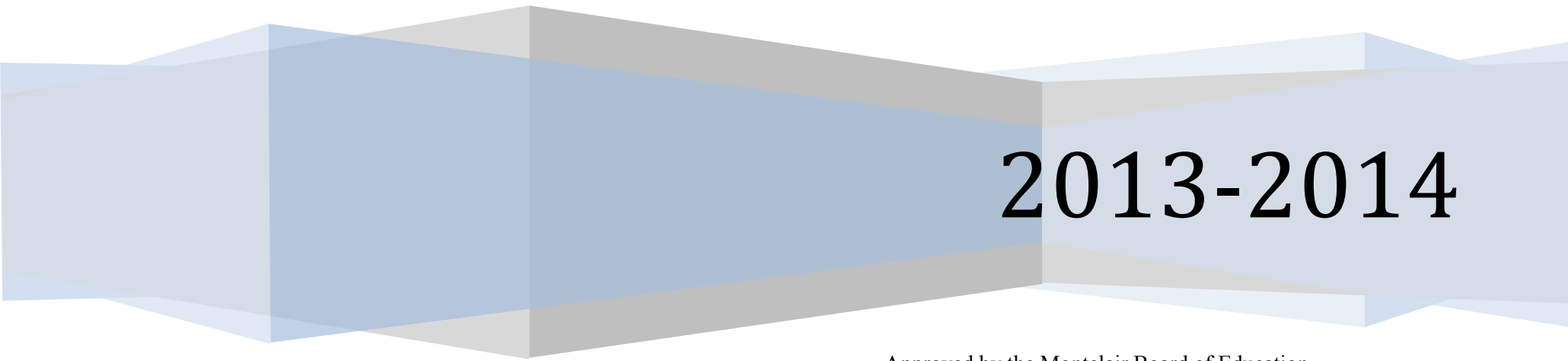


Montclair Public Schools

Science

Curriculum Guide

Chemistry Academic Grade 10-11



2013-2014

Approved by the Montclair Board of Education
September 2011/Revised: September 2013

Montclair Public Schools
CCSS Chemistry Academic Unit: Marshall A.b

Subject	CHEMISTRY Academic	Grade	10-11	Unit #	1	Pacing	10 WEEKS
Unit	MEASUREMENT, MATTER, ATOMIC THEORY						
Overview							
<ul style="list-style-type: none"> Unit I functions to develop student skills in investigative methodology, familiarize students with the concepts of matter and measurement, and how to analyze data obtained during the course of experimentation. An overview of the history of chemistry will help reinforce basic concepts and an analysis of previous work will display how we do chemical investigation today. Lab safety is discussed so students are familiar with the need to work with care in the chemistry lab. SI units and dimensional analysis will be reviewed. Students will be introduced to matter and its properties. It explores the development of modern atomic theory and explains how theory and experimentation gave rise to our modern view of the atom. The way atoms are build gives rise to a discussion of how they decay. 							
Standard #	NJCCCS	SLO #	Student Learning Objectives			Depth of Knowledge	
HS-PS1-7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	1	<ul style="list-style-type: none"> Research and apply appropriate safety precautions when designing and/or conducting scientific investigations (e.g., OSHA, MSDS, eyewash, goggles and ventilation). 			2	
		2	<ul style="list-style-type: none"> Understand atomic models ,determine the number of protons, neutrons, and electrons in atoms, define atomic mass 			2	
		3	<ul style="list-style-type: none"> Recognize that all atoms of the same element contain the same number of protons, and elements with the same number of protons may or may not have the same mass. Those with different masses (different numbers of 			1	

1: 2013-2014

		4	neutrons) are called isotopes.	3
		5	<ul style="list-style-type: none"> Use historical examples to explain how new ideas are limited by the context in which they are conceived; are often initially rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly through contributions from many different investigators (e.g., atomic theory, quantum theory and Newtonian mechanics). Perform calculations using the factor label (dimensional analysis) method Convert atoms, molecules, moles 	2
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.	6	<ul style="list-style-type: none"> List the major kinds of nuclear transmutations that are known to exist 	1
		7	<ul style="list-style-type: none"> Calculate and determine half-life. 	3
Standard #	CCSS ELA Standard	SLO #	Student Learning Objectives	Depth of Knowledge
RST11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	8	<ul style="list-style-type: none"> Read lab before starting and generate a flow chart to follow during the experiment 	2

