATION OF CONCEPTS

1. Accurate Measurement Techniques and Safe Laboratory Conduct
2. Understanding of Classifications of Matter and Chemistry Language Skills
3. Comparison of Composition, Properties and Behavior of Matter
4. Use of Mole Knowledge for chemistry conversions and calculations
5. Ability to recognize reaction types and predict chemical products
6. Use of dimensional analysis and mole knowledge to complete stoichiometry work
7. Understanding of roles and relationships among sub-atomic particles
8. Discovery of relationship between sub-atomic particles and energy
9. Analysis of nuclear energy, half-life and types of radioactivity
10. Use of periodic property trends to discover and connect behavior of matter
11. Examination of facts and figures pertaining to common and valuable elements
12. Comparison of properties and behavior of solid, liquid and gaseous matter
13. Understanding of factors affecting solubility and importance of concentration
14. Discovery of affect of solution concentration on boiling point and freezing point
15. Use of solubility rules to predict precipitates in aqueous reactions
16. Study of various relationships among volume, temperature and pressure of gases
17. Connections of gas chemistry to changing conditions of the Earth's atmosphere
18. Properties of ionic, covalent and metallic bonds
19. Relationship of bond types and bond energy to chemical reactions
20. Analysis of bond angles and molecule shapes according to VSEPR theory
21. Understanding of impact of intermolecular forces on properties of matter
22. Examination of enthalpy, entropy and Free energy data on chemical reactions

23. Discovery and connections to experimental factors affecting reaction rates
24. Use of rate law expressions to quantitatively analyze reaction rate data
25. Analysis of energy data graphs in order to draw conclusions about reactions
26. Understanding of fundamental properties and behaviors of acids and bases
27. Use of laboratory data to determine pH and ion concentrations of acids / bases
28. Safe and proper use of laboratory equipment for titration purposes
29. Comparison of weak and strong acids/bases through laboratory analysis
30. Ability to identify and name simple organic compounds through functional groups
31. Understanding of basic organic chemistry vocabulary and reaction types

IV. ATTENDANCE

Attendance: Refer to Board of Education Policy

V. GRADING PROCEDURES

A. Marking Period I - 4:

TESTS:	45%
QUIZZES:	20%
LAB:	20%
PROJECT:	10%
HOMEWORK:	5%

Per Washington Township Board of Education Policy effective June, 2009

Final Yearly Average Calculation

Semester One

Marking Period 1……..20%

Marking Period 2 ……20%

Mid-term Examination……10%

Semester Two

Marking Period 3……..20%

Marking Period 4 ……20%

Final Examination……10%

MAJOR UNITS OF STUDY

Course Title: HONORS CHEMISTRY

I. Matter, Measurement and The Language of Chemistry

II. Moles, Chemical Reactions and Stoichiometry

III. Atoms, Electrons and Nuclear Chemistry

IV. The Periodic Table – Properties, Trends and Connections

V. Solids, Liquids and Solution Chemistry

VI. Gases and Gas Law Relationships

VII. Chemical Bonding and Molecular Geometry

VIII. Thermodynamics and Kinetics

IX. Chemical Equilibrium and Acid-Base Chemistry

X. Introduction to Organic Chemistry

Unit Overview

Course Title: HONORS CHEMISTRY

Unit #: **UNIT 1 OVERVIEW** **Unit Title:** Matter, Measurement and The Language of Chemistry

Unit Description:

UNIT 1 will require students to focus on the fact that chemistry is the study of matter. Students will discover that matter is a very broad entity and is best studied in categories. Students will learn that matter can be categorized as a pure substance (element or compound) or as a mixture (heterogeneous or homogeneous). Students will study the composition, properties and behavior of matter in UNIT 1. A vital component to chemistry knowledge is communication, therefore, students will be required to learn and practice chemical naming and formula writing methods for various types of matter. UNIT 1 will also introduce essential knowledge of measurement and working with numbers in the laboratory. Students will practice and master the skills associated with studying properties of matter; such as reading scales, scientific notation and significant figures. Density and Specific Heat are two physical properties that will be studied in UNIT 1 to build measurement skills in the laboratory applications.

Enduring Understandings/Generalizations

Students will understand that:

Chemistry is the study of the composition, properties and behavior of matter. Matter is anything that has mass and takes up space. Matter can be sub-divided into two major categories: pure substances and mixtures. Pure substance compounds are named according to specific rules and have fixed formulas representative of the properties of the atoms composing these compounds.

Guiding Questions

1. What is matter? What are the similarities and differences among pure substances and mixtures?
2. How do physical and chemical properties compare? How do physical and chemical changes compare?
3. What methods are used to accurately name different types of ionic and covalent compounds?
4. How are acid formulas recognized and how are acid compounds named?
5. How does a scientist accurately read measurement scales and work with numbers in the science laboratory?
6. What do the physical properties of density and specific heat tell scientists about matter?
7. What measures and techniques are used to study matter safely and accurately in a chemistry lab?

CURRICULUM – Unit Plan

Course Title: HONORS CHEMISTRY

Unit Title: UNIT 1: Matter, Measurement and The Language of Chemistry

Time Allocation: 3 weeks

Core Content Standards and Cumulative Progress Indicators:

5.1.12.A.1,3	5.1.12.B.1,2	5.1.12.C.1	5.3.12.B.1
5.3.12.D.1	5.4.12.A.1	5.1.12.A.1,3	5.6.12.A.4,7
5.7.12.A.4			

Objectives: Students will be able to…

- Classify forms of matter as an element, compound, heterogeneous or homogeneous
- Categorize matter according to chemical formula as ionic, covalent or acid
- Understand and use knowledge of positive, negative and polyatomic ions to construct chemical formulas
- Use provided nomenclature rules to accurately name various ionic, covalent and acidic compounds
- Accurately and safely use laboratory equipment to make measurements of the properties of matter
- Determine whether properties and changes of matter are physical or chemical by nature
- Understand physical properties of density and specific heat through definitions and problem solving
- Understand and practice safe laboratory conduct through introduction to the laboratory activities

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Classifications of Matter Physical and Chemical Properties and Changes Density and Specific Heat Naming Compounds Formula Writing Measurement Skills Laboratory Equipment and Safety	Lesson Notes and Instructional Handouts Worksheets - UNIT 1 Vocab WS - Physical vs. Chemical - Naming and Writing Formulas - Density and Specific Heat Labs - Introduction to Measurement and Separation of Mixtures - Density and Specific Heat - Percent Water in a Hydrate Projects - MP1 Project: "Element Showdown"	Textbook Reading - Pg. 1-37, 82-124 Lab Sheets - Introduction to Measurement and Separation of Mixtures - Density and Specific Heat - Percent Water in a Hydrate Vernier Temperature Probe and Graphing Software Websites: http://www.flinnsci.com/search_MSDS.asp http://www.geocities.com/mrsparrisghs/TourofTheLabandEquipment.ppt#40 Video: "Lab Accident at Jefferson	Homework - Text Problems Pg. 38-43 - Text Problems Pg. 124-129 - Matter Research / MSDS Activity Quiz 1 – Matter and Measurement Quiz 2 – Formulas and Nomenclature I Quiz 3 – Formulas and Nomenclature II UNIT 1 TEST

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
		High”	

Unit Overview

Course Title: HONORS CHEMISTRY

Unit #: **UNIT 2 OVERVIEW** **Unit Title:** Moles, Chemical Reactions and Stoichiometry

Unit Description:

UNIT 2 will extend the fundamental knowledge gained through mastery of UNIT 1. Students will continue to apply understanding of working with numbers and measurements in science to discover the meaning of the mole and solve mole math problems. The mole will serve as a central measurement for many of the advanced mathematical problem solving activities encompassed in each unit throughout the rest of the curriculum. Students will extend nomenclature and formula writing abilities to assist in learning various standard chemical reaction types. Formula writing will serve an important role in predicting product and balancing chemical equations during this unit. With an understanding of both moles and chemical reactions, students can accurately complete stoichiometric problem solving and begin to capture knowledge related to the quantitative cause and affect of the Law of Conservation of Matter and chemical reactions.

