Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	Chemistry Essentials (p.1 of 2)
Key Learning(s):	Basic chemistry terminology, science models, laboratory equipment and techniques, and data handling methods form the vital foundation for learning and performing chemistry.
Essential Question(s):	What is chemistry? How does chemistry benefit our every day lives? What standard processes, procedures, and vocabulary do chemists use? What tools and skills are needed to safely and efficiently work in a chemistry lab?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.4.12	A) Apply concepts about the structure and properties of matter. B) Apply and analyze energy sources and conversions. C) Apply the principles of motion and force.	Define and give at least two examples of each basic vocabulary term.	Inertia Demonstration Vocabulary list Discussions related to demo and vocabulary terms	Textbook Vocabulary List (World of Chemistry) CFF Resources
3.7.12	Evaluate appropriate instruments and apparatus to [safely and] accurately measure materials and processes.	Label a map of the classroom and lab, indicating the names and uses of lab equipment and safety apparatus.	Map notes or scavenger hunt, equipment flash cards Intro to Lab Quiz	Blank map of room, equipment list, and class discussion.
3.2.12 C	Apply the elements of scientific inquiry to solve multi-step problems	Design an experiment using the steps of the scientific method to answer a simple question (ex. -"Why does popcorn pop?" "How does length affect mass?" "Which paper towel absorbs the best?" etc.,)	Lab report List the steps of the scientific method, explaining how each step was used in this lab.	Teacher-made handout. Misc. lab equipment. (Data analysis with CFF laptops and/or graphics calculators)

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	Chemistry Essentials (p.2 of 2)
Key Learning(s):	Basic chemistry terminology, science models, laboratory equipment and techniques, and data handling methods form the vital foundation for learning and performing chemistry.
Essential Question(s):	What is chemistry? How does chemistry benefit our every day lives? What standard processes, procedures, and vocabulary do chemists use? What tools and skills are needed to safely and efficiently work in a chemistry lab?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.1.12 D	Analyze scale as a way of relating concepts and ideas to one another by some measure.	Demonstrate correct use of conversion factors, scientific notation, significant figures and density.	Practice problems QUIZ	Textbook exercises Teacher-made Quiz
3.1.12 C 3.4.12 A	Assess and apply patterns in science and technology. Apply concepts about the structure and properties of matter.	Relate mass to volume for given substances through graphic analysis of mass and volume measurements collected in the lab and entered into a spreadsheet.	Lab report, including spreadsheet, graphs, linear regressions, conclusions and questions.	Teacher generated instructions, computers, graphics calculators and lab supplies
3.6.12 B	Analyze knowledge of information technologies of process encoding, transmitting, receiving, storing, retrieving and decoding.	Maintain an organized data record.	Lab notebook or electronic lab portfolio UNIT TEST ExploraVision (Honors Only)	3- ring binder quadruplicate forms, OR computer printouts/files Teacher-generated test

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	Classifying and Identifying Matter (p.1 of 2)
Key Learning(s):	Types of matter and their changes are far too numerous to study individually. Chemists use broad categories for these types of matter and their changes to facilitate learning and communication.
Essential Question(s):	How can matter be characterized/categorized to simplify its study? What structural tools do chemists use to organize types and properties of matter? What systems do scientists use to represent different types of matter and changes?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.4.12 A	Apply concepts about the structure and properties of matter. • Characterize and identify important classes of compounds	Categorize types of matter as elements, compounds, solutions, and mixtures.	Class Discussion & Practice examples	Supplemental Text, (Chemistry: A Modern Course) p. 45
3.1.12 C	Assess and apply patterns in science and technology	Classify properties as chemical or physical and as intensive or extensive	Practice examples	Supplemental Text, p. 48
3.1.12 E	Evaluate change in nature, physical systems and man made systems	Classify changes as chemical or physical	Practice examples	Supplemental Text, p. 50
3.4.12 A	Apply concepts about the structure and properties of matter. • Quantify the properties of matter	Read a solubility curve	Practice examples	Supplemental Text, p. 48