RST11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 and 11-12 texts and topics.	9	<ul style="list-style-type: none"> • Make a vocabulary list of key terms and their meaning 	1
RST11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.	10	<ul style="list-style-type: none"> • Use the text as well as other sources to arrive at a complete understanding of the information 	2
WHST.11-12.2e	Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).	11	<ul style="list-style-type: none"> • Use information collected in the lab to draw conclusions about the results 	3

Big Ideas: Marshall A.c

1. Science is a process of inquiry including repeatable observations
2. The modern quantum view of the atom is the result of 125 years of study.

Essential Questions: Marshall A.c, C.c

1. What methods do we use to do chemical research?
2. What is the scientific method?
3. What safety precautions are needed in the chemistry lab?
4. How do we properly analyze the data we collect?
5. What is matter? What are its properties?
6. What are the similarities and differences amongst atoms?
7. What is our modern view of the atom? How was it developed?

Assessments: Marshall A.d, D.c

- Formal and informal formative and summative assessments as determined by the teacher
- Common Benchmark as per district schedule

Key Vocabulary

- SI units
- Dimensional analysis
- Density
- Elements
- Compounds
- Homogeneous mixture
- Heterogeneous mixture
- Mixture
- Pure substance
- Physical change
- Chemical change
- Hypothesis
- Scientific law
- Significant figures
- Atomic theory
- Electron
- Proton
- Neutron
- Dalton
- Geiger
- Rutherford
- Thomson
- Millikan
- Periodic table
- Radioactive decay
- Half life

- Fission
- Fusion

Suggested Resources (These are recommended; you may select others as long as they are aligned to the standards and Lexile levels in this unit of study.)

Textbook:

Web-based:

<http://intro.chem.okstate.edu>

A chapter outline for chemistry with notes and lots of sample tests

<http://chemistry2.csudh.edu>

Homework, games, and practice

<http://www.chemtutor.com>

A very complete site offering review and sample questions

<http://lrc-srvr.mps.ohio-state.edu/under/chemed/qbank/quizmain.htm>

A fantastic resource including all topics for the course with tutorials and quizzes

<http://www.chem.purdue.edu/gchelp/howtosolveit/index.html>

atomic structure timeline

<http://pals.sri.com/tasks/9-12/RadioDecay/>

Performance task Radioactive decay

<http://www.chalkbored.com/lessons/chemistry-11.htm>

Periodic table and periodic trends worksheet

Multi-media:

<http://www.learner.org/resources/series61.html>

World of Chemistry

6. The Atom

7. The Periodic Table

Additional Resources:

Let's Review: Chemistry--The Physical Setting (Let's Review: Chemistry) by Albert S. Tarendash, Paperback: 563 pages, Publisher: Barron's Educational Series

<http://www.chem1.com/acad/webtext/virtualtextbook.html>

DIFFERENTIATION		
Special Education	ELL	RtI
<ul style="list-style-type: none"> • Modifications & accommodations as listed in the student's IEP • Assign a peer to help keep student on task • Modified or reduced assignments • Reduce length of assignment for different mode of delivery • Increase one to one time • Working contract between you and student at risk • Prioritize tasks • Think in concrete terms and provide hands on tasks • Position student near helping peer or have quick access to teacher • Anticipate where needs will be • Break tests down in smaller increments • NJDOE resources 	<ul style="list-style-type: none"> • Strategy groups • Teacher conferences • Graphic organizers • Modification plan • NJDOE resources • Adapt a Strategy-Adjusting strategies for ESL students: http://www.teachersfirst.com/content/esl/adaptstrat.cfm 	<ul style="list-style-type: none"> • Tiered Interventions following RtI framework • RtI Intervention Bank • Foundations Double-Dose (Tier II) • LLI (Tier III) • FFI Skill Report: DRA On-Line • enVision intervention supports • NJDOE resources
ALIGNMENT TO 21 st CENTURY SKILLS AND TECHNOLOGY		
21 st Century/ Interdisciplinary Themes: Bold all that apply	21 st Century Skills: Bold all that apply	
Global Awareness Financial, Economic, Business and Entrepreneurial Literacy Civic Literacy Health Literacy Environmental Literacy	Creativity & Innovation Critical Thinking & Problem Solving Communication & Collaboration Media Literacy Information Literacy Information, Communication & Technology Life & Career Skills	