Enduring Understandings/Generalizations

Students will understand that:

The mole is the central unit of measurement in chemistry. Calculating mole amounts is vital to problem solving in chemistry because it allows a scientist to connect, convert and extend measurements of matter. Many chemical reactions can be studied and organized based on a predictable formation of products. All chemical changes abide by the Law of Conservation of Matter; that matter can neither be created nor destroyed only rearranged. Knowledge of moles, mole ratios and balanced chemical equations can be used to solve stoichiometry problems pertaining to any chemical reaction. Stoichiometry is an organized problem solving method that allows scientists the ability to predict and calculate the cause and affect nature of any chemical reaction with provided measurement data.

Guiding Questions

1. What are the 3 definitions of a mole? How can mole values be used to convert and connect properties of matter?
2. What is dimensional analysis? What benefits does dimensional analysis provide as a problem solving system?
3. How are Synthesis, Decomposition, Single Displacement, Double Displacement and Combustion reactions recognized?
4. How does the Law of Conservation of Matter help to explain reactant and product information in a chemical reaction?
5. How can molar mass values and other definitions of a mole be used to solve stoichiometry problems?
6. What is stoichiometry? What benefits does stoichiometry offer to a chemist in the laboratory?
7. Why are limiting reactants and percent yield important extensions to stoichiometry analysis in the laboratory?

CURRICULUM – Unit Plan

Course Title: HONORS CHEMISTRY

Unit Title: UNIT 2: Moles, Chemical Reactions and Stoichiometry

Time Allocation: 3 weeks

Core Content Standards and Cumulative Progress Indicators:

5.1.12.A.1,3	5.1.12.B.1,2	5.1.12.C.1	5.3.12.B.1
5.3.12.C.1	5.3.12.D.1	5.4.12.B.1	5.6.12.A.3,5
5.6.12.B.1,2	5.7.12.A.4	5.7.12.B.2	

Objectives: Students will be able to…

- Use mole definitions to best understand the quantitative nature of chemistry and matter
- Use mole knowledge and Periodic Table data to determine molar mass values for elements and compounds
- Combine skills of dimensional analysis problem solving and mole definitions to carry out mole conversion calculations
- Understand and recognize reactants and products through chemical equation analysis
- Predict products to chemical reactions according to chemical reaction type and format
- Compare and contrast synthesis, decomposition, single and double displacement, and combustion reactions
- Combine knowledge of moles and chemical reactions to solve basic stoichiometry problems
- Analyze answers to stoichiometry problems for understanding of limiting reactants and percent yield

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Definitions of a Mole Molar Mass and Mole Conversion Problem Solving Dimensional Analysis Significant Digits Writing and Balancing Chemical Equations Predicting Products and Recognizing Reaction Types Stoichiometry Problem Solving Limiting Reactants and Percent	Lesson Notes and Handouts Worksheets - UNIT 2 Vocab WS - Molar Mass and % Composition - Mole Conversions - Balancing Equations - Predicting Products - Stoichiometry Problem Solving Labs - Mole Identification Lab - Types of Chemical Reactions - Simple Stoichiometry Projects	Textbook Reading - Pg. 82 -176 Lab Sheets - Mole Identification Lab - Types of Chemical Reactions - Simple Stoichiometry Videos World of Chemistry - “The Mole” Websites http://antoine.frostburg.edu/chem http://moleday.org	Homework - Text Problems Pg. 124-129 - Text Problems Pg. 177-183 - Minerals and Moles Activity - Mole Day Activity Quiz 1 – Mole Math Quiz 2 – Equations and Reactions Quiz 3 - Stoichiometry UNIT 2 TEST

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Yield	- MP1 Project: “Element Showdown”		

Unit Overview

Course Title: HONORS CHEMISTRY

Unit #: **UNIT 3 OVERVIEW** **Unit Title:** Atoms, Electrons and Nuclear Chemistry

Unit Description:

UNIT 3 will allow students to focus on the sub-microscopic nature of matter. The history and development of atomic theory will be featured and students will discover the roles and responsibilities of sub-atomic particles in matter. Half of the unit will be dedicated to a detailed look at electrons. Students will learn about valence electrons, electron configurations, ionic charges, quantum theory, and the relationship between electrons and energy. The other half of the unit will focus on the nucleus of an atom. Students will again discover a connection to energy through studies of isotopes, radioactivity and half-life.

Enduring Understandings/Generalizations

Students will understand that:

Atoms are the building blocks of all matter. The properties and behavior of matter traces back to the nature of the atoms composing matter. Atoms are chemically defined by the quantity of three major sub-atomic particles: protons, neutrons and electrons. Protons and neutrons compose the nucleus of an atom and are responsible for atomic number, atomic mass, isotopes and radioactivity. Electrons are high speed particles that move around the atom in energy levels, sublevels and orbitals and are responsible for chemical bonding. The loss or gain of electrons is the cause for ion formation.

Guiding Questions

1. What are the similarities and differences among protons, neutrons and electrons?
2. How do isotopes and ions compare? What roles do isotopes and ions have in chemistry?
3. Why is an understanding of energy levels, sublevels and orbitals important to a scientist?
4. What relationships exist between energy and electrons?
5. How do electron configurations represent atomic information? How do they connect to the Periodic Table?
6. What is radioactivity? How do the three major types of radioactivity (alpha, beta and gamma) compare?
7. What is half-life? How do scientists use half-life in modern chemistry applications?

CURRICULUM – Unit Plan

Course Title: HONORS CHEMISTRY

Unit Title: UNIT 3: Atoms, Electrons and Nuclear Chemistry

Time Allocation: 3 weeks

Core Content Standards and Cumulative Progress Indicators:

5.1.12.A.1,3	5.1.12.B.1,2	5.1.12.C.1	5.2.12.B.1,3
5.3.12.C.1	5.4.12.A.1	5.6.12.A.1,2,3	5.6.12.A.6,8
5.7.12.A.4,5	5.7.12.B.4		

Objectives:

- Understand the location, roles and properties of protons, neutrons and electrons
- Discover deeper meaning to electrons through examination of energy levels, sublevels and orbitals
- Use Periodic Table to write and interpret electron configurations and determine valence electron amounts
- Connect electrons to energy using an investigation into wavelength, frequency and the Electromagnetic Spectrum
- Use numerical data to work with and understand the difference between isotopes and ions
- Discover the progress of the atomic theory of matter through analysis of scientific contributions
- Examine nuclear energy by comparing and contrasting the 3 major types of nuclear radioactivity
- Accurately solve and interpret nuclear equations representing radioactive decay, fission and fusion
- Use half-life problem solving to quantify and connect the role of time to radioactivity