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	Classifying and Identifying Matter (p.2 of 2)
Key Learning(s):	Types of matter and their changes are far too numerous to study individually. Chemists use broad categories for these types of matter and their changes to facilitate learning and communication.
Essential Question(s):	How can matter be characterized/categorized to simplify its study? What structural tools do chemists use to organize types and properties of matter? What systems do scientists use to represent different types of matter and changes?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.1.12 C	Assess and apply patterns in science and technology.	Identify elements and their major properties and characteristics.	Review packet – "Typical Elements" ORAL PRESENTATIONS	Teacher made worksheet Textbook, Chpts. 3, 9,10, and 11.
3.1.12 B	Apply concepts of models as a method to predict and understand science and technology.	Summarize and explain trends in the properties of families and series of elements on the Periodic Table. Use these trends to make predictions.	Notes and discussion of trends Informal "Quiz"	Teacher made graphic organizer
3.4.12 A	Apply concepts about the structure and properties of matter. • Apply rules of systematic nomenclature and formula writing to chemical substances	Given a formula, write the name of the compound or vice-versa, based on common practice in nomenclature of organic and inorganic compounds (including Types I, II and III binary compounds, acids, alkanes and compounds with polyatomic ions.). Identify compounds from their structural diagrams.	Practice Problems Worksheets QUIZ UNIT TEST	Text, pp. 67-71 Teacher made worksheets Teacher made test

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	Quantifying Chemical Change (p.1 of 2)
Key Learning(s):	Chemists use the concept of the mole to indirectly count atoms, molecules and other very small particles. The mole is the key concept in the area of stoichiometry in which scientists relate the amounts of different reaction components and predict amounts of energy exchanged during chemical reactions.
Essential Question(s):	How can we represent chemical changes and predict the quantities of substances and energy used and/or produced by those changes?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.4.12 A	Apply concepts about the structure and properties of matter. • Apply rules of systematic nomenclature and formula writing to chemical substances	Balance chemical equations and classify them as single displacement, double displacement, synthesis, decomposition, or combustion	Textbook exercises and finger response. Practice worksheet QUIZ	Supplemental Text, p. 100 Teacher made worksheet Teacher made QUIZ
		Distinguish between subscripts and coefficients. Demonstrate their application in formulas and equations.	Textbook exercises	Supplemental Text, p. 72
		Calculate the formula masses for as variety of substances.	Class examples Textbook exercises	Supplemental Text, p. 80
		Use formula masses to compute the number of moles of a given mass of substance.	Microscale Chemical Reactions Lab	Teacher made lab handout
		Apply concepts related to the mole (molarity, empirical formula, percent composition, etc.,)	Practice Exercises	Various Sources

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	Quantifying Chemical Change (p.2 of 2)
Key Learning(s):	Chemists use the concept of the mole to indirectly count atoms, molecules and other very small particles. The mole is the key concept in the area of stoichiometry in which scientists relate the amounts of different reaction components and predict amounts of energy exchanged during chemical reactions.
Essential Question(s):	How can we represent chemical changes and predict the quantities of substances and energy used and/or produced by those changes?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.4.12 B	Apply and analyze energy sources and conversions and their relationship to heat and temperature. • Determine heat involved in illustrative chemical reactions. • Apply appropriate thermodynamic concepts (e.g., conservation, entropy) to solve problems relating to energy and heat	Predict the identities and quantities of the products of a chemical reaction, both matter and energy. Identify and predict products of different types of chemical reactions. (Acid-Base, Precipitation and Redox.) Learn how technology utilizes different types of reactions (wet cell batteries, titration, qualitative analysis, etc.,)	Lab-Specific Heat of a Metal Lab-Estimating caloric content of a fat and a carbohydrate Application labs – construct a wet cell, perform titration, test solutions for the presence of certain ions, etc.,) UNIT TEST	Teacher made lab handouts Lab procedures from various sources. Teacher made TEST

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	Exploring the Structure of Matter (p.1 of 4)
Key Learning(s):	The parts of the atom, how they are held together, how they interact with energy, and what happens when they come apart are ideas that can be used in many ways – both beneficial and potentially detrimental.
Essential Question(s):	What is the world made of? What techniques have scientists used to identify the basic components of matter? How can an understanding of subatomic particles and their properties deepen and enhance our comprehension of matter and its interactions? How and why do atoms join together to form molecules?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.1.12 B	Apply concepts of models as a method to predict and understand science and technology.	Research the historical context of the development of atomic theory and the methods scientists used to discover subatomic particles.	Student constructed timeline	Textbook, library, and internet research
3.1.12 E	Evaluate change in nature, physical systems and man made systems.	Calculate average atomic mass from relative isotopic abundance	Drill and practice student calculations	Textbook problems, computer tutorial
3.1.12 D	Analyze scale as a way of relating concepts and ideas to one another by some measure.	Use spectroscopy to identify samples of gases	Spectroscope activity Intro to Spec-20 lab	Spectrum tubes, teacher-made handout
3.1.12 C	Assess and apply patterns in science and technology.	Use spectrophotometry to analyze solutions for content and concentration and to relate color of light to wavelength	"Rainbow of Fire" Demonstration	Spec-20, samples, teacher-made handout
3.4.12 A	Apply concepts about the structure and properties of matter.			