Technology Infusion

- Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others
- Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
- Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

Epson Interactive Whiteboard Applications

Evidence of Student Learning

- | | | | |
|----------------------|-------------------------------|----------------------------|-----------------------------|
| • Common benchmark | • Teacher-student conferences | • Students' published work | • Quizzes |
| • Evaluation rubrics | • Running records | • Unit tests | • Laboratory Investigations |

Subject	CHEMISTRY ACADEMIC	Grade	11-12	Unit #	2	Pacing	10 WEEKS
Unit	REACTIONS, NOMENCLATURE, PERIODIC TABLE, QUANTUM THEORY						
Overview							
The unit introduces students to the basis of all of chemistry. It explores the development of modern atomic theory and explains how theory and experimentation gave rise to our modern view of the atom. The structure of the periodic table is based upon the concept of electron configuration. The unit introduces students to chemical equations and stoichiometry. The unit details the types of information we can get from chemical equations. The student will be introduced to the chemical measurement unit, the mole.							
Standard #	NJCCCS	SLO #	Student Learning Objectives	Depth of Knowledge			
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.	1	<ul style="list-style-type: none"> Show how atoms may be bonded together by losing, gaining or sharing electrons and that in a chemical reaction, the number, type of atoms and total mass must be the same before and after the reaction (e.g., writing correct chemical formulas and writing balanced chemical equations). 	2			
		2	<ul style="list-style-type: none"> Identify the five main types of reactions (synthesis, decomposition, single replacement, double replacement, and combustion) 	1			
		3	<ul style="list-style-type: none"> Calculate the number of atoms, molecules, moles, or grams of a substance that would be produced in a given chemical reaction 	2			
HS-PS1-1	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	4	<ul style="list-style-type: none"> Show that when elements are listed in order according to the number of protons (called the atomic number), the repeating patterns of physical and 	2			

		5	<p>chemical properties identify families of elements. Recognize that the periodic table was formed as a result of the repeating pattern of electron configurations.</p> <ul style="list-style-type: none"> Explain periodic trends (atomic size, ionization, electronegativity, density, melting point, phase at room temperature, and conductivity) 	2
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.	6 7	<ul style="list-style-type: none"> Demonstrate that electromagnetic radiation is a form of energy. Recognize that light acts as a wave. Show that visible light is a part of the electromagnetic spectrum (e.g., radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays). Understand how our present model of the atom is based on quantum ideas 	2 2
Standard #	CCSS ELA Standard	SLO #	Student Learning Objectives	Depth of Knowledge
RST 9-10.1 11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	12	<ul style="list-style-type: none"> Utilize text and suggested resources to support understanding 	2
RST 9-10.3 11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	13	Use lab instructions and background materials to develop a scheme for collection and analysis of data	2
RST 9-10.3 11-12.3	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 and 11-12 texts and topics.	14	Define all key vocabulary terms and concepts and review them with the teacher	1
RST 9-	Analyze the author’s purpose in providing an explanation,			

10.4 11- 12.4	describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	15	Understand how scientists pose and answer questions based on the data available	3
RST 9- 10.6 11- 12.6	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	16	Be able to use tables, graphs, and charts to analyze a system and develop conclusions	3
RST 9- 10.7	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.	17	Type a comprehensive , complete lab/project report showing objective, data collection, sample calculations, and graphs	2
WHST 11-12.8				

Big Ideas

- Scientists use chemical symbols and equations to represent chemical reactions
- Chemical bonding is an attempt by atoms to achieve stability.
- Atom properties are based on their electron configuration.

Essential Questions

- What are the ways we measure chemical quantities?
- What types of information are provided to you by a chemical equation?
- Why do elements behave the way they do?
- How did we come to understand atomic structure?
- Why is the periodic table arranged the way it is?