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Atomic Theory Development Sub-Atomic Particles Isotopes and Ions Valence Electrons and Electron Configurations Quantum Theory Electrons and Energy Radioactivity Half-Life Nuclear Energy	Lesson Notes and Handouts Worksheets - UNIT 3 Vocab WS - Isotopes and Ions - Electron Configurations - Electrons and Energy - Nuclear Equations - Half-Life Demo: Cathode Rays and the Discovery of the Electron Labs - Flame Test Analysis Projects	Textbook Reading - Pg. 44-67 - Pg. 280-314 - Pg. 864-898 Lab Sheets - Flame Test Analysis Videos IMC - “Inside a Nuclear Power Plant” Prentice Hall Video Field Trips: “Fusion and Fission” Websites	Homework - Text Problems Pg. 77-81 - Text Problems Pg. 314-317 - Text Problems Pg. 898-901 UNIT 3 Crossword Puzzle Nuclear Energy Web Quest Quiz 1 – Atomic Theory / Electrons Quiz 2 – The Nucleus / Nuclear Chemistry UNIT 3 TEST

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
	- Presentation of MP1 Project: "Element Showdown"	http://www.nobeliefs.com/atom.htm www.howstuffworks.com	

Unit Overview

Course Title: HONORS CHEMISTRY

Unit #: **UNIT 4 OVERVIEW** **Unit Title:** The Periodic Table – Properties, Trends and Connections

Unit Description:

UNIT 4 will focus on the most important resource available to a chemist – The Periodic Table. Students will discover the significance of organizing the elements into a table through a brief study of the historical development of the Periodic Table of the Elements. UNIT 4 will continue to provide students with a group by group analysis of similarities and differences among the elements. Metals and Non-Metals will be compared and contrasted and facts and figures of the more common and important elements will be presented. Finally, periodic property trends of atomic radius, electronegativity, ionization energy (among others) will be studied in order to provide cause and effect reasoning related to the chemical behavior and tendency of the elements.

Enduring Understandings/Generalizations

Students will understand that:

The Periodic Table of the Elements is an essential resource to chemistry education. The Periodic Table provides an organized and meaningful arrangement of the elements in a structure filled with patterns and trends. Students will first understand the importance of a table of the elements by studying the historical development of the modern Periodic table. Next, periodic properties such as atomic radii, electronegativity, ionization energy, density and others will be studied to show that elemental properties vary in a predictable, periodic manner throughout the rows and columns of the periodic table. Students will also study the fact that periodic properties of the elements are directly connected to the metallic or non-metallic nature of the elements as well as atomic structure, particularly electron configurations.

Guiding Questions

1. How was the modern Periodic Table of the Elements developed? What scientists contributed to its development?
2. How are the elements arranged on the periodic table?
3. What are the major property differences among the metals, non-metals and metalloids?
4. What do the properties of atomic radius, ionic radius, electronegativity, and ionization energy measure?
5. Why do the properties of elements listed above have repeating patterns / trends on the P.T.? What are the trends?
6. How are these periodic properties of matter connected to electron configuration and other atomic data of the elements?
7. What vocabulary and period / group names are used to communicate families of elements on the Periodic Table?

CURRICULUM – Unit Plan

Course Title: HONORS CHEMISTRY

Unit Title: UNIT 4: The Periodic Table – Properties, Trends and Connections

Time Allocation: 2 weeks

Core Content Standards and Cumulative Progress Indicators:

5.1.12.A.1,3	5.1.12.B.1,2	5.1.12.C.1	5.2.12.B.1,3
5.3.12.D.1	5.6.12.A.2,3,5	5.6.12.A.7,8	5.8.12.B.2,3
5.9.12.B.1	5.3.12.B.1		

Objectives:

- Understand the historical development over time and the importance of an organized Periodic Table of the Elements
- Study periods and groups and recognize and connect physical and chemical property trends of the known elements
- Discover the properties and uses of major elements in the main group elements, the transition metals and the rare earth elements
- Use knowledge of properties such as electronegativity and atomic radius to understand both horizontal and vertical P.T. property trends
- Use knowledge of properties such as ionization energy and ionic radius to understand both horizontal and vertical P.T. property trends
- Connect knowledge from UNIT 3 to periodic table property trends through focused study of roles of sub-atomic particles
- Use textbook research to complete activities and extend knowledge of element facts, figures, properties and uses

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
History and Development of the Periodic Table Families of Elements Element Facts and Figures Periodic Properties and Trends Atomic and Ionic Radius Electronegativity Ionization Energy	Lesson Notes and Handouts Worksheets - UNIT 4 Vocab WS - Element Facts and Figures - Periodic Table Property Trends Projects MP2 Projects: "Chemistry: College and Careers"	Textbook Reading: - Pg. 318-358 - Pg. 988-1022 - Pg. 1026-1046 Videos: IMC - "Periodic Property Trends" History Channel - Metals History Channel - Steel Websites Webelements.com http://www.lynchburg.net/hhs/chemistry/trends/	Homework - Text Problems Pg. 359-361 - Text Problems Pg. 1023-1025 - Text Problems Pg. 1047-1049 Element Research Activity Quiz 1 – The Periodic Table UNIT 4 TEST

Unit Overview

Course Title: HONORS CHEMISTRY

Unit #: **UNIT 5 OVERVIEW** **Unit Title:** Solids, Liquids and Solutions Chemistry

Unit Description:

UNIT 5 will extend the students knowledge of matter by specifically focusing on the properties and behavior of solid and liquid matter in the world of chemistry, and by focusing on the importance of understanding solutions in chemistry. Students will learn fundamental property differences between solids and liquids and also valuable vocabulary pertaining to these types of matter. UNIT 5 will then extend to study solutions by highlighting the dissolving process and the cause and effect behind solubility. Students will also compare and contrast the solubility of various substances using solubility curves. Molarity and other systems will be used to quantitatively connect moles to the important concept of solution concentration. Finally, colligative properties, net ionic equations and solubility rules will round out the material for UNIT 5

Enduring Understandings/Generalizations

Students will understand that:

Solids and Liquids are very different forms of matter. Many vocabulary words are used in science to describe the properties and behavior of solid and liquid substances. When solids dissolve in a liquid, a solution is formed. Solutions, usually aqueous solutions, are very commonly used in the world of chemistry. The dissolving abilities of both solids and liquids can best be studied through solubility curve analysis. The relative strengths of solutions can be studied through concentration. Molarity is one of several systems used by scientists to quantitatively compare and study solution concentration. Some properties of matter are affected by solution concentration. These properties are called colligative properties and include boiling point and freezing point as examples. Finally, the solubility of elements and compounds in water can be studied through solubility rules determined by combinations of metal and non-metal ions in products.

Guiding Questions

1. What are the fundamental similarities and differences found among solids and liquids?
2. What causes certain solids to dissolve in certain liquids? What forces and factors influence the dissolving process?
3. Why is solution concentration so important? How does the molarity system measure solution concentrations?
4. What are colligative properties? How do scientists explain and prove that BP and FP are colligative properties?
5. How can solubility curves be used to analyze the dissolving abilities of various solutes?
6. What is molality? How are net ionic equations written and why do they best represent reactions of solutions?
7. What combinations of metal and non-metal ions describe soluble products and precipitates in aqueous solutions?

