Montclair Public Schools

Science

Curriculum Guide

Chemistry Honors Grade 10-11

2013-2014

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

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

Subject	CHEMISTRY HONORS	Grade	10-11	Unit #	1	Pacing	8-10 WEEKS
Unit	MEASUREMENT, MATTER, ATOMIC THEORY, QUANTUM THEORY, PERIODIC TABLE AND PROPERTIES						

Overview

Students develop skills in investigative methodology, and become familiar 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.

The development of modern atomic theory giving the history of the experiments that led to our modern view of the atom. The development of the periodic table is considered. Methods for measuring atomic masses are reviewed as is an introduction to isotopes.

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**	• State and understand the Law of Conservation of Mass and energy	4
		2	• Gather and utilize information regarding the metric system, exponential notation, and significant digits.	2
		3	• Identify and classify states of matter as well as chemical and physical properties contrasting with chemical and physical changes.	4
		4	• Implement the mole concept and its relation to Avogadro's Number in the context of measurement and understanding quantity.	3
		5	• Discriminate between the relative size, charge, and position of electrons, neutrons, and protons in the atoms	2
		6	• Use and understand metric notation and units, use factor label method	3

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.	**7**	• Use the periodic table to predict periodic trends including atomic radii, ionic radii, ionization energy, electron affinity, and metallic character. Compare and contrast chemical and physical properties of elements and their placement on the periodic table.	3
		8	• Compare and contrast types of basic chemical bonds-ionic and covalent in the context of electron movement.	3
		9	• Discriminate among mass number, atomic number, atomic mass, and average atomic mass; and relate to nuclide symbols.	2
		10	• Explain the relationship of isotopes to the relative abundance of atoms of a particular element.	2
		11	• Use the orbital configuration of neutral atoms to explain its effect on the atom's chemical properties. Explain the relationship of proton number to an element's identity	3
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.	12	• List the major kinds of nuclear transmutations that are known to exist	1
		13	• Calculate and determine half-life.	3
HS-PS4-3	Evaluate the claims, evidence, and reasoning behind behind the idea that electromagnetic radiation can be described	**14**	• Design topics demonstrating the dual nature of light as waves and particles.	4

	either by a wave model or a particle model, and that for some situations one model is more useful than the other.	**15** **16** **17**	• Discover and invent equations relating frequency, wavelength, and energy. • Calculate the energy of a photon and relate to the position of the electron in the atom. • Characterize electron placement with its configuration and valence number.	4 3 3
Standard #	CCSS ELA Standard	SLO #	Student Learning Objectives	Depth of Knowledge
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.	18	• Use lab instructions and background materials to develop a scheme for collection and analysis of data	4
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.	19	• Define all key vocabulary terms and concepts and review them with the teacher	1
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.	20	• Be able to use tables, graphs, and charts to analyze a system and develop conclusions	3
WHST 9-10.8 11-12.8	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.	21	• Type a comprehensive , complete lab/project report showing objective, data collection, sample calculations, and graphs	3
WHST 9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when	22	• Do quarterly research project	4

11-12.7	appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.			

Big Ideas: Marshall A.c

1. Science is a process of inquiry including repeatable observations and testable
2. Electron configurations give elements their distinctive properties.
3. The periodic table is arranged by electron configuration.
4. 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. How do we properly analyze the data we collect?
3. What is matter? What are its properties?
4. What are the similarities and differences amongst atoms?
5. What is our modern view of the atom? How was it developed?
6. How is the periodic table arranged? Why?

Assessments: Marshall A.d, D.c

1. Formal and informal formative and summative assessments as determined by the teacher
2. Common Benchmark as per district schedule
3. Project

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.)

Web-based:

Web site for the text

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

virtual text

- 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

DIFFERENTIATION

Special Education	ELL	RtI
• 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	• 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	• Tiered Interventions following RtI framework • RtI Intervention Bank • Fundations 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

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

Subject	CHEMISTRY HONORS	Grade	10-11	Unit #	2	Pacing	10 WEEKS
Unit	NOMENCLATURE, BONDING, EQUATION WRITING, STOICHIOMETRY						

Overview

Unit 2 begins with a discussion of the simple ionic bond and continues with covalent bonding. The factors that cause atoms to bond and the resulting structures of the molecules they make is the main focus of the unit. Methods for diagramming molecules are presented as are the reasons behind the shape that molecules take. The interaction between atoms and molecules is introduced here and we examine intermolecular forces. Nomenclature is covered in this unit. Lecture will include an introduction to bonding using the simple model of an ionic compound. The discussion of covalent compounds will lead to how the bonding influences molecular shape. The unit introduces students to chemical equations and stoichiometry. The mole as a chemical measurement is introduced. The chapter details the types of information we can get from chemical equations. Different types of chemical reactions are defined and analyzed. The student will be shown how to predict products of chemical reactions and the types of reactions typical of various chemical groups.