Assessments

- Common Benchmark as per district schedule
- Teacher generated quizzes and tests including multiple choice, free response, and essay
- Lab tasks and reports
- Class/homework

Key Vocabulary

- Valence electrons
- IUPAC
- Periodic Trends
- Mole
- Wave-particle duality
- Electron configuration
- Thomson
- Rutherford
- Millikan
- Synthesis
- Decomposition
- Replacement
- Oxidation
- Limiting reagent
- Percent yield

Suggested Resources (CCSS Exemplar Texts in Bold)

Web-based:

<http://intro.chem.okstate.edu>

A chapter outline for chemistry with notes and lots of sample tests

<http://chemistry2.csudh.edu>

Homework, games, and practice

<http://www.chemtutor.com>

A very complete site offering review and sample questions

<http://www.jce.divched.org/JCEDLib/QBank/collection/ConceptTests/>

A collection of tests teachers can use as practice work for students

<http://misterguch.brinkster.net/MLX039.doc>

Stoichiometry Lab

<http://www.chalkbored.com/lessons/chemistry-11.htm>

Periodic table and periodic trends worksheet

<http://www.chem.purdue.edu/gchelp/howtosolveit/index.html>

atomic structure timeline

Multi-media:

<http://www.learner.org/resources/series61.html>

World of Chemistry

11. The Mole

6. The Atom

7. The Periodic Table

Instructional Focus	Student Learning Objectives	Assessments
<ul style="list-style-type: none">• What can I do to make the work maximally engaging and effective?• What content should we cover? What content needs to be “uncovered”?• When should the “basics” come first? When should they be on a “need to know” basis?• When should I teach, when should I coach, and when should I facilitate student “discovery”?• How do I know who and where the learners are?	<ul style="list-style-type: none">• List SLOs that are addressed via instructional focus• If listed then they should be taught	<ul style="list-style-type: none">• How will you assess these learning events?• What types of assessments will you use to check for understanding?

<ul style="list-style-type: none"> • In order to truly meet the standard, what should they be able to do independently (transfer)? What should I be doing to make them more independent and able to transfer? • What events will help students practice & get feedback in transfer using the learning in realistic ways? 		
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DIFFERENTIATION

Special Education	ELL	RtI
<ul style="list-style-type: none"> • Modifications & accommodations as listed in the student’s IEP • Assign a peer to help keep student on task • Modified or reduced assignments • Reduce length of assignment for different mode of delivery • Increase one to one time • Working contract between you and student at risk • Prioritize tasks • Think in concrete terms and provide hands on tasks • Position student near helping peer or have quick access to teacher • Anticipate where needs will be • Break tests down in smaller increments • NJDOE resources 	<ul style="list-style-type: none"> • Strategy groups • Teacher conferences • Graphic organizers • Modification plan • NJDOE resources • Adapt a Strategy-Adjusting strategies for ESL students: http://www.teachersfirst.com/content/esl/adaptstrat.cfm 	<ul style="list-style-type: none"> • Tiered Interventions following RtI framework • RtI Intervention Bank • Foundations Double-Dose (Tier II) • LLI (Tier III) • FFI Skill Report: DRA On-Line • enVision intervention supports • NJDOE resources

ALIGNMENT TO 21st CENTURY SKILLS AND TECHNOLOGY

21st Century/ Interdisciplinary Themes: Bold all that apply	21st Century Skills: Bold all that apply
Global Awareness	Creativity & Innovation

Financial, Economic, Business and Entrepreneurial Literacy Civic Literacy Health Literacy Environmental Literacy	Critical Thinking & Problem Solving Communication & Collaboration Media Literacy Information Literacy Information, Communication & Technology Life & Career Skills		
Technology Infusion			
<ul style="list-style-type: none"> • Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others • Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. • Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. Epson Interactive Whiteboard Applications			
Evidence of Student Learning			
<ul style="list-style-type: none"> • Common benchmark • Evaluation rubrics 	<ul style="list-style-type: none"> • Teacher-student conferences • Running records 	<ul style="list-style-type: none"> • Students' published work • Unit tests 	<ul style="list-style-type: none"> • Quizzes • Laboratory Investigations