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	Exploring the Structure of Matter (p.2 of 4)
Key Learning(s):	The parts of the atom, how they are held together, how they interact with energy, and what happens when they come apart are ideas that can be used in many ways – both beneficial and potentially detrimental.
Essential Question(s):	What is the world made of? What techniques have scientists used to identify the basic components of matter? How can an understanding of subatomic particles and their properties deepen and enhance our comprehension of matter and its interactions? How and why do atoms join together to form molecules?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.1.12 A	Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.	Utilize information about some properties of atoms (mass number, atomic number, charge, # of protons, neutrons, electrons) to predict other properties.	Practice problems and spreadsheet assignment	Text problems and teacher-made handout
3.4.12 A 4.3.12	Apply concepts about the structure and properties of matter. A) Analyze the complexity of environmental health issues. B) Analyze the local, regional and national impacts of environmental health.	Compare and contrast radiation and radioactivity. Analyze the risks and benefits of various types of each.	Class discussions Field Trip, guest speaker and/or on-line research – Three Mile Island	Textbook readings Guest Speaker (Tom Kauffman, Jim Byrne have visited in the past) Field Trip (If available)
3.2.12 B	Evaluate experimental information for appropriateness and adherence to relevant science processes.	Simulate radioactive decay and analyze data to see how random processes obey statistical probability in large samples.	"Radioactive Candy" lab Half-life calculations	Teacher made handouts Text Problems

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	Exploring the Structure of Matter (p.3 of 4)
Key Learning(s):	The parts of the atom, how they are held together, how they interact with energy, and what happens when they come apart are ideas that can be used in many ways – both beneficial and potentially detrimental.
Essential Question(s):	What is the world made of? What techniques have scientists used to identify the basic components of matter? How can an understanding of subatomic particles and their properties deepen and enhance our comprehension of matter and its interactions? How and why do atoms join together to form molecules?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.4.12 C	Apply the principles of motion and force.	Calculate wave characteristics – wavelength, frequency, energy	Practice Problems	Exercises from various sources
3.4.12 A	Apply concepts about the structure and properties of matter.	Write electron configurations, orbital filling diagrams, and electron dot diagrams for individual elements. Also, analyze the above for similarities and differences. Relate electron arrangements to stability/reactivity of atoms.	Paper and pencil "Lab" – Electron Arrangements	Supplemental Text – Lab Manual
3.1.12 C	Assess and apply patterns in science and technology.	Analyze trends in electronegativity and use this property to predict bond type	Class discussions	Teacher made notes and diagrams
		Apply the octet rule and the concept of conservation of electrons to predict Lewis Structures.	Practice Problems Game-Lewis Structure Challenge! QUIZ	Molecular formulas from a variety of sources

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	Exploring the Structure of Matter (p.4 of 4)
Key Learning(s):	The parts of the atom, how they are held together, how they interact with energy, and what happens when they come apart are ideas that can be used in many ways – both beneficial and potentially detrimental.
Essential Question(s):	What is the world made of? What techniques have scientists used to identify the basic components of matter? How can an understanding of subatomic particles and their properties deepen and enhance our comprehension of matter and its interactions? How and why do atoms join together to form molecules?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.1.12 B	Apply concepts of models as a method to predict and understand science and technology.	Use Lewis Structures and electron pair repulsion theory to predict shapes and bond angles of molecules. Predict properties such as polarity, solubility and type of intermolecular forces on the basis of molecular shape and bond type.	Lab – Building Molecules Lab – Shapes of Covalent Molecules & Polarity	Teacher made wksht, molecular model kits Supplemental Text – Lab Manual
3.7.12 A	Apply advanced tools, materials and techniques to answer complex questions.	Utilize chromatography as a means of separating and identifying components of a mixture. Apply the results to determine relative polarities.	Lab – Separation & I.D. of Cations and Dyes (a.k.a. – Kool Aid® Lab)	Lab Handouts & supplies from ***Advancing Science***
3.7.12 E	Assess the effectiveness of computer communications systems.	Compare and contrast a variety of forms of chromatography.	Follow up questions (textbook and internet research required to find answers) to the above lab. UNIT TEST	Textbook & internet access