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**	• Predict formulas for stable ionic compounds based on the balance of charges.	2
		2	• Determine the relationship between position on the periodic table and predicting whether or not a reaction will take place and if the result will be an ionic (formula unit) or covalent (molecule) compound.	3
		3	• Memorize ions and their changes. Identify substances based on ionic or covalent properties.	1
		4	• Use IUPAC nomenclature for naming ionic and covalent compounds (binary and tertiary) and for frequently used acids (binary and tertiary).	2
		5	• Predict empirical formulas of hydrated compounds based on experimental evidence and incorporate mole and mass relationships.	3
		6	• Experimentally determine the indicators of a chemical reaction specifically precipitation,	4

			gas evolution, water production, and changes in energy in the system. Relate to physical and chemical changes from previous unit.	
		7	• Identify and balance the following types of chemical reactions: synthesis, decomposition, single displacement, double displacement, and combustion. Predict reaction products.	3
		8	• Predict whether or not a reaction will take place based on the activity series.	3
		9	• Be able to write molecular, ionic , and net ionic equations.	2
		10	• Describe oxidation-reduction reactions, and relate to the term redox. Demonstrate how charged species change in redox reactions.	3
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	**11**	• Experimentally determine the indicators of a chemical reaction specifically precipitation, gas evolution, water production, and changes in energy in the system. Relate to physical and chemical changes from previous unit.	4
HS-PS1-7.	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	**12**	• Apply concepts of the mole and Avogadro's number to conceptualize and calculate empirical and molecular formulas along with percent composition.	2
		13	• Use Avogadro's hypothesis to predict mass and mole relationships for atoms, molecules, and formula units.	2
		14	• Define Stoichiometry and mass/mole relationships in equations. Calculate and predict a mass produced when a mass reacts. Calculate moles produced when a mass reacts. Calculate molecules produced when a mass reacts.	3

		15	• Demonstrate the conceptual principle of limiting reactants. Predict percent yield as a measure of the efficiency of a chemical reaction and relate to the concept of percent error in experimental situations. Compare and contrast theoretical and actual yields	4
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.	16	• 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.	17	• 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.	18	• 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.	19	• 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.	20	• Be able to use tables, graphs, and charts to analyze a system and develop conclusions	3
RST 9-10.10 11-12.10	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.	21	• 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	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively;			

9-10.8 11-12.8	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.	22	• Type a comprehensive , complete lab/project report showing objective, data collection, sample calculations, and graphs	3
WHST 9-10.7 11-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	23	• Do quarterly research project	4

Big Ideas

- Chemical bonding is an attempt by atoms to achieve stability.
- Chemicals are named via specific guidelines.
- Chemical equations give us an enormous amount of different types of information.

Essential Questions

- Why do atoms make chemical bonds?
- What determines the shape of molecules?
- What are the ways we measure chemical quantities?
- What types of information are provided to you by a chemical equation?
- How do we classify the different types of chemical reactions?
- How can we predict the products of chemical reactions?

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

- Ionic bond
- Covalent bond
- Valence electrons
- VSEPR theory

- Molecular Architecture
- Bond polarity
- IUPAC
- Mole
- Synthesis
- Decomposition
- Replacement
- Oxidation
- Limiting reagent
- Percent yield

Suggested Resources (CCSS Exemplar Texts in Bold)

Textbook:

Chemistry Matter and Changes Glencoe

Chapters 7-11

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

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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/ConcepTests/
A collection of tests teachers can use as practice work for students
http://www.frontiernet.net/~jlkeefer/molecular_geometry.doc
Molecular Geometry lab
http://www.mrnorton.com/assignment_calendar/ChemicalBondingLab.doc
Bonding Lab
http://misterguch.brinkster.net/MLX609.doc
Limiting Reagent Lab
http://misterguch.brinkster.net/MLX039.doc
Stoichiometry Lab

Multi-media:

