Advanced Placement Chemistry--Grade 12

Unit: **Chemistry in Review**

Content Standard: **Understand the basic tools of chemistry**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.

Course Content	Student Performance	Resources	Assessments
A. Classification of matter. B. Properties and changes in matter. C. Measurement and error. D. Significant digits. E. Dimensional analysis. F. Atomic structure. G. Atomic mass and atomic number. H. Isotopes and mass number. I. The mole. J. Periodic table. K. Chemical formulas and nomenclature.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapters 1, 2, and 3 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Chemical Reactions**

Content Standard: **Quantify and identify chemical reactions and apply thermodynamic concepts**

State Curriculum Standard: **3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.**
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.
3.4.10 B Analyze energy sources and transfers of heat.
3.4.12 B Apply and analyze energy sources and conversions and their relationship to heat and temperature.
3.7.12 B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

Course Content	Student Performance	Resources	Assessments
A. Chemical equations: writing and balancing. B. Equation stoichiometry. C. Chemical equations and chemical analysis. D. Properties of aqueous solution. E. Precipitation reactions. F. Acid/base reactions. G. Classification of reactions. H. Redox reactions. I. Molarity. J. Titration . K. Basic principles of energy and heat. L. Specific heat capacity, heat transfer and calorimetry. M. Energy and changes of state. N. First Law of Thermodynamics. O. Enthalpy changes of chemical reactions. P. Hess's Law. Q. Standard enthalpy of formation. R. Enthalpy changes of reactions.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapters 4, 5 and 6 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Organic Chemistry**

Content Standard: **Explain and analyze the basics of carbon chemistry**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.12 C Assess and apply patterns in science and technology.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.

Course Content	Student Performance	Resources	Assessments
A. Structural diversity of the carbon bond. B. Isomers. C. Classification of hydrocarbons: alkanes, alkenes, alkynes. D. Nomenclature of hydrocarbons. E. Properties of hydrocarbons. F. Reactions of hydrocarbons. G. Aromatic compounds. H. Classification, properties, reactions and nomenclature of the organic functional groups. I. Polymers.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 11 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Nuclear Chemistry**

Content Standard: **Analyze and explain the behavior of radiation**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.

Course Content	Student Performance	Resources	Assessments
A. Natural radioactivity. B. Ionizing versus nonionizing radiation. C. Nuclear terms and symbols. D. Radiation versus radioactivity. E. Nuclear equations. F. Nuclear stability and binding energy. G. Rate of nuclear decay: half-life. H. Artificial radioactivity. I. Nuclear fission versus fusion. J. Nuclear power. K. Applications of nuclear chemistry. L. Radiation health physics.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 23 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Chemical Kinetics**

Content Standard: **Analyze and evaluate chemical reactions in terms of rate and energy**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.2.12 D Analyze and use the technological design process to solve problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.

Course Content	Student Performance	Resources	Assessments
A. Rates of chemical reactions. B. Conditions that affect rate. C. Effect of concentration on rate. D. Rate equations, reaction order and the rate constant. E. Determining the rate equation by the method of initial rates. F. Integrated rate laws. G. Graphical determination of reaction order and the rate constant. H. Reaction half-life. I. Concentration, rate and collision theory. J. Temperature, rate and activation energy. K. Effect of molecular orientation and catalysts on rate. L. The Arrhenius Equation. M. Reaction mechanisms.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 15 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Chemical Equilibrium**

Content Standard: **Analyze the qualitative and quantitative aspects of reversible chemical reactions**

State Curriculum Standard: **3.1.10 E Describe patterns of change in nature, physical and man made systems.**
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12 A Apply concepts about the structure and properties of matter.
3.4.12 B Apply and analyze energy sources and conversions and their relationship to heat and temperature.
3.7.12 A Apply advanced tools, materials and techniques to answer complex questions.

Course Content	Student Performance	Resources	Assessments
A. Nature of the equilibrium state. B. Equilibrium constant. C. Reaction quotient. D. Writing equilibrium constant expressions. E. Determining the equilibrium constant. F. Calculations involving the equilibrium constant. G. Forms of the equilibrium constant. H. LeChatelier's Principle. I. Applications of chemical equilibrium.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 16 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: The Chemistry of Acids and Bases

Content Standard: **Qualify and quantify acids and bases and their reactions**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.1.12 E Evaluate change in nature, physical systems and man made systems.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.2.12 D Analyze and use the technological design process to solve problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.
3.7.12 B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

Course Content	Student Performance	Resources	Assessments
A. Acids, bases and the equilibrium constant. B. Bronsted-Lowry concept of acid/base behavior C. Water and the pH scale. D. Equilibrium constants for acids and bases. E. Acid-base reactions. F. Calculations with acid/base equilibrium constants. G. Polyprotic acids and bases. H. Lewis concept of acids and bases. I. Molecular structure and acid-base behavior. J. Common ion effect. K. Buffer systems and solutions. L. Acid-base titration. M. Acidic and basic salts.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 17, 18.1-18.3 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Precipitation Reactions**