Subject	CHEMISTRY ACADEMIC	Grade	10-11	Unit #	3	Pacing	10 WEEKS
Unit	BONDING, THERMOCHEMISTRY, GAS LAWS						
Overview							
<p>The interaction between atoms and molecules is introduced here and we examine intermolecular forces. Once intermolecular forces have been introduced the unit moves on to states of matter delves into the laws that govern their behavior and includes the properties of solutions. Finally we deal with the energy changes accompanying both chemical and physical processes. The most common form of energy transfer associated with chemical changes is that of heat and so the majority of time is spent dealing with this transfer. The zeroth, first, and second laws are considered here and students will investigate changes of heat content and the transfer of heat between objects.</p>							
Standard #	NJCCCS	SLO #	Student Learning Objectives				Depth of Knowledge
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.	1	<ul style="list-style-type: none"> Use calorimeters to design an experiment to display energy transfer from one material to another 				4
		2	<ul style="list-style-type: none"> Understanding energy transformations during physical and chemical changes. 				3
		3	<ul style="list-style-type: none"> Understand the concept of phase changes and the accompanying heat energy changes. 				3
		4	<ul style="list-style-type: none"> Compare and contrast atomic/molecular motion in solids, liquids, gases, and plasmas. 				3
		5	<ul style="list-style-type: none"> Utilize the kinetic molecular theory of gases to explain the production and influence of pressure and list the ways pressure is measured. 				3
		6	<ul style="list-style-type: none"> Identify the significance of absolute zero 				2

		7	and its influence on the behavior of gases.	
		8	<ul style="list-style-type: none"> Identify the major gas laws-Boyle's, Charles', Gay-Lussac's, Combined law-to illustrate the behavior of gases when temperature, pressure, and volume are varied, but the number of molecules stays the same. Use the ideal gas law to find moles, number of molecules, and the specific mass of gas present. 	3
		9	<ul style="list-style-type: none"> Incorporate Hess' Law as a tool to find the unknown enthalpy change for a reaction. 	3
		10	<ul style="list-style-type: none"> Compare and contrast endothermic and exothermic reactions and their values and sign for delta H. 	3
			<ul style="list-style-type: none"> Graph a thermo-chemical equation to show heat changes accompanying a chemical reaction. 	3
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).	11	<ul style="list-style-type: none"> Design a lab testing properties like melting and boiling points as well as solubility and conductivity to classify the type of forces and their relative strengths 	4
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.	8	<ul style="list-style-type: none"> Explain that the electric force between the nucleus and the electrons hold an atom together. Relate that on a larger scale, electric forces hold solid and liquid materials together (e.g., salt crystals and water). 	
		9	<ul style="list-style-type: none"> Explain that the electric force between the nucleus and the electrons hold an atom together. Relate that on a larger scale, 	

			electric forces hold solid and liquid materials together (e.g., salt crystals and water).	
HS-PS2-6	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.		<ul style="list-style-type: none"> Compare the conductivity of different materials and explain the role of electrons in the ability to conduct electricity. 	
Standard #	CCSS ELA Standard	SLO #	Student Learning Objectives	Depth of Knowledge
RST 9-10.1 11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	12	<ul style="list-style-type: none"> Utilize text and suggested resources to support understanding 	2
RST 9-10.3 11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	13	<ul style="list-style-type: none"> Use lab instructions and background materials to develop a scheme for collection and analysis of data 	3
RST 9-10.4 11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 and 11-12 texts and topics.	14	<ul style="list-style-type: none"> Define all key vocabulary terms and concepts and review them with the teacher 	1
RST 9-10.6 11-12.6	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	15	<ul style="list-style-type: none"> Understand how scientists pose and answer questions based on the data available 	3
RST 9-10.7 11-12.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	16	<ul style="list-style-type: none"> Be able to use tables, graphs, and charts to analyze a system and develop conclusions 	3
RST 9-10.8	Assess the extent to which the reasoning and evidence in a	17		

11-12.8	text support the author’s claim or a recommendation for solving a scientific or technical problem.		<ul style="list-style-type: none"> Use the text as well as other references as sources and supplemental learning tools in every unit. Clarify any information not understood immediately with your teacher 	3
WHST 9-10.1e 10-11.1e	Provide a concluding statement or section that follows from or supports the argument presented.	18	<ul style="list-style-type: none"> Incorporate conclusions in lab reports 	4
WHST 9-10.9 11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.	19	<ul style="list-style-type: none"> Use the text and other resources to support conclusions arrived at in lab 	4