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	States of Matter and Chemical Kinetics (p.1 of 3)
Key Learning(s):	Chemists base all kinds of hypotheses, predictions and theories on ideas about the motion of molecules and the attractions between them. Along these lines, we can relate the physical state of matter, the arrangements of particles and the behaviors of gases on the structure of molecules and external conditions such as temperature and pressure.
Essential Question(s):	What factors determine the state of matter in which a substance exists? How does molecular motion and arrangement of particles relate to the effectiveness of intermolecular forces? What laws describe the quantitative behaviors of gases?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.1.12 B	Apply concepts of models as a method to predict and understand science and technology.	List the three basic assumptions upon which the Kinetic Molecular Theory is based.	Class discussion	Supplemental Text – Chapter 15
3.1.12 D	Analyze scale as a way of relating concepts and ideas to one another by some measure	Investigate the measurement and interrelation of temperature and pressure in light of motion and interaction of particles.	Demonstration lab – Absolute Zero Manometer problems and Celsius-Kelvin conversions	Abs. Zero apparatus Text and resource material
3.1.12 A	Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.	Analyze phase diagrams to determine melting points, boiling points, triple points, state of matter under specified conditions, etc.,	Phase Diagrams and accompanying questions Heating curve practice problems	Text, teacher made handouts, and various other sources Various sources
3.4.12 B	Apply and analyze energy sources and conversions and their relationship to heat and temperature.	Apply knowledge of heating curves, specific heat capacity, and heats of fusion and vaporization to predict energy changes with change of phase.	Heat of Fusion of Ice lab	Teacher made handout

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	States of Matter and Chemical Kinetics (p.2 of 3)
Key Learning(s):	Chemists base all kinds of hypotheses, predictions and theories on ideas about the motion of molecules and the attractions between them. Along these lines, we can relate the physical state of matter, the arrangements of particles and the behaviors of gases on the structure of molecules and external conditions such as temperature and pressure.
Essential Question(s):	What factors determine the state of matter in which a substance exists? How does molecular motion and arrangement of particles relate to the effectiveness of intermolecular forces? What laws describe the quantitative behaviors of gases?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.4.12 A, C	A) Apply concepts about the structure and properties of matter. C) Apply the principles of motion and force.	Compare and contrast the three common states of matter in terms of physical properties and molecular motion.	Class discussion and notes.	Text and notes.
3.7.12 A	Apply advanced tools, materials and techniques to answer complex questions.	Investigate typical crystal systems and their dependence on chemical bonding and intermolecular forces.	Textbook reading and follow-up discussion Lab – Melting Point of a crystalline solid	Text Teacher made lab handout
3.4.12 A	Apply concepts about the structure and properties of matter.	Summarize the unique properties of liquids – surface tension and capillary action.	Class notes/ exit discussion	Lecture
3.2.12 C	Apply the elements of scientific inquiry to solve multi-step problems.	Utilize the Ideal Gas Equation and classical gas laws to explain and predict the quantitative behavior of gases.	Lab – Boyle's Law Lab – Charles' Law Lab – Molar Volume Practice problems	Teacher made lab handouts Various sources

Northern York County School District Curriculum

Course Name:	Academic/Honors Chemistry
Content:	States of Matter and Chemical Kinetics (p.3 of 3)
Key Learning(s):	Chemists base all kinds of hypotheses, predictions and theories on ideas about the motion of molecules and the attractions between them. Along these lines, we can relate the physical state of matter, the arrangements of particles and the behaviors of gases on the structure of molecules and external conditions such as temperature and pressure.
Essential Question(s):	What factors determine the state of matter in which a substance exists? How does molecular motion and arrangement of particles relate to the effectiveness of intermolecular forces? What laws describe the quantitative behaviors of gases?
Grade Level:	10-12

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.2.12 B	Evaluate experimental information for appropriateness and adherence to relevant science processes.	Compare the behaviors of real gases to those predicted for ideal gases.	Class discussion UNIT TEST	Notes Teacher-Made Test