

Wallenpaupack Area School District

COURSE: Chemistry I

GRADE LEVEL: 10-12

LENGTH OF COURSE: 120 hours

TEXT: Modern Chemistry

PUBLISHER: Holt, Rinehart and Winston

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COURSE DESCRIPTION:

This course includes the study of introductory chemistry topics, including composition, structure, and properties of matter and the changes matter undergoes. Laboratory safety and appropriate laboratory experiments are emphasized.

CURRICULUM WRITING TEAM:

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Wallenpaupack Area School District

Course: Chemistry I

Grade Level: Grade 10 - 12

Unit: Safety in the Chemistry

PA Standards: 3.2.10.B

3.7.10.A

3.7.12.A

Topics:	Skills:
Safety in the chemistry laboratory Knowledge and rationale of chemistry laboratory safety rules Use of safe techniques during all laboratory work	<ol style="list-style-type: none">1. Know location of and correct use of safety equipment2. Perform correct and safe laboratory techniques
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Supervised self-paced chemical laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook/portfolio3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

Wallenpaupack Area School District

Course: Chemistry I

Grade Level: 10-12

Unit: Matter and Change

PA Standards: 3.1.10.A
3.1.10.C
3.1.12.C
3.2.10.B
3.4.10.A
3.4.12.A

Topics:	Skills:
Definition of chemistry 6 Major branches of chemistry Definition and properties of matter Classification of matter: mixtures, substances, compounds, elements The chemical elements The periodic table Element symbols	<ol style="list-style-type: none">1. Classify substances as a pure substance or mixture2. Differentiate between physical and chemical change, and properties3. Memorize names and symbols of common elements4. Memorize aspects of the periodic table's method of organization
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Supervised self-paced chemical laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook/portfolio3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

Wallenpaupack Area School District

Course: Chemistry I

Grade Level: 10-12

Unit: Measurements and Calculations

PA Standards: 3.1.10.D
 3.1.12.D
 3.1.10.E
 3.1.12.E
 3.2.10.C
 3.4.10.B
 3.4.12.B

<p>Topics:</p> <ul style="list-style-type: none"> The Scientific method The SI (metric) system Units of measurement Problem solving and dimensional analysis Heat and temperature Accuracy and precision Significant figures Scientific notation 	<p>Skills:</p> <ol style="list-style-type: none"> 1. Perform the scientific method during laboratory procedures 2. Convert metric to English and metric to metric units using dimensional analysis 3. Understand and apply accuracy and precision to scientific problems 4. Record significant digits correctly when adding, subtracting, multiplying, and dividing 5. Be able to correctly write numerical data in both standard form and scientific notation
<p>Activities:</p> <ol style="list-style-type: none"> 1. Supervised self-paced chemical laboratory work in laboratory groups 2. Group projects and individual projects 3. Cooperative learning groups 4. Board demonstrations 5. Guided practice 6. Homework 	<p>Performance Assessments:</p> <ol style="list-style-type: none"> 1. Teacher-made chapter tests and quizzes 2. Student notebook/portfolio 3. Projects (individual & group) 4. Laboratory work and reports 5. Final Exam

Wallenpaupack Area School District

Course: Chemistry I

Grade Level: 10-12

Unit: Atomic Theory

PA Standards: 3.1.10.B
3.1.10.C
3.1.12.C
3.1.10.D
3.1.12.D
3.4.10.A

Topics: Historical perspectives of atomic theory The structure of the atom including the nucleus and isotopes Average atomic mass Atomic number, mass number, atomic mass The mole, Avogadro's number, molar mass, liters at stp	Skills: 1. Determine the number of protons, neutrons, electrons, and the mass number of an isotope from information given 2. Convert between moles, atoms, grams, and liters of an element or compound 3. Calculate the average atomic mass
Activities: 1. Supervised self-paced chemical laboratory work in laboratory groups 2. Group projects and individual projects 3. Cooperative learning groups 4. Board demonstrations 5. Guided practice 6. Homework	Performance Assessments: 1. Teacher-made chapter tests and quizzes 2. Student notebook/portfolio 3. Projects (individual & group) 4. Laboratory work and reports 5. Final Exam

Wallenpaupack Area School District

Course: Chemistry I

Grade Level: 10-12

Unit: Arrangement of Electrons in Atoms

PA Standards: 3.1.10.B
3.1.10.C
3.1.12.C
3.1.10.D
3.1.12.D
3.1.12.E
3.2.12.A

Topics:	Skills:
<p>Electromagnetic radiation, wavelength, frequency, speed of light, energy, and metric conversions Spectroscopy Quantum model of the atom Quantum numbers: principal, angular momentum, magnetic, and spin Electron Configurations Orbital Notation Electron Dot</p>	<ol style="list-style-type: none"> 1. Solve for energy, wavelength, and frequency and convert these scales 2. Recognize elements based on their bright-line spectra/flame tests 3. Draw electron configuration, orbital notation, noble gas configuration, and electron dot structure for elements
Activities:	Performance Assessments:
<ol style="list-style-type: none"> 1. Supervised self-paced chemical laboratory work in laboratory groups 2. Group projects and individual projects 3. Cooperative learning groups 4. Board demonstrations 5. Guided practice 6. Homework 	<ol style="list-style-type: none"> 1. Teacher-made chapter tests and quizzes 2. Student notebook/portfolio 3. Projects (individual & group) 4. Laboratory work and reports 5. Final Exam