Big Ideas

- Hard won conclusion
- Generalizations or insights inferred by students with teacher help and from the learning
- Sometimes easier to identify the common misunderstandings first when teaching this unit
- Unit is connected

Essential Questions

- “big picture” questions
- Thought-provoking
- Recurring questions by which we try and make sense of our work, our world, and ourselves

Assessments

- Must be aligned with SLO
- **All SLOs must be assessed; but, not all SLOs are contained in the unit assessment**
- Only focus or priority standards and corresponding SLOs are included in the unit assessment
- Non-priority or focus SLOs are measured throughout the unit in a variety of ways (quizzes, exit tickets, check for understanding, journal entries, etc.)
- Unit assessments must be written before learning experiences
- Common Benchmark as per district schedule

Key Vocabulary

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2014

- Content specific
- Tier II grade level

Suggested Resources (CCSS Exemplar Texts in Bold)

- List resources that are aligned with SLOs and grade level or content area including texts, exemplars, rubrics, interdisciplinary resources, etc.
- CCSS Framework Appendix A: Grade Level Text Complexity (p.5)
- CCSS Framework Appendix B: Text Exemplars and Sample Performance Tasks
- CCSS Framework Appendix C: Writing Exemplars

Learning Experiences (last area to be completed)

Instructional Focus	Student Learning Objectives	Assessments
<ul style="list-style-type: none"> • What can I do to make the work maximally engaging and effective? • What content should we cover? What content needs to be “uncovered”? • When should the “basics” come first? When should they be on a “need to know” basis? • When should I teach, when should I coach, and when should I facilitate student “discovery”? • How do I know who and where the learners are? • In order to truly meet the standard, what should they 	<ul style="list-style-type: none"> • List SLOs that are addressed via instructional focus • If listed then they should be taught 	<ul style="list-style-type: none"> • How will you assess these learning events? • What types of assessments will you use to check for understanding?

<p>be able to do independently (transfer)? What should I be doing to make them more independent and able to transfer?</p> <ul style="list-style-type: none"> • What events will help students practice & get feedback in transfer using the learning in realistic ways? 		
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ALIGNMENT TO 21st CENTURY SKILLS AND TECHNOLOGY

21st Century/ Interdisciplinary Themes: Bold all that apply	21st Century Skills: Bold all that apply
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Global Awareness Financial, Economic, Business and Entrepreneurial Literacy	Creativity & Innovation Critical Thinking & Problem Solving
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Civic Literacy Health Literacy Environmental Literacy	Communication & Collaboration Media Literacy Information Literacy Information, Communication & Technology Life & Career Skills		
Technology Infusion			
<ul style="list-style-type: none"> • Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others • Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. • Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. Epson Interactive Whiteboard Applications			
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Subject	CHEMISTRY Academic	Grade	10-11	Unit #	4	Pacing	10 WEEKS
Unit	REACTIONS RATES ,EQUILIBRIUM, ACID BASE						
Overview	The unit deals starts with the study of reaction kinetics which is divided into 2 parts. The first part we will explore involves the macroscopic level including reaction rates, what the reaction rate means, how we determine a reaction rate experimentally, and how factors like temperature and concentration affect the rate. The second part considers reactions at the particulate level and deals with the mechanisms by which the reaction occurs. The concept of equilibrium is fundamental in chemistry and we will explore it following kinetics. In a closed system a state of equilibrium is eventually achieved between products and reactants. We will see how outside forces can affect this equilibrium and with this gain the ability to describe chemical reactions in quantitative terms. The unit then explores acids and bases some of the most common substances in nature. It will expand the ideas presented in the previous section to include the concepts of k_a and k_b . We will see how acids and bases are classified and how acids and bases interact.						
Standard #	NJCCCS	SLO #	Student Learning Objectives				Depth of Knowledge
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.	1	<ul style="list-style-type: none"> Design an experiment illustrating how each contributing factor can alter the rate of a reaction. Provide a model for reaction rates that will provide the key to understanding collision theory. 				4
		2	<ul style="list-style-type: none"> List ways, according to kinetic molecular theory, that reaction rates can be affected during a chemical reaction. 				2
		3	<ul style="list-style-type: none"> Discuss the significance of orientation during a reaction. 				3
		4	<ul style="list-style-type: none"> Associate the concept of the activated complex with the importance of activation energy. Relate activation energy to spontaneity and the use of catalysts. 				3
		5	<ul style="list-style-type: none"> Inquire as to how catalysts speed the 				4