CURRICULUM – Unit Plan

Course Title: HONORS CHEMISTRY

Unit Title: UNIT 5: Solids, Liquids, and Solutions Chemistry

Time Allocation: 3 weeks

Core Content Standards and Cumulative Progress Indicators:

5.1.12.A.1,3	5.1.12.B.1,2	5.1.12.C.1	5.3.12.B.1
5.3.12.C.1	5.3.12.D.1	5.6.12.A.4,6,7	5.3.12.B.1
5.7.12.A.4,6			

Objectives:

Distinguish between amorphous and crystalline solids in terms of properties, behavior and examples

Understand the differences between solutes and solvents and factors affecting solubility and the dissolving process

Use graphical evidence such as solubility curves to quantify the physical property of solubility and introduce and extend concentration

Differentiate between molarity and molality and use these systems to accurate calculate and analyzed solution concentration

Extend knowledge of molality to colligative properties and problem solving pertaining to boiling point and freezing point changes

Discover that precipitates forming in aqueous reaction solutions are predictable and determined by solubility of ions in water

Learn and use solubility rules to extend reaction writing to net ionic equations for aqueous chemical reaction environments

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Crystalline and Amorphous Solids Solutes and Solvents The Dissolving Process Factors Affecting Solubility Solubility Curve Analysis Colligative Properties Net Ionic Equations Solubility Rules	Lesson Notes and Handouts Worksheets - UNIT 5 Vocab WS - Solubility Curve Analysis - Molarity and Molality - Colligative Properties - Net Ionic Equations and Solubility Rules Labs - Molarity of Kool-Aid - Qualitative Analysis I - Colligative Properties: BPE and FPD	Textbook Reading: - Pg. 460-511 - Pg. 518-561 Lab Sheets - Molarity of Kool-Aid - Qualitative Analysis I - Colligative Properties: BPE and FPD Vernier Temperature Probes and Graphing Software Videos World of Chemistry - “Water” Prentice Hall Video Field Trips: “Cool, Clear Water”	Homework - Text Problems Pg. 512-517 - Text Problems Pg. 562-566 Quiz 1 – Vocab, Solubility, and Concentration Quiz 2 – Colligative Properties and Solubility Rules UNIT 5 TEST

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
	Projects MP2 Projects: "Chemistry: College and Careers"	Websites http://antoine.frostburg.edu/chem/senese/101/solutions/faq/why-salt-melts-ice.shtml	

Unit Overview

Course Title: HONORS CHEMISTRY

Unit #: **UNIT 6 OVERVIEW** **Unit Title:** Gases and Gas Law Relationships

Unit Description:

UNIT 6 extends the concepts from UNIT 5 and compares and contrasts gases to solids and liquids. Students will understand that gases stand apart from other forms of matter and exist under much different combinations of temperature and pressure. The predictable behavior of gases can be summed up through the kinetic-molecular theory. Compared to solids and liquids, gas particles have much more kinetic energy and are not restricted by intermolecular forces to the same extent as solids and liquids. Students will engage in studying gas laws and apply mathematics to solve problems related to gas volume, temperature, pressure, molar mass and velocity. Various gas law relationships will be examined through problem solving, graphical analysis and laboratory study. The conclusion of the unit will focus on gas chemistry in the environment with a study of the Earth's atmosphere, global warming and the ozone layer.

Enduring Understandings/Generalizations

Students will understand that:

Gas properties and behavior stem from a kinetic-molecular theory of matter. Gases are heavily influenced by changes in temperature and pressure. Gases are often produced as products in chemical reactions. Gas law relationships such as Boyle's Law, Charles' Law, Dalton's Law of Partial Pressures, Graham's Law and the Ideal Gas law can be used to mathematically determine the affect of conditions on the properties of a gas sample. Phase diagrams are simple graphs used to define when matter will exist as a solids, liquid or gas depending on conditions of temperature and pressure. Many of the gas law relationships be seen by analyzing everyday products and events such as scuba diving, air bags, hot air balloons and aerosol cans. The Earth's atmosphere is one big study of gas chemistry and modern day studies of global warming and ozone layer depletion emphasize the importance of understanding gases and chemistry.

Guiding Questions

1. What factors within the kinetic-molecular theory explain the predictable properties and behavior of gases?
2. How do Boyle's Law, Dalton's Law and Charles' law show the relationships between gas volume, pressure & temperature?
3. What is Graham's Law? How are the molecular mass and the velocity of gas particles related?
4. What is the Ideal Gas Law? How can this law be used to extend gas knowledge to moles, density and molar mass?
5. How does a phase diagram connect solids, liquids and gases with conditions of pressure and temperature?
6. What elements and compounds commonly exist as gases? What elements and compounds commonly are produced in chemical reactions?
7. How can global warming and ozone layer depletion be explained in terms of gas law chemistry?

CURRICULUM – Unit Plan

Course Title: HONORS CHEMISTRY

Unit Title: UNIT 6: Gases and Gas Law Relationships

Time Allocation: 2 weeks

Core Content Standards and Cumulative Progress Indicators:

5.1.12.A.1,3	5.1.12.B.1,2	5.1.12.C.1	5.2.12.B.1,3
5.3.12.B.1	5.3.12.C.1	5.3.12.D.1	5.4.12.A.1
5.6.12.A.3,5,6	5.7.12.A.1,3,4	5.8.12.A.1	5.10.12.A.1

Objectives:

Compare and contrast the major property and behavior differences of gases as compared to solids, liquids and solutions

Understand that gas properties and behavior are consistent and defined by a model known as the kinetic-molecular theory of gases

Learn and use conversion factors to work with numerical data measuring both temperature and pressure

Discover through problem solving that gas volume is affected by changes in pressure (Boyle's Law) and temperature (Charles' Law)

Understand that the velocity of moving gas particles is related to the molar mass of those gas particles (Graham's Law)

Use the Ideal Gas Law equation to connect and extend gas data to moles, molar mass and density

Connect gas law chemistry to modern environmental problems such as global warming and ozone layer depletion

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Kinetic-Molecular Theory of Gases Gas Properties and Behavior Boyle's Law and Pressure Charles' Law and Temperature Dalton's Law of Partial Pressures The Ideal Gas Law Gas Density and Molar Mass The Earth's Atmosphere Global Warming and Ozone Layer Depletion	Lesson Notes and Handouts Worksheets - UNIT 6 Vocab WS - Boyle's Law - Charles' Law - Graham's Law - Ideal Gas Law Labs - Boyle's Law and Graham's Law Activity (w/ Vernier Lab 6) Projects - Presentation of MP2 Projects: "Chemistry: Careers and College"	Textbook Reading - Pg. 184-230 Lab Sheets - Boyle's Law and Graham's Law Activity (w/ Vernier Lab 6) Vernier Gas Pressure Sensors and Graphing Software Videos -IMC - "Ozone Layer - The Invisible Shield" -"An Inconvenient Truth" Global Warming Clips Prentice Hall Video Field Trips -	Homework - Text Problems Pg. 230-235 Gases Current Event HW Quiz 1 – Gas Properties and Gas Law Relationships UNIT 6 TEST

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
		"Scuba Diving", "Air Bags" and "CO Poisoning" Websites http://www.chem.ufl.edu/~itl/2045/MH_sims/gas_sim.html http://www.epa.gov/climatechange/	

Unit Overview

Course Title: HONORS CHEMISTRY

Unit #: **UNIT 7 OVERVIEW** **Unit Title:** Chemical Bonding and Molecular Geometry

Unit Description:

UNIT 7 highlights the various types of chemical bonds and the effect of chemical bond types on properties and behavior of matter. Electronegativity concepts will be used to differentiate ionic, polar covalent, non-polar covalent and metallic bonding. Students will realize that bond type is determined by the way electrons interact between neighboring atoms. Students will examine the relative strengths and lengths of various chemical bonds. A focus on covalent bonding will extend to instruction on single, double and triple bonds and molecular geometry. Students will understand that the number of bonds and un-bonded electrons surrounding a central atom determines molecular shape, bond angles and bond hybridization. Molecular geometry plays a major role in molecular stability and reactivity. Finally, UNIT 7 will conclude with an examination of intermolecular forces and how intermolecular forces differ from chemical bonds but still affect the properties and behavior of matter.

