

Wallenpaupack Area School District

COURSE: Chemistry II

GRADE LEVEL: 10-12

LENGTH OF COURSE: 120 hours

TEXT: Modern Chemistry

PUBLISHER: Holt, Rinehart and Winston

COPYRIGHT: 1999

COURSE DESCRIPTION:

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

CURRICULUM WRITING TEAM:

Jamie Mason-Clark, Ed. D.
Carol Henry Dunn

DATE OF REVISION:

December 2003

Wallenpaupack Area School District

Course: Chemistry II

Grade Level: Grade 10 - 12

Unit: Review of Chemistry I Topics

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

Topics:	Skills:
Matter: property and states Atomic theory Quantum theory Periodic properties Chemical bonding Chemical reactions Descriptive chemistry	<ol style="list-style-type: none">1. Differentiate between physical and chemical change, and properties2. Determine the number of protons, neutrons, electrons, and mass number of an isotope from information given3. Perform calculations between moles, atoms, grams, and liters of an element or compound4. Solve for energy, wavelength, and frequency and convert these scales5. Draw electron configuration, orbital notation, noble gas configuration, and electron dot structure of elements6. Predict an element's properties based on its location on the periodic table7. Draw Lewis structures based on shared and unshared electrons8. Write chemical names and chemical formulas in both word and symbol form9. Balance chemical reactions using coefficients10. Formulate products for reactants in a chemical reaction based on the five types of reactions and their sub-rules11. Predict if a reaction will occur based on the activity series, 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

Wallenpaupack Area School District

Course: Chemistry II

Grade Level: 10-12

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:
Using stoichiometry to solve these types of problems: mass-mass, volume-mass, volume-volume, limiting reactant, and reactant in excess	<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 stoichiometry5. Determine which of two reactants is a limiting reactant6. Determine which reactant is in excess and its amount
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 II

Grade Level: 10-12

Unit: Gases and Gas Laws

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

Topics:	Skills:
Kinetic molecular theory of gases Real and ideal gases Pressure Gas law problems using: ideal, Boyles, Charles, combined, Gay-Lussac, Avogadro's, and partial pressure laws	<ol style="list-style-type: none"> 1. Describe the properties of gases to include: expansion, density, fluidity, compressibility, diffusion, and effusion 2. Use the kinetic molecular theory to explain the relationships between gas volume, temperature, and pressure 3. Differentiate between real gas and ideal gas conditions and behaviors 4. Derive the ideal gas constant and units 5. Convert units of pressure, temperature and volume among different scales 6. Calculate pressure, temperature, and volume of a gas using the ideal, Boyles, Charles, combined, Gay-Lussac, Avogadro, and partial pressure laws 7. Use volume ratios and gas laws to calculate volumes, masses, or molar amounts of gaseous reactants or products 8. Determine the relative rates of effusion of two gases of known molar masses
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

Wallenpaupack Area School District

Course: Chemistry II

Grade Level: 10-12

Unit: Liquids and Solids

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

Topics:	Skills:
<p>Properties of liquids Properties of solids, crystalline solids, and amorphous solids Equilibrium Equilibrium vapor pressure Change of state: freezing and melting Phase diagrams Solution chemistry: molarity and molality Compounds in aqueous solution, solubility guidelines, and net ionic equations Colligative properties</p>	<ol style="list-style-type: none"> 1. Describe the motion of particles in liquids and solids and their properties according to the kinetic molecular theory 2. Distinguish between the types of solids 3. Describe the different types of crystal 4. Explain the relationship between equilibrium and changes of state 5. Predict changes in equilibrium using Le Chatelier's principle 6. Describe the processes of boiling, freezing, melting, and sublimation 7. Interpret phase diagrams 8. Calculate the amount of heat energy absorbed or released when a quantity of water changes state 9. List and explain factors that affect the rate at which a solid solute dissolves in a liquid solvent 10. Compare the effects of temperature and pressure on solubility 11. Calculate mass of a solute, volume of a solvent, concentration of a solution from given information 12. List and explain colligative properties 13. Calculate freezing-point depression, boiling-point elevation, and solution molality of nonelectrolytic solutions 14. Calculate the expected freezing-point and boiling-point of electrolytic solutions
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 	<ol style="list-style-type: none"> 6. Teacher-made chapter tests and quizzes 7. Student notebook/portfolio 8. Projects (individual & group) 9. Laboratory work and reports 10. Final Exam