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Unit: The Periodic Table

PA Standards: 3.1.10.B

3.1.10.C

3.1.12.C

Topics:	Skills:
Historical perspective of the periodic table The modern periodic table Electron configuration and the periodic table Periodic properties of elements including: atomic radii, ionization energy, electron affinity, ionic radii, valence electrons, and electro negativity Trends of these periodic properties	<ol style="list-style-type: none">1. Interpret periodic trends of atomic radii, ionization energy, electron affinity, ionic radii, valence electrons, and electro negativity2. Predict an element's properties based on trends3. Predict an element's properties based on its location on the periodic table4. Assign location of an element based on electron configuration
	Performance Assessments:
<ol style="list-style-type: none">1. Supervised self-paced chemical laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook/portfolio3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

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Unit: Chemical Bonding

PA Standards: 3.1.10.C

3.1.12.C

3.4.10.A

Topics:	Skills:
Chemical bonding including ionic, polar covalent, nonpolar covalent, metallic Covalent bonding including: bond energy, octet rule, Lewis structures, multiple covalents, resonance structures, electron dot formulas Ionic bonding Polyatomic ions Metallic bonding VSEPR theory, hybridization, and intermolecular forces	<ol style="list-style-type: none">1. Solve for types of bonds through data analysis and experimentation2. Draw Lewis structures based on shared and unshared electrons3. Create 3-D molecular structures with the use of model kits and understanding VSEPR theory
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Supervised self-paced chemical laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook/portfolio3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

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Unit: Chemical Formulas and Composition

PA Standards: 3.1.10.B
3.1.10.C
3.4.10.A
3.4.12.A

Topics:	Skills:
Chemical names and formulas of common ions, monatomic and polyatomic Naming compounds including binary ionic, binary molecular, acids, salts Stock system Eight rules of oxidation numbers Problem-solving skills to determine oxidation numbers, formula mass, molar mass, liters at STP, molar mass conversion, percent composition, empirical formula, and molecular formula	<ol style="list-style-type: none">1. Write chemical formulas in both word and symbol form2. Solve for oxidation number, formula mass, molar mass, liters at STP, percent composition, empirical formula, and molecular formula3. Apply the rules of oxidation numbers, naming, and formula writing4. Use the stock system of nomenclature
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Supervised self-paced chemical laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook/portfolio3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

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Course: Chemistry I

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Unit: Chemical Equations and Reactions

PA Standards: 3.1.10.C
3.1.12.C
3.4.10.A
3.4.12.A

Topics:	Skills:
Balancing chemical equations Reading and writing chemical equations to include word equations, correct formulas, balancing with coefficients, and equation symbols Five types of chemical reactions: synthesis, decomposition, single-replacement, double-replacement, and combustion Activity series Solubility table and rules	<ol style="list-style-type: none">1. Write word equations, write correct formulas, and balance chemical reactions using coefficients2. Predict products of chemical reaction based on the five types of reactions and their sub-types3. Predict if a reaction will occur based on the activity series4. Predict if a reaction will occur based on the solubility table and rules
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Supervised self-paced chemical laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook/portfolio3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

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Unit: Acids and Bases
Acid-Base Titration

PA Standards: 3.4.10.A
3.4.12.A

Topics: Properties of acids, naming acids, and characteristics of common acids Properties of bases, types of bases, and characteristics of common bases Acid-base reactions, neutralization pH scale and measurement Titration techniques Acid-base titration	Skills: 1. Determine if a substance is an acid or base based on the substance's properties and chemical testing 2. Measure pH using litmus, pHdriion paper, pH meter, and indicators 3. Perform acid-base titrations and calculations to determine the concentration of an unknown solution
Activities: 1. Supervised self-paced chemical laboratory work in laboratory groups 2. Group projects and individual projects 3. Cooperative learning groups 4. Board demonstrations 5. Guided practice 6. Homework	Performance Assessments: 1. Teacher-made chapter tests and quizzes 2. Student notebook/portfolio 3. Projects (individual & group) 4. Laboratory work and reports 5. Final Exam

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Unit: Qualitative Analysis

PA Standards: 3.2.10.B

3.2.12.B

3.4.10.A

3.4.12.A

Topics:	Skills:
Identification of positive ions including: lithium, sodium, potassium, calcium, strontium, barium, copper, aluminum, nickel, iron (II) and iron (III) Identification of negative ions including: fluoride, chloride, bromide, iodide, carbonate, sulfate, phosphate, and nitrate	<ol style="list-style-type: none">1. Identify the cation and anion components of unknown salts by performing laboratory tests2. Formulate both chemical name and chemical formulas of these unknowns from laboratory data
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Supervised self-paced chemical laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook/portfolio3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

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Unit: Stoichiometry

PA Standards: 3.1.10.D
3.1.12.D
3.1.10.E
3.1.12.E
3.4.12.A

Topics:	Skills:
Reaction stoichiometry: Mole ratios Molar mass Stoichiometric conversions: Moles to mass Mass to moles Mass to mass Stoichiometric calculations	<ol style="list-style-type: none">1. Balance equations with mole ratios2. Calculate molar mass3. Use dimensional analysis to convert: Moles to mass Mass to moles Mass to mass4. Solve for mass or moles of reactants or products using stoichiometry
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Supervised self-paced chemical laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook/portfolio3. Projects (individual & group)4. Laboratory work and reports5. Final Exam