Content Standard: **Analyze, qualify and explain the nature of precipitation reactions**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.1.12 E Evaluate change in nature, physical systems and man made systems.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.2.12 D Analyze and use the technological design process to solve problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.
3.7.12 B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

Course Content	Student Performance	Resources	Assessments
A. Solubility constant product, $K_{sp.}$ B. Relating solubility to $K_{sp.}$ C. Solubility and the common ion effect. D. Effect of basic anions on salt solubility. E. Precipitation reactions and the reaction quotient. F. Solubility and complex ions. G. Solubility, ion separation and qualitative analysis.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 18.4-18.7 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Entropy and Free Energy**

Content Standard: **Use the laws of thermodynamics to explain reaction spontaneity and direction**

State Curriculum Standard: **3.1.10 E Describe patterns of change in nature, physical and man made systems.**
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12 A Apply concepts about the structure and properties of matter.
3.4.12 B Apply and analyze energy sources and conversions and their relationship to heat and temperature.
3.7.12 A Apply advanced tools, materials and techniques to answer complex questions.

Course Content	Student Performance	Resources	Assessments
A. Spontaneous change and equilibrium. B. Heat and spontaneity. C. Dispersal of energy and matter. D. Entropy and the 2nd and 3rd Laws of Thermodynamics. E. Entropy changes in chemical and physical processes. F. Energy changes and spontaneity. G. Gibbs free energy and spontaneity. H. Standard free energy of formation . I. Free energy and temperature. J. Conditions for product formation. K. Free energy, reaction quotients, and equilibrium constants.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 19 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Electron transfer reactions-Oxidation/Reduction**

Content Standard: **Identify, analyze and quantify electron transfer reactions**

State Curriculum Standard: **3.1.10 E Describe patterns of change in nature, physical and man made systems.**
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12 A Apply concepts about the structure and properties of matter.
3.4.12 B Apply and analyze energy sources and conversions and their relationship to heat and temperature.
3.7.12 A Apply advanced tools, materials and techniques to answer complex questions.

Course Content	Student Performance	Resources	Assessments
A. Balancing redox equations. B. Simple voltaic cells. C. Voltaic cells with inert electrodes. D. Commercial voltaic cells. E. Batteries: dry cell, alkaline, secondary and rechargeable. F. Fuel cells. G. Electromotive force. H. Measuring standard electrode potentials. I. Standard reduction potentials. J. Calculating cell potentials. K. The Nernst equation. L. Electrochemistry and thermodynamics. M. Standard electrode potentials and the equilibrium constant. N. Electrolysis: molten salts and aqueous solutions. O. Counting electrons.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 20 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Atomic Structure, Electron Configuration and Periodicity**

Content Standard: **Analyze and explain atomic structure in terms of light and energy with applications to periodicity**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.1.12 E Evaluate change in nature, physical systems and man made systems.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.
3.4.12 C Apply the principles of motion and force.
3.7.12 B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

Course Content	Student Performance	Resources	Assessments
A. Electromagnetic radiation. B. Planck's equation. C. Photoelectric effect. D. Atomic line spectra. E. Bohr atomic model. F. Wave properties of the electron. G. Quantum mechanical view of the atom. H. Quantum numbers and electron configuration. I. Atomic orbitals. J. Periodic trends.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapters 7 and 8 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Bonding, Molecular Structure and Orbital Hybridization**

Content Standard: **Explain and apply chemical bonding theory to the structure and properties of molecules.**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 E Evaluate change in nature, physical systems and man made systems.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.
3.4.12 B Apply and analyze energy sources and conversions and their relationship to heat and temperature.

Course Content	Student Performance	Resources	Assessments
A. Valence electrons and chemical bond formation. B. Ionic bonding. C. Covalent bonding. D. Lewis structures. E. Resonance. F. Molecular geometry. G. VSEPR. H. Formal charge. I. Bond polarity. J. Molecular polarity. K. Bond order, length and energy. L. Valence bond theory. M. Orbital hybridization. N. Sigma and pi bonds O. Molecular orbital theory.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapters 9 and10 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Gases and Their Properties**

Content Standard: **Analyze and quantify the behavior of gases**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.1.12 E Evaluate change in nature, physical systems and man made systems.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.2.12 D Analyze and use the technological design process to solve problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.
3.7.12 B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

Course Content	Student Performance	Resources	Assessments
A. Gas pressure. B. Boyle's Law. C. Charles'Law D. General Gas Law. E. Ideal Gas Law. F. Gas density. G. Avogadro's Law. H. Stoichiometry of gases. I. Partial pressure. J. Kinetic-Molecular Theory. K. Diffusion and effusion. L. Gas law application. M. Non-ideal behavior.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 12 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Condensed Phases: Solids and Liquids**