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

12: 2013-2014	

World of Chemistry

11. The Mole

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

World of Chemistry

8. Chemical Bonds

9. Molecular architecture.

DIFFERENTIATION

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• 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	• 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	• Tiered Interventions following RtI framework • RtI Intervention Bank • Fundations Double-Dose (Tier II) • LLI (Tier III) • FFI Skill Report: DRA On-Line • enVision intervention supports • NJDOE resources

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Subject	CHEMISTRY HONORS	Grade	10-11	Unit #	3	Pacing	10 WEEKS
Unit	MOLECULAR STRUCTURE, GAS LAWS, THERMOCHEMISTRY						

Overview

The concepts of atomic orbitals is now expanded to show how atomic orbitals can merge to generate new molecular orbitals. 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 student is introduced to the field of thermodynamics which will be revisited in a latter unit. The zeroth, first, and second laws are considered here and students will investigate changes of heat content and the transfer of heat between objects.

Standard #	NJCCCS	SLO #	Student Learning Objectives	Depth of Knowledge
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).	1	• Use calorimeters to design an experiment to display energy transfer from one material to another	4
		2	• Understanding energy transformations during physical and chemical changes.	3
		3	• Understand the concept of phase changes and the accompanying heat energy changes.	3
		4	• Compare and contrast atomic/molecular motion in solids, liquids, gases, and plasmas.	3
		5	• Using the kinetic molecular theory, explain the physical properties of gases.	3
		6	• Utilize the kinetic molecular theory of gases to explain the production and influence of pressure and list the ways pressure is measured.	3
		7	• Identify the significance of absolute zero and	

			its influence on the behavior of gases.	2
		8	• Distinguish between non-ideal and ideal gases.	2
		9	• 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
		10	• Utilize Dalton's Law of partial pressures in situations where multiple gases are contributing to pressure individually.	2
		11	• Conceptualize the speed of a gas and the mass of a gas molecule in the context of the kinetic molecular theory utilizing Graham's Law.	4
		12	• Discuss the role of state functions and the determination of spontaneity.	3
		13	• Incorporate the concepts of free energy and entropy in the context of the second and third laws of thermodynamics.	3
		14	• Use the Gibbs Free Energy equation to determine spontaneity of a chemical reaction.	3
		15	• Incorporate Hess' Law as a tool to find the unknown enthalpy change for a reaction.	3
		16	• Compare and contrast endothermic and exothermic reactions and their values and	3

			sign for delta H.	
		17	• Graph a thermo-chemical equation to show heat changes accompanying a chemical reaction.	3
HS-PS1-3 HS-PS2-6	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. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials	**18**	• 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
		19	• Distinguish between ionic and covalent bonding and relate to the number of valence electrons.	2
		20	• Identify ,quantify, and qualify intermolecular forces.	4
		21	• Depict electron dot notation for elements based on valency. Formulate Lewis structures for molecules incorporating the octet-duet rule for stability. Relate stability and molecular formation to the completion of outer shell configurations.	3
		22	• Discuss electronegativity and its relationship to bond polarity. Contrast bond polarity with molecular polarity and utilize each to distinguish dipoles.	4
		23	• Conceptualize the VSEPR theory and use it as a means of understanding molecular geometry. Identify the kinds of molecular geometries. Relate geometry and VSEPR to exceptions to the octet rule and the prevalence of resonance.	3

		24	• Discuss orbital hybridization and the formation of bonds in molecular compounds Indicate the hybridization off the central atom for molecules.	3
		25	• Discuss the presence of multiple bonds and their relationship to sigma and pi bonds.	2
		26	• Identify the major types of organic compounds.	2
Standard #	CCSS ELA Standard	SLO #	Student Learning Objectives	Depth of Knowledge
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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.	29	• 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.	30	• Understand how scientists pose and answer questions based on the data available	3
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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.	32	• 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.	33	• Incorporate conclusions in lab reports	4
WHST 9-10.9 11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.	34	• Use the text and other resources to support conclusions arrived at in lab	4

Big Ideas

- Gas behavior is predictable.
- The components of a solution determine its properties.
- Forces between molecules determine their physical state under certain conditions
- Energy is absorbed or released in chemical processes.
- Rates of reactions are influenced by a number of factors.

Essential Questions

- What is the kinetic molecular theory and how and how does it describe gas properties?
- How do the gas laws relate the variables of P, V, T and n?
- What is a solution and what are some of its properties?
- How is heat associated with chemical reactions?
- How do we measure energy changes during reactions?
- How do we determine the strength of attractive forces between molecules?