			rate of a reaction. Set up a model that demonstrates catalytic activity.	
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.*	6	<ul style="list-style-type: none"> Design a lab that uses variation in product and reactant concentrations to display Le Chatlier's Principle. Apply Le Chatlier's Principle to a shifting in equilibrium. 	4
		7	<ul style="list-style-type: none"> List the factors that affect equilibrium in a closed system or an open system. 	1
		8	<ul style="list-style-type: none"> List the properties of acids and bases. Define acids and bases three different ways. 	1
		9	<ul style="list-style-type: none"> Relate acid/base chemistry to equilibrium. 	3
Standard #	CCSS ELA Standard	SLO #	Student Learning Objectives	Depth of Knowledge
RST.9-10.1 11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	10	<ul style="list-style-type: none"> Utilize text and suggested resources to support understanding 	2
RST.9-10.2 11-12.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.	11	<ul style="list-style-type: none"> Review text materials on a teacher selected topic and present a summary 	3

RST.9-10.3 11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	12	<ul style="list-style-type: none"> Use lab instructions and background materials to develop a scheme for collection and analysis of data 	3
RST.9-10.4 11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 and 11-12 texts and topics.	13	<ul style="list-style-type: none"> Define all key vocabulary terms and concepts and review them with the teacher 	1
RST.9-10.5 11-12.5	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., <i>force</i> , <i>friction</i> , <i>reaction force</i> , <i>energy</i>).	14	<ul style="list-style-type: none"> Describe the relationships amongst k values (sp, a, b, c, p etc.) explaining differences and similarities. Use terms and equations 	4
RST.9-10.6 11-12.6	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	15	<ul style="list-style-type: none"> Understand how scientists pose and answer questions based on the data available 	3
RST.9-10.7 11-12.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	16	<ul style="list-style-type: none"> Be able to use tables, graphs, and charts to analyze a system and develop conclusions 	3
RST.9-10.8 11-12.8	Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem.	17	<ul style="list-style-type: none"> Use the text as well as other references as sources and supplemental learning tools in every unit. Clarify any information not understood immediately with your teacher 	3

RST. 9-10.10	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.	18	<ul style="list-style-type: none"> Analyze a teacher selected lab to determine if results agree with the text as well as at least two other sources 	4
WHST 9-10.1e 10-11.1e	Provide a concluding statement or section that follows from or supports the argument presented.	19	<ul style="list-style-type: none"> Incorporate conclusions in lab reports 	4
WHST 9-10.9 11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.	20	<ul style="list-style-type: none"> Use the text and other resources to support conclusions arrived at in lab 	4

Big Ideas

- Reaction rates that depend on temperature and other environmental factors are determined by measuring changes in concentrations of reactants or products over time.
- Most reactions do not go to completion but reach a state of dynamic equilibrium.
- Rates of reactions are influenced by a number of factors.
- An equilibrium will respond to environmental changes.
- Acids and bases have many uses.

Essential Questions

- How is the rate of a reaction influenced by the concentration or pressure of reactants, the phase of the reactants and products, and environmental factors such as temperature and solvent.
- How does the rate depend on reactant concentrations.
- What does it mean to say a reaction has reached equilibrium?
- What factors will disturb that equilibrium and why?
- What are the ways chemists define acids and bases?
- What types of reactions occur between acids and bases? What are the results

Assessments

- Teacher generated quizzes and tests including multiple choice, free response, and essay
- Lab tasks and reports
- Class/homework
- Unit 4 project
- Common Benchmark as per district schedule

Key Vocabulary

- Kinetics
- Reaction rate
- Activated complex
- Reaction mechanism
- Endothermic
- Exothermic
- Rate constant
- Equilibrium
- Equilibrium constant
- pH
- pOH
- Le Chatelier's Principle
- Arrhenius
- Bronsted-lowry
- Lewis

Suggested Resources (CCSS Exemplar Texts in Bold)

Textbook:

Modern Chemistry Holt McDougal

Chapters 17,18,14, and 15

Almost all pages are relevant as the book includes limited text and many worked examples.