Wallenpaupack Area School District

Course: Chemistry II

Grade Level: 10-12

Unit: Acid-Base Indicators

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

Topics:	Skills:
Properties of acids Nomenclature of acids Properties of bases Acid-base theories: Arrhenius, Bronsted-Lowry, and Lewis Neutralization reactions PH and pOH theory and calculations Acid-Base indicators Titration	<ol style="list-style-type: none">1. List five general properties of aqueous acids and bases2. Name common binary acids and oxyacids, given their chemical formulas3. Explain the differences between strong and weak acids and bases4. Determine the formulas for the conjugate acid of a given base and for the conjugate base of a given acid5. Predict and balance neutralization reactions6. Recognize Arrhenius, Bronsted-Lowry, and Lewis acids and bases7. Use the pH and pOH scales8. Convert pH and pOH readings9. Recognize and use acid-base indicators10. Calculate the molarity of a solution from a titration
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 II

Grade Level: 10-12

Unit: Organic Chemistry

PA Standards: 3.4.12.A

Topics:	Skills:
Allotropes of carbon Structural formulas Isomers Use the rules of organic nomenclature to draw the structural formulas and name hydrocarbons: alkanes, alkenes, alkynes, aromatic hydrocarbons Use the rules of organic nomenclature to draw the structural formulas and name substituted hydrocarbons: alcohols, phenols, ethers, carboxylic acids, ketones, halocarbons, aldehydes, esters, and amines Organic reactions: substitution, addition, condensation, and elimination Polymer chemistry	<ol style="list-style-type: none">1. Identify the different allotropes of carbon and their structural differences2. Explain how the different structures of carbon allotropes affect their properties3. Recognize the important structural feature of saturated hydrocarbons, alkanes4. Name and write structural formulas for: alkanes, alkenes, alkynes, aromatic hydrocarbons5. Use the rules of organic nomenclature to draw the structural formulas and name substituted hydrocarbons: alcohols, phenols, ethers, carboxylic acids, ketones, halocarbons, aldehydes, esters, and amines6. Explain how structures of unsaturated hydrocarbons relate to their properties and how those properties affect the uses of specific hydrocarbons7. Relate properties of functional groups to their structure8. Describe and distinguish between the organic reactions: substitution, addition, condensation, and elimination9. Explain the relationship between monomers and polymers10. Describe how the differences in the general structures of linear, branched, and cross-linked polymers contribute to their properties
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 II

Grade Level: 10-12

Unit: Nuclear Chemistry

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

Topics:	Skills:
Nuclear particles and changes Balancing nuclear equations Mass defect Nuclear stability Nuclear reactions and nuclear equations Radioactive decay Half-life problems Nuclear decay series Current topics related to nuclear energy and society	<ol style="list-style-type: none">1. Explain why nuclear reactions occur2. Balance nuclear equations3. Describe different types of radioactive decay and their effect on the nucleus4. Know how artificial nuclides are made and their significance5. Compare the penetrating ability and shielding requirements of alpha particles, beta particles, and gamma rays6. Describe devices used in radiation detection7. Discuss applications of radioactive nuclides and radioactive decay8. Interpret the nuclear decay series9. Distinguish between nuclear fission, chain reaction and nuclear fusion10. Solve half-life problems11. Investigate current topics related to nuclear energy and society
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 II

Grade Level: 10-12

Unit: Qualitative Analysis

PA Standards: 3.2.10.B
3.2.12.B

Topics: Investigation of common household chemicals based on their chemical properties Use of the scientific method to determine the properties of unknown substances	Skills: 1. Perform the scientific method through a variety of chemical tests to determine properties of household chemicals 2. Utilize past knowledge and skills to interpret test results
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