Enduring Understandings/Generalizations

Students will understand that:

All chemical compounds are held together by chemical bonds. Chemical bond types are determined by the manner in which electrons between neighboring atoms are engaged. Ionic bonds involve a transfer of electrons due to a high electronegativity difference between atoms. Polar and Non-Polar covalent bonds describe the extent to which electrons are shared to form a chemical bond. Metallic bonding is unique in its nature and in many ways is a special type of bonding that produces the unique properties of metals. A focus on covalent bonding indicates that molecules attain specific shapes and bond angles depending on combinations of shared and un-shared electrons. Molecular geometry creates polar and non-polar molecules which affects chemical behavior. Intermolecular forces such as hydrogen bonding differ from chemical bonds which are intramolecular forces. Intermolecular forces affect properties such as surface tension, boiling point, freezing point and solubility.

Guiding Questions

1. What are the fundamental differences among ionic, polar covalent, non-polar covalent and metallic bonding?
2. How does electronegativity determine the type of bond that will form between two atoms?
3. How does polarity affect the properties and behavior of a molecule?
4. What is molecular geometry? How does the VSEPR theory summarize molecular shape and bond angles?
5. What is bond hybridization? How does bond hybridization tie together UNIT 7?
6. What types of intermolecular forces exist in the world of matter? How do IM forces affect the properties of matter?
7. Why is hydrogen bonding such an important intermolecular force to study in chemistry?

CURRICULUM – Unit Plan

Course Title: HONORS CHEMISTRY

Unit Title: UNIT 7: Chemical Bonding and Molecular Geometry

Time Allocation: 3 weeks

Core Content Standards and Cumulative Progress Indicators:

5.1.12.A.1,3	5.1.12.B.1,2	5.1.12.C.1	5.3.12.B.1
5.4.12.B.1	5.6.12.A.3,47	5.6.12.B.2	5.7.12.A.4,7

Objectives:

- Distinguish between the nature and properties of ionic, polar covalent, non-polar covalent, and metallic chemical bonds
- Use electro negativity difference to predict and verify types of chemical bonds found in chemical compounds
- Use knowledge of valence electrons to draw and analyze Lewis bond structures for ionic and covalent compounds
- Discover the role of both bonded and non-bonded electrons in the determination of covalent molecule shapes and bond angles
- Research and work with VSEPR theory to extend knowledge of bond angles and covalent molecular shape through examples
- Analyze bond hybridization as a modern model accounting for equality of bond strengths and lengths in molecules
- Compare intermolecular forces of attraction to intramolecular forces (bonds)
- Distinguish between the strengths and property influences of dipole forces, dispersion forces and hydrogen bonding forces

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Ionic, Covalent and Metallic Bonding Polar vs. Non-Polar Bond Properties Lewis Structures VSEPR Theory Molecular Geometry: Shapes and Angles Bond Hybridization Intermolecular Forces	Lesson Notes and Handouts Worksheets - UNIT 7 Vocab WS - Lewis Structures - ABE Formulas and VSEPR - Intermolecular Forces Labs - Molecular March Madness - Bond Types and Properties (w/ Vernier Lab 13) Projects MP3 Projects: "Alternative Energy"	Textbook Reading: - Pg. 362-399 - Pg. 404-453 Lab Sheets - Molecular March Madness - Bond Types and Properties (w/ Vernier Lab 13) Ball and Stick Modeling Kits Vernier Conductivity Probes and Graphing Software Videos World of Chemistry - "Molecular Architecture" Websites http://www.cem.msu.edu/~reusch/VirtualText/intro3.htm	Homework - Text Problems Pg. 400-403 - Text Problems Pg. 453-459 Quiz 1 – Bond Types, Properties and Vocab Quiz 2 – VSEPR, Molecular Geometry and IM Forces UNIT 7 TEST

Unit Overview

Course Title: HONORS CHEMISTRY

Unit #: **UNIT 8 OVERVIEW** **Unit Title:** Thermodynamics and Kinetics

Unit Description:

UNIT 8 will focus on two advanced topics of chemistry. First, the role of energy in chemical reactions will be analyzed through enthalpy, entropy and Gibbs free energy studies. Students will understand that reactions occur when total energy change conditions are favorable, and do not occur when energy change conditions are unfavorable. Vocabulary, graphs and problem solving will be used to explain various conditions of enthalpy and entropy change in reactions with consideration of the role of temperature in reaction energy changes. Students will discover that energy change is a vital part of all physical and chemical reactions. The second half of the unit will extend knowledge of reaction energy to the topic of speed of reactions. Kinetics studies will use vocabulary, collision theory and problem solving to compare and contrast factors and reasoning for why some reactions proceed slowly while other proceed rapidly. Kinetics studies will include an examination of catalysts and the role of catalysts in modern chemistry.

Enduring Understandings/Generalizations

Students will understand that:

Chemical reactions involve the breaking and forming of chemical bonds and this process can only happen if an energy change is involved. Hess's Law considers the Law of Conservation of Energy in using enthalpy heat of formation data to calculate the total enthalpy change of a reaction. Entropy is a second form of reaction energy that is very different from enthalpy. Enthalpy is associated with heat energy while entropy measures the degree of organization or randomness of matter. Combining factors of enthalpy change, entropy change and temperature, students can determine and analyze the total, Gibbs free energy change of any system. Students will further understand the role of energy in kinetics by considering factors such as temperature, pressure, surface area, activation energy, catalysts, and others, on reaction rate. Students will use rate law expressions to quantitatively understand and solve problems pertaining to rates of reactions.

Guiding Questions

1. How is energy involved in chemical reactions? What is the difference between enthalpy energy and entropy energy?
2. How can Hess's Law and heat of formation values be used to determine exothermic or endothermic reactions?
3. What is entropy? How can entropy change in a reaction be assessed using a balanced chemical equation?
4. What is Gibbs Free energy? How can the spontaneous or non-spontaneous nature of a reaction be determined?
5. What is collision theory? How can the factors affecting reaction rate be explained according to collision theory?
6. What is a rate law expression? How can rate law expressions be used to calculate the speed of a chemical reaction?
7. How do reaction mechanisms differ from one-step reactions? How do catalysts work to increase reaction rate?