Content Standard: **Qualify and quantify the behavior and properties of solids and liquids**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.1.12 E Evaluate change in nature, physical systems and man made systems.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.
3.7.12 B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

Course Content	Student Performance	Resources	Assessments
A. Intermolecular forces. B. Vaporization. C. Vapor pressure and boiling point. D. Critical temperature and pressure. E. Surface tension, capillary action and viscosity. F. Crystal lattice and unit cells. G. Structure and formulas of ionic solids. H. Molecular solids. I. Network solids. J. Amorphous solids. K. Sublimation. L. Phase diagrams: water and carbon dioxide.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 13 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Solutions: Properties and Behavior**

Content Standard: **Qualify and quantify solution behavior**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.1.12 E Evaluate change in nature, physical systems and man made systems.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12 C Apply the elements of scientific inquiry to solve multi-step problems.
3.2.12 D Analyze and use the technological design process to solve problems.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.
3.7.12 B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

Course Content	Student Performance	Resources	Assessments
A. Units of concentration. B. The solution process. C. Factors affecting solubility. D. Colligative properties. E. Raoult's Law. F. Molar mass determination. G. Osmosis. H. Colloids.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapter 14 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

Advanced Placement Chemistry--Grade 12

Unit: **Chemistry of the Elements**

Content Standard: **Understand and explain the behavior and properties of the elements**

State Curriculum Standard: **3.1.10 C Apply patterns as repeated processes or recurring elements in science and technology.**
3.1.10 E Describe patterns of change in nature, physical and man made systems.
3.1.12 B Apply concepts of models as a method to predict and understand science and technology.
3.1.12 C Assess and apply patterns in science and technology.
3.1.12 E Evaluate change in nature, physical systems and man made systems.
3.2.12 A Evaluate the nature of scientific and technological knowledge.
3.2.12 B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.4.10 A Explain concepts about the structure and properties of matter.
3.4.12 A Apply concepts about the structure and properties of matter.

Course Content	Student Performance	Resources	Assessments
A. Periodic table review. B. Ionic compounds and the main group elements. C. Molecular compounds and the main group elements. D. Hydrogen. E. Alkali metals. F. Alkaline earth metals G. Group 3A through Group 6A elements. H. Halogens. I. Properties of transition elements. J. Periodic trends in the d-block. K. Metallurgy L. Coordination compounds.	• Take notes from a variety of instructional presentations • Actively complete all reading assignments • Complete all assigned laboratory experiments • Collect and analyze laboratory data • Participate in cooperative learning activities focusing on problem solving • Contribute to class discussions • Evaluate laboratory data and discuss theory in a formal laboratory report • Actively view and analyze all video presentations	• Chemistry and Chemical Reactivity, 6th edition, (Thomson Publishing Co, 2006). – Chapters 21 and 22 • Assorted laboratory manuals • Textbook supplementary materials • Teacher developed notes and handouts • Videos / DVDs • Primary and secondary source readings • Websites • Library services • Posters / visual aides	• Laboratory report evaluation based on a rubric • Teacher generated assessments with primary focus on open-ended questions and problems • Oral questioning • Teacher observations • Evaluation of class work and homework • Content based quizzes • AP practice questions

The following is a list of laboratory experiments that must accompany the AP Chemistry curriculum. These experiments are a requirement of the College Board. Universities may not grant college credit to individuals who cannot produce documentation and evidence of completion of these experiments.

1. **Determination of the formula of a compound**
2. **Determination of the percentage of water in a hydrate**
3. **Determination of molar mass by vapor density**
4. **Determination of molar mass by freezing-point depression**
5. **Determination of the molar mass of a gas**
6. **Standardization of a solution using a primary standard**
7. **Determination of concentration by acid-base titration, including a weak acid or base**
8. **Determination of concentration by oxidation-reduction titration**
9. **Determination of mass and mole relationship in a chemical reaction**
10. **Determination of the equilibrium constant for a chemical reaction**
11. **Determination of appropriate indicators for various acid-base titrations; pH determination**
12. **Determination of the rate of a reaction and its order**
13. **Determination of the enthalpy change associated with a reaction**
14. **Separation and qualitative analysis of cations and anions**
15. **Synthesis of a coordination compound and its chemical analysis**
16. **Analytical gravimetric determination**
17. **Colorimeric or spectrophotometric analysis**
18. **Separation by chromatography**
19. **Preparation and properties of buffer solutions**
20. **Determination of electrochemical series**
21. **Measurements using electrochemical cells and electroplating**
22. **Synthesis, purification, and analysis of an organic compound**