Web-based:

<http://www.sciencegeek.net/APChemistry>

This site includes a chapter by chapter overview of all the topics in the AP Chemistry curriculum. The site has notes, worksheets, and interactive practice problems.

<http://chem101library.thinkquest.org>

A great resource having an online text, labs, and videos.

<http://intro.chem.okstate.edu>

A chapter outline for chemistry with notes and lots of sample tests

<http://chemistry2.csudh.edu>

Homework, games, and practice

<http://www.chemtutor.com>

A very complete site offering review and sample questions

<http://www.jce.divched.org/JCEDLib/QBank/collection/ConcepTests/>

A collection of tests teachers can use as practice work for students

<http://www.chem.purdue.edu/gchelp/howtosolveit/index.html>

How do I solve it?

<http://pals.sri.com/tasks/9-12/Sunshine/>

Acid Base lab 1

<http://www.siraze.net/chemistry/sezennur/subjects/experiment/024.pdf>

Equilibrium lab

<http://www.siraze.net/chemistry/sezennur/subjects/experiment/025.pdf>

LeChatelier's Principle

<http://www.siraze.net/chemistry/sezennur/subjects/experiment/027.pdf>

Acid Base lab 2

<http://www.siraze.net/chemistry/sezennur/subjects/experiment/028.pdf>

Multi-media:

<http://www.learner.org/resources/series61.html>

World of Chemistry

16. The proton in chemistry

Multi-media:

<http://www.learner.org/resources/series61.html>

World of Chemistry

13. The Driving Forces

Additional Resources:

Let's Review: Chemistry--The Physical Setting (Let's Review: Chemistry) by Albert S. Tarendash, Paperback: 563 pages, Publisher: Barron's Educational Series

<http://www.chem1.com/acad/webtext/virtualtextbook.html>

virtual text

American Chemical Society

- [Chemistry in the Community \(ChemCom\)](#),

DIFFERENTIATION

Special Education	ELL	RtI
<ul style="list-style-type: none">• Modifications & accommodations as listed in the student's IEP• Assign a peer to help keep student on task• Modified or reduced assignments• Reduce length of assignment for different mode of delivery• Increase one to one time• Working contract between you and student at risk• Prioritize tasks• Think in concrete terms and provide hands on tasks• Position student near helping peer or have quick access to teacher• Anticipate where needs will be• Break tests down in smaller increments• NJDOE resources	<ul style="list-style-type: none">• Strategy groups• Teacher conferences• Graphic organizers• Modification plan• NJDOE resources• Adapt a Strategy-Adjusting strategies for ESL students: http://www.teachersfirst.com/content/esl/adaptstrat.cfm	<ul style="list-style-type: none">• Tiered Interventions following RtI framework• RtI Intervention Bank• Foundations Double-Dose (Tier II)• LLI (Tier III)• FFI Skill Report: DRA On-Line• enVision intervention supports• NJDOE resources

ALIGNMENT TO 21st CENTURY SKILLS AND TECHNOLOGY

21st Century/ Interdisciplinary Themes: Bold all that apply		21st Century Skills: Bold all that apply	
Global Awareness Financial, Economic, Business and Entrepreneurial Literacy Civic Literacy Health Literacy Environmental Literacy		Creativity & Innovation Critical Thinking & Problem Solving Communication & Collaboration Media Literacy Information Literacy Information, Communication & Technology Life & Career Skills	
Technology Infusion			
<ul style="list-style-type: none"> • Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others • Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. • Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. Epson Interactive Whiteboard Applications			
Evidence of Student Learning			
<ul style="list-style-type: none"> • Common benchmark • Evaluation rubrics 	<ul style="list-style-type: none"> • Teacher-student conferences • Running records 	<ul style="list-style-type: none"> • Students' published work • Unit tests 	<ul style="list-style-type: none"> • Quizzes • Laboratory Investigations