CURRICULUM – Unit Plan

Course Title: HONORS CHEMISTRY

Unit Title: UNIT 8: Thermodynamics and Kinetics

Time Allocation: 3 weeks

Core Content Standards and Cumulative Progress Indicators:

5.1.12.A.1,3	5.1.12.B.1,2	5.1.12.C.1	5.3.12.B.1
5.3.12.C.1	5.3.12.D.1	5.4.12.A.1	5.4.12.B.1
5.6.12.A.6	5.6.12.B.1,2	5.7.12.A.1,3,4	5.7.12.B.1-3

Objectives:

- Examine the role of energy change and transfer in every chemical reaction through the Law of Conservation of Energy
- Study the role of enthalpy energy through Hess's Law problem solving and exothermic and endothermic chemical reactions
- Study the role of entropy energy through definition of entropy and by assessing entropy change in chemical equations
- Combine and connect the roles of enthalpy, entropy and temperature through problem solving with the Gibbs Free Energy equation
- Compare and contrast spontaneous and non-spontaneous reactions using enthalpy, entropy and temperature data
- Discover and understand the numerous factors affecting collision theory and subsequently affection chemical reaction rates
- Build and use rate law expressions to calculate reaction rate answers and understand rate order of reactants
- Study energy diagrams and examples to examine reaction kinetics for reaction mechanisms
- Extend knowledge of catalysts using demonstrations, handout and video clips

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Energy in Chemical Reactions Enthalpy and Hess's Law Entropy and Temperature Gibbs Free Energy Collision Theory and Activation Energy Factors Affecting Reaction Rate Rate Law Expressions and Problem Solving Reaction Mechanisms	Lesson Notes and Handouts Worksheets - UNIT 8 Vocab WS - Hess's Law and Enthalpy - Entropy Analysis - Free Energy Calculations - Rate Law Problem Solving Labs - Thermodynamics Lab (w/ Vernier Lab 1, 4 + Demos) - Kinetics Using Single Displacement Reactions Projects MP3 Project Presentations: "Alternative Energy"	Textbook Pages - Pg. 236-273 - Pg. 568-606 - Pg. 616-655 - Pg. 774-812 Lab Sheets - Thermodynamics Lab (w/ Vernier Lab 1,4 + Demos) - Kinetics Using Single Displacement Reactions Vernier Temperature Probes and Graphing Software Videos Prentice Hall Video Field Trips: "Measuring the Energy Value of	Homework - Text Problems Pg. 274-279 - Text Problems Pg. 607-615 - Text Problems Pg. 655-661 - Text Problems Pg. 812-817 Quiz 1 - Thermodynamics Quiz 2 - Kinetics UNIT 8 TEST

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Catalysts		Food” Ward’s Video - Catalysis Websites http://www.emsb.qc.ca/laurenhill/science/exo.html http://auto.howstuffworks.com/catalytic-converter2.htm	

Unit Overview

Course Title: HONORS CHEMISTRY

Unit #: **UNIT 9 OVERVIEW** **Unit Title:** Chemical Equilibrium and Acid-Base Chemistry

Unit Description:

UNIT 9 introduces the advanced topic of chemical equilibrium. Students will discover the details of the recycling nature of many reversible chemical reactions. LeChatlier's Principle will be used to analyze reversible reactions and extend the UNIT 8 topic of reaction rate to the definition of chemical equilibrium. Students will also study factors such as temperature, pressure and concentration and how these factors cause shifts in the direction of chemical change to regain equilibrium. Once equilibrium has been introduced, the remaining topics in UNIT 9 will focus on acid-base chemistry. Fundamental facts and figures related to acids and bases will be covered including properties, pH, vocabulary, chemical indicators and neutralization. The topic of neutralization will be extended to include a thorough investigation of the titration process used to study acid-base reactions in the laboratory. Chemical equilibrium and acid-base reactions will be connected at the conclusion of the unit through work with strong and weak acid/base reactions in solution.

Enduring Understandings/Generalizations

Students will understand that:

Chemical equilibrium is a natural condition attained when reversible chemical reactions proceed in a closed container. Temperature, pressure and concentration are three major factors that affect chemical equilibrium. Each factor can be explained and best understood by considering LeChatlier's principle and the definition of chemical equilibrium. Many chemical reactions do not have the change to "proceed to completion" because of chemical equilibrium. Problem solving related to chemical equilibrium is a very advanced topic that can be introduced through acid and base reactions. Ka and Kb values are equilibrium constants representative of the "balance" of particles in an acidic or basic reaction solution. Students will understand the properties and behavior of both strong and weak acids and bases. Students will use fundamental knowledge of acids and bases to solve problems related to both pH and laboratory titrations.

Guiding Questions

1. What is chemical equilibrium? How is it achieved? How does it relate to the UNIT 8 topic kinetics?
2. What is LeChatlier's Principle? What experimental conditions affect or alter chemical equilibrium?
3. What major properties and behavior define acids and bases? What is the difference between strong and weak acids and bases?
4. What is the pH scale? How was it developed? How can pH be calculated form laboratory data?
5. What is neutralization? How is a lab titration used to best study and solve problems related to acid-base neutralization reactions?
6. What are chemical indicators and buffers? Why do scientists use the materials to better understand acids and bases?
7. How does a Ka or Kb value connect equilibrium and acid-base chemistry?

CURRICULUM – Unit Plan

Course Title: HONORS CHEMISTRY

Unit Title: UNIT 9: Chemical Equilibrium and Acid-Base Chemistry

Time Allocation: 3 weeks

Core Content Standards and Cumulative Progress Indicators:

5.1.12.A.1,3	5.1.12.B.1,2	5.1.12.C.1	5.2.12.B.1,3
5.3.12.B.1	5.3.12.C.1	5.3.12.D.1	5.4.12.A.1
5.6.12.A.6,7	5.6.12.B.1	5.8.12.A.1	5.10.12.A.1

Objectives:

- Discover the nature of chemical equilibrium and understand changes in equilibrium through study of LeChatlier's principle
- Research, compare and contrast the fundamental properties and behavior of acids and bases
- Realize the chemical reasoning used to found the pH scale and use pH equations to quantify the acid and base nature of chemicals
- Understand the differences between strong and weak acids / bases through numerical data and examples
- Use methods of titration in the laboratory to extend knowledge of acid-base neutralization reactions and acid / base concentrations
- Examine the importance of chemical indicators and buffer in the study and use of acids and bases in modern science
- Connect chemical equilibrium and acid-base chemistry using analysis of Ka and Kb expressions and numerical values
- Discover and connect acid-base chemistry knowledge to modern day issues related to acid rain and pollution

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Chemical Equilibrium LeChatlier's Principle Acid and Base Properties The pH scale Titrations Chemical Indicators Buffers Strong and Weak Acids and Bases Ka and Kb values	Lesson Notes and Handouts Worksheets - UNIT 9 Vocab WS - LeChatlier's Principle - pH Calculations - Titration Math Labs - Introduction to Titrations (w/ Vernier Lab 24) - Antacids Analysis Projects - MP4 Projects: "Chemistry in Entertainment"	Textbook Reading - Pg. 616-655 - Pg. 662-710 - Pg. 716-765 Lab Sheets - Introduction to Titrations (w/ Vernier Lab 24) - Antacids Analysis Vernier pH Probes and Graphing Software Videos Prentice Hall Video Field Trips: - "Balancing Soil" Websites http://www.vias.org/simulations/simusoft_titration.html	Homework - Text Problems Pg. 655-661 - Text Problems Pg. 711-715 - Text Problems Pg. 766-773 Acids/Bases Current Event HW Quiz 1 – Equilibrium and Acid/Base Fundamentals Quiz 2 – Titrations and Acid/Base Problem Solving UNIT 9 TEST

Unit Overview

Course Title: HONORS CHEMISTRY

Unit #: **UNIT 10 OVERVIEW** **Unit Title:** Introduction to Organic Chemistry

Unit Description:

UNIT 10 concludes the course with a brief introduction to the fundamentals of organic chemistry. Organic chemistry is an encompassing branch of science that is incorporated more fully at the collegiate level. Students will be introduced to basic knowledge of organic compounds, organic nomenclature, functional groups and related vocabulary. Problem solving will include the drawing and naming of simple organic structures as well as a simplified analysis of the roles and reactivity of major functional groups such as alcohols, ethers, ketones, amines and carboxylic acids. Students will also gain insight to the vast expanse of knowledge pertaining to carbon based compounds and the vital role organic chemistry plays in the modern world.