Assessments

- Teacher generated quizes and tests including multiple choice, free response, and essay
- Lab tasks and reports

- Class/homework\
- Common Benchmark as per district schedule

Key Vocabulary

Kinetic molecular theory
Boyle's law
Charles's law
Ideal gas law
Phase change
Molarity
Molality
Henry's law
Ideal gas law
Nonideal gases
Partial pressure
Bond polarity
Van der Waals Forces
Metallic Bonding
Covalent Network Solids
Heat
Calorimetry
Specific heat
Joule

Suggested Resources (CCSS Exemplar Texts in Bold)

Textbook:

Chemistry Matter and Changes Glencoe

Chapters 12-15

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

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Web-based:

http://www.sciencegeek.net/APChemistry
This site includes a chapter by chapter overview of all the topics in the 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://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
How do I solve it?
http://www.usoe.k12.ut.us/CURR/Science/core/plans/antifreez.html
Lots of solution chemistry
http://www.overflite.com/science.html

Hot air balloon info

http://pals.sri.com/tasks/9-12/Sunshine/
Performance task
http://osx.lps.org/manila/dhaug/specificheatlab.cwk.pdf
Specific heat lab
Multi-media:

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

World of Chemistry

13. The Driving Forces

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

World of Chemistry

5. A Matter of State

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

21: 2013-2014	

DIFFERENTIATION

Special Education	ELL	RtI
• 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	• 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	• Tiered Interventions following RtI framework • RtI Intervention Bank • Fundations Double-Dose (Tier II) • LLI (Tier III) • FFI Skill Report: DRA On-Line • enVision intervention supports • NJDOE resources

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- Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others
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Subject	CHEMISTRY HONORS	Grade	10-11	Unit #	4	Pacing	10 WEEKS
Unit	REACTIONS RATES, EQUILIBRIUM, ACID BASE CHEMISTRY						

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 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. Buffers will be introduced as well as titration methodology.

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	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	List ways, according to kinetic molecular theory, that reaction rates can be affected during a chemical reaction.	2
		3	Calculate rate order in a rate law equation using experimental information. Utilize rate laws to calculate the specific rate constant and rate determination.	3
		4	Discuss the significance of orientation during a reaction.	3
		5	Associate the concept of the activated complex with the importance of activation	3

			energy. Relate activation energy to spontaneity and the use of catalysts.	
		6	Inquire as to how catalysts speed the rate of a reaction. Set up a model that demonstrates catalytic activity.	4
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.*	7	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
		8	Use the concept of reaction reversibility to construct the equilibrium constant expression.	3
		9	List the factors that affect equilibrium in a closed system or an open system.	1
		10	Analyze equilibrium constant problems and relate to the common ion effect.	3
		13	List the properties of acids and bases. Define acids and bases three different ways.	2
		14	Relate acid/base chemistry to equilibrium.	3
		15	Associate salt hydrolysis and buffering to changes is pH and ion concentrations.	

Standard #	CCSS ELA Standard	SLO #	Student Learning Objectives	Depth of Knowledge
RST 9-10.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise	16	Utilize text and suggested resources to support understanding	2

11-12.1	details of explanations or descriptions.			
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.	17	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.	18	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.	19	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., *force, friction, reaction force, energy*).	20	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.	21		
RST 9-10.7 11-12.7			Understand how scientists pose and answer questions based on the data available	3
RST 9-10.8 11-12.8	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.	22	Be able to use tables, graphs, and charts to analyze a system and develop conclusions	3
RST	Assess the extent to which the reasoning and evidence in a text support the author's claim or a	23	Use the text as well as other references as sources and supplemental learning tools in	3

9-10.9 11-12.9	recommendation for solving a scientific or technical problem.		every unit. Clarify any information not understood immediately with your teacher	
WHST 9-10.1e 10-11.1e	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	24	Analyze a teacher selected lab to determine if results agree with the text as well as at least two other sources	4
WHST 9-10.9 11-12.9	Provide a concluding statement or section that follows from or supports the argument presented.	25	Incorporate conclusions in lab reports	4
	Draw evidence from informational texts to support analysis, reflection, and research.	26	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 • Monoprotic • Diprotic • Le Chatelier's Principle	• Arrhenius • Bronsted-lowry • Lewis • Titration • Equivalence Point

Suggested Resources (CCSS Exemplar Texts in Bold)

Textbook:

Chemistry Matter and Changes Glencoe

Chapters 16-18

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

LEXILE LEVEL 1170

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),

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