Enduring Understandings/Generalizations

Students will understand that:

Organic chemistry is an expansive field of chemistry with major roles in modern day science. Organic chemistry is the study of the properties and behavior of carbon based matter. Organic compounds can be classified and named based on the presence of certain common functional groups of atoms in their structure. Alcohols, ethers, aldehydes, ketones, amines, carboxylic acids and esters are some of the major functional groups often seen in organic compounds. Each of these functional groups affects the properties and behavior of matter as related to factors learned throughout the course. Organic chemistry has some simple and predictable reaction types including addition, substitution and elimination.

Guiding Questions

1. What are alkanes, alkenes and alkynes? How are these organic compound types named?
2. What groups of bonded atoms indicate the presence of major functional groups in organic matter?
3. Why do functional groups affect the properties and behavior of organic matter?
4. How are organic compounds named when major functional groups are present in the structure?
5. What is an isomer? How are isomers different from organic compounds with bond resonance?
6. Why do some functional groups affect properties of boiling point and solubility more than others?
7. What types of reactants and products are involved in the organic reaction types of addition, substitution and elimination?

CURRICULUM – Unit Plan

Course Title: HONORS CHEMISTRY

Unit Title: UNIT 10: Introduction to Organic Chemistry

Time Allocation: 2 weeks

Core Content Standards and Cumulative Progress Indicators:

5.1.12.A.1,3	5.1.12.B.1,2	5.1.12.C.1	5.2.12.B.2
5.4.12.B.1	5.6.12.A.6,7	5.6.12.B.1,2	

Objectives:

- Use essential and fundamental vocabulary related to organic compounds and organic chemistry
- Recognize the presence of major functional groups in organic compounds and research affects of these groups on properties
- Analyze organic compound structures and apply basic nomenclature rules to accurately name organic compounds
- Study major organic compounds and analyze bond structures and molecular geometry
- Use textbook to examine the role of several major and important organic compounds in the modern world
- Recognize the format and predict products for several simple organic chemistry reaction types
- Discover the chemical composition and properties of polymers

A. CONTENT/SKILLS	B. LEARNING ACTIVITIES	C. SUGGESTED MATERIALS	D. STUDENT EVALUATION
Alkanes, Alkenes and Alkynes Organic Vocabulary Organic Nomenclature Basics Functional Groups Organic Reaction Types Polymers	Lesson Notes and Handouts Worksheets - UNIT 10 Vocab WS - Organic Nomenclature - Organic Structures - Functional Groups Labs - Organic Synthesis Demonstrations Projects - MP4 Project Presentations: "Chemistry in Entertainment"	Textbook Reading - Pg. 902-944 - Pg. 954-982 Lab Sheets - Organic Synthesis Demonstrations Videos Prentice Hall Video Field Trips - "What do you know about Polymers?" Websites http://www.americanchemistry.com/s_plastics/hands_on_plastics/intro_to_plastics/students.html	Homework - Text Problems Pg. 945-953 - Text Problems Pg. 983-987 Organic Compound Analysis Quiz 1 – Introduction to Organic Chemistry

Cross-Content Standards Analysis

Course Title: HONORS CHEMISTRY **Grade:** 10/11

Unit Title:	Visual and Performing Arts	Comp. Health & Physical Ed.	English Language Arts (See Pg. 32)	Mathematics (See Pg. 34)	Science	Social Studies	World Languages	Tech Literacy	21st Century Life & Careers
UNIT 1: Matter, Measurement and The Language of Chemistry					5.6.12.A.4,7 5.7.12.A.4			5.4.12.A1, B1	
UNIT 2: Moles, Chemical Reactions and Stoichiometry					5.6.12.A.3,5 5.6.12.B.1,2 5.7.12.A.4, B2			5.4.12.A1, B1	
UNIT 3: Atoms, Electrons and Nuclear Chemistry					5.6.12.A.1,2,3 5.6.12.A.6,8 5.7.12.A.4,5, B4	5.2.12.B1-3			
UNIT 4: The Periodic Table – Properties, Trends and Connections					5.6.12.A.2,3,5 5.6.12.A.7,8 5.8.12.B.2,3	5.2.12.B1-3			
UNIT 5: Solids, Liquids and Solutions Chemistry					5.6.12.A.4,6,7 5.7.12.A.4,6			5.4.12.A1, B1	
UNIT 6: Gases and Gas Law Relationships					5.6.12.A.3,5,6 5.7.12.A.1,3,4 5.8.12.A.1 5.10.12.A.1	5.2.12.B1-3		5.4.12.A1, B1,C1	
UNIT 7: Chemical Bonding and Molecular Geometry					5.6.12.A.3,4,7 5.6.12.B.2 5.7.12.A.4,7				
UNIT 8: Thermodynamics and Kinetics					5.6.12.A.6, B1-2 5.7.12.A.1,3,4 5.7.12.B.1-3				
UNIT 9: Chemical Equilibrium and Acid-Base Chemistry					5.6.12.A.6,7, B1 5.8.12.A.1 5.10.12.A.1	5.2.12.B1-3		5.4.12.A1, B1, C1	
UNIT 10: Introduction to Organic Chemistry					5.6.12.A.6,7 5.6.12.B.1,2				

***All core content areas may not be applicable in a particular course.**

Cross-Content Standards Analysis

Course Title: HONORS CHEMISTRY **Grade:** 10/11

COMMON CORE ENGLISH LANGUAGE ARTS ALIGNMENT

Unit Title:			ENGLISH LANGUAGE ARTS						
			RST	**WHST**	**ELA Anchors 9-10**	**ELA Anchors 9-10**	**ELA Anchors 11-12**	**ELA Anchors 11-12**	
UNIT 1: Matter, Measurement and The Language of Chemistry			9-10, 1-7, 9-10 11-12, 1-6, 10	9-10, 1-2, 4, 10 11-12, 1-2, 4, 10	RL 9-10, 2 RI 9-10, 2, 8 W 9-10, 1,2,4-7, 10	SL 9-10, 1-6 L 9-10, 2,4,6	RL 11-12, 2, 4 RI 11-12, 2, 7 W 11-12, 1-2, 4, 6, 7, 10	SL 11-12, 1-6 L 11-12, 2, 4, 6	
UNIT 2: Moles, Chemical Reactions and Stoichiometry			9-10, 1-10 11-12, 1-10	9-10, 1-2, 4, 10 11-12, 1-2, 4, 10	RL 9-10, 2 RI 9-10, 2, 8 W 9-10, 1,2,4-7,10	SL 9-10, 1-6 L 9-10, 2,4,6	RL 11-12, 2,4 RI 11-12, 2,7 W 11-12, 1-2, 4,6,7,10	SL 11-12, 1-6 L 11-12, 2,4,6	
UNIT 3: Atoms, Electrons and Nuclear Chemistry			9-10, 1-6, 9-10 11-12, 1-7, 9-10	9-10, 1-2, 4-6, 8,10 11-12, 1-2, 4-6, 8,10	RL 9-10, 2 RI 9-10, 2,8 W 9-10, 1,2,4-7, 10	SL 9-10, 1-6 L 9-10, 2,4,6	RL 11-12, 2,4 RI 11-12, 2, 7 W 11-12, 1-2, 4,6,7,10	SL 11-12, 1-6 L 11-12, 2,4,6	
UNIT 4: The Periodic Table – Properties, Trends and Connections			9-10, 1-6, 9-10 11-12, 1-7, 9-10	9-10, 1-2, 4,10 11-12, 1-2, 4,10	RL 9-10, 2 RI 9-10, 2,8 W 9-10, 1,2,4-7,10	SL 9-10, 1-6 L 9-10, 2,4,6	RL 11-12, 2,4 RI 11-12, 2,7 W 11-12, 1-2, 4,6,7,10	SL 11-12, 1-6 L 11-12, 2,4,6	
UNIT 5: Solids, Liquids and Solutions Chemistry			9-10, 1-7, 9-10 11-12, 1-7, 9-10	9-10, 1-2, 4,10 11-12, 1-2, 4,10	RL 9-10, 2 RI 9-10, 2,8 W 9-10, 1,2,4-7, 10	SL 9-10, 1-6 L 9-10, 2,4,6	RL 11-12, 2,4 RI 11-12, 2,7 W 11-12, 1-2, 4,6,7,10	SL 11-12, 1-6 L 11-12, 2,4,6	
UNIT 6: Gases and Gas Law Relationships			9-10, 1-10 11-12, 1-10	9-10, 1-2, 4-6,8,10 11-12, 1-2, 4-6, 8,10	RL 9-10, 2 RI 9-10, 2,8 W 9-10, 1,2,4-7,10	SL 9-10, 1-6 L 9-10, 2,4,6	RL 11-12, 2,4 RI 11-12, 2,7 W 11-12, 1-2, 4,6,7,10	SL 11-12, 1-6 L 11-12, 2,4,6	
UNIT 7: Chemical Bonding and Molecular Geometry			9-10, 1-7, 10 11-12, 1-7, 8,10	9-10, 1-2, 4,10 11-12, 1-2, 4,10	RL 9-10, 2 RI 9-10, 2,8 W 9-10, 1,2,4-7, 10	SL 9-10, 1-6 L 9-10, 2,4,6	RL 11-12, 2,4 RI 11-12, 2,7 W 11-12, 1-2, 4,6,7,10	SL 11-12, 1-6 L 11-12, 2,4,6	
UNIT 8: Thermodynamics and Kinetics			9-10, 1-10 11-12, 1-10	9-10, 1-2, 4-6, 8,10 11-12, 1-2, 4-6, 8,10	RL 9-10, 2 RI 9-10, 2,8 W 9-10, 1,2,4-7, 10	SL 9-10, 1-6 L 9-10, 2,4,6	RL 11-12, 2,4 RI 11-12, 2,7 W 11-12, 1-2, 4,6,7,10	SL 11-12, 1-6 L 11-12, 2,4,6	
UNIT 9: Chemical Equilibrium and Acid-Base Chemistry			9-10, 1-10 11-12, 1-10	9-10, 1-2, 4,10 11-12, 1-2, 4-6, 8,10	RL 9-10, 2 RI 9-10, 2,8 W 9-10, 1,2,4-7, 10	Sl 9-10, 1-6 L 9-10, 2,4,6	RL 11-12, 2,4 RI 11-12, 2,7 W 11-12, 1, 2, 4,6,7,10	SL 11-12, 1-6 L 11-12, 2,4,6	

UNIT 10: Introduction to Organic Chemistry			9-10, 1-2, 4-5, 9,10 11-12, 1-2, 4-5, 9,10	9-10, 1-2, 4-6, 8,10 11-12, 1-2, 4-6, 8,10	RL 9-10, 2 RI 9-10, 2,8 W 9-10, 1,2,4-7, 10	SL 9-10, 1-6 L 9-10, 2,4,6	RL 11-12, 2,4 RI 11-12, 2,7 W 11-12, 1-2, 4,6,7,10	SL 11-12, 1-6 L 11-12, 2,4,6	

***All core content areas may not be applicable in a particular course.**

Cross-Content Standards Analysis

Course Title: HONORS CHEMISTRY **Grade:** 10/11

COMMON CORE MATH ALIGNMENT

Unit Title:		MATHEMATICS							
		Numbers & Quantity	**Algebra**	**Functions**	**Geometry**	**Statistics & Probability**			
UNIT 1: Matter, Measurement and The Language of Chemistry		N-Q 1-3	A-SSE 1-3 A-CED 1,2,4 A-REI 1			S-ID 1,2,7,8 S-IC 3			
UNIT 2: Moles, Chemical Reactions and Stoichiometry		N-Q 1-3	A-SSE 1-3 A-CED 1,2,4 A-REI 1			S-ID 1,2,7,8 S-IC 3			
UNIT 3: Atoms, Electrons and Nuclear Chemistry		N-Q 1-3	A-SSE 1-3 A-CED 1,2,4 A-REI 1			S-ID 1,2,7,8 S-IC 3			
UNIT 4: The Periodic Table – Properties, Trends and Connections		N-Q 1-3	A-SSE 1-3 A-CED 1,2,4 A-REI 1			S-ID 1,2,7,8 S-IC 3			
UNIT 5: Solids, Liquids and Solutions Chemistry		N-Q 1-3	A-SSE 1-3 A-CED 1,2,4 A-REI 1			S-ID 1,2,7,8 S-IC 3			
UNIT 6: Gases and Gas Law Relationships		N-Q 1-3	A-SSE 1-3 A-CED 1,2,4 A-REI 1			S-ID 1,2,7,8 S-IC 3			
UNIT 7: Chemical Bonding and Molecular Geometry		N-Q 1-3 NVM 1,4	A-SSE 1-3 A-CED 1,2,4 A-REI 1		G-CO 4-5 G-MG 1	S-ID 1,2,7,8 S-IC 3			
UNIT 8: Thermodynamics and Kinetics		N-Q 1-3	A-SSE 1-3 A-CED 1,2,4 A-REI 1			S-ID 1,2,7,8 S-IC 3			
UNIT 9: Chemical Equilibrium and Acid-Base Chemistry		N-Q 1-3	A-SSE 1-3 A-CED 1,2,4 A-REI 1	F-BF 5		S-ID 1,2,7,8 S-IC 3			
UNIT 10: Introduction to Organic Chemistry		N-Q 1-3	A-SSE 1-3 A-CED 1,2,4 A-REI 1			S-ID 1,2,7,8 S-IC 3			

***All core content areas may not be applicable in a particular course.**

Washington Township Public Schools
Department of Student Personnel Services

CURRICULUM MODIFICATION

The regular curriculum is modified for Special Education students enrolled in both self-contained and resource center classes.

Modifications address individual learning rates, styles, needs and the varying abilities of all special populations served in the programs available in the district.

The intent is three-fold:

- To provide alternative materials, techniques and evaluation criteria to address the range of students' needs;
- To parallel the regular curriculum in skill, content sequence and coverage to prepare students for mainstreaming;
- To maximize students' potential for movement to less restrictive environments.

In the event there is a conflict between the prescribed curriculum and the IEP for an individual student, the IEP will take precedence and will constitute the individually prescribed proficiencies for the student.