Chapter 1: Introduction to Chemistry

Biblical Worldview Essential Questions:
Why is chemistry important in using dominion science?
Is chemistry necessary in all aspects of life?
How can a chemist advance science for the kingdom of God?

1 Lesson

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. be introduced to the scope of chemistry. 2. list five traditional areas of study in chemistry. 3. distinguish between pure and applied chemistry. 4. list three reasons to study chemistry. 5. understand the impact of chemistry on materials, energy, medicine, agriculture, the environment, and the study of the universe. 6. explain the contribution of alchemy to modern chemistry. 7. describe the steps of the scientific method. 8. learn strategies for problem solving in chemistry.	• Students read text, take notes, and complete book problems	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Tests • Oral response

Curriculum Guide Chemistry

Chapter 2: Matter and Change

Biblical Worldview Essential Questions:
How can the study of matter point to God's creation design?
How does the law of conservation of mass confirm the creation account?

5 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. distinguish among extensive, intensive, physical and chemical properties. 2. list three states of matter. 3. describe reversible and irreversible physical changes. 4. describe and distinguish heterogeneous and homogeneous materials, substances, mixtures, and solutions. 5. describe how to separate mixtures using differences in physical properties. 6. describe and give examples of elements and compounds. 7. classify examples of matter. 8. classify changes in matter as physical or chemical. 9. represent elements and compounds using symbols and formulas 10. list four possible indicators of a chemical change 11. describe conservation of mass as it pertains to chemical reactions.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response

Chapter 3: Scientific Measurement

Biblical Worldview Essential Questions:
Why is precision and accuracy important in understanding the exactness of God?

12 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. list and use the SI base units for mass, length, time, and temperature. 2. express and convert quantities using the common SI prefixes. 3. use significant digits to express the exactness of measurements. 4. understand the use of dimensional analysis in problem solving 5. distinguish between accuracy and precision 6. perform calculations using density measurements.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations: density samples	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 4: Atomic Structure

Biblical Worldview Essential Questions:
How does the "history" of a subject pertain to the validity of its claims?
If we trust the "history" of the atom, why can people not trust the "history" of the Bible?

7 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. discuss early developments in atomic theory. 2. explain the laws of multiple proportions and definite proportions and give examples. 3. determine the atomic number and mass number of given isotopes of elements. 4. differentiate among the major subatomic particles. 5. discuss the development of modern atomic theory. 6. calculate the average atomic mass of a mixture of isotopes of an element.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Curriculum Guide Chemistry

Chapter 5: Electrons in Atoms

<u>Biblical Worldview Essential Questions</u>:
Same as chapter 4, both chapters tie together

10 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. be familiar with history of the model of an atom, including Dalton's, Thomson's, Rutherford's, and Bohr's. 2. describe the quantum mechanical model of the hydrogen atom. 3. determine electron configurations of atoms. 4. describe an electron cloud. 5. characterize the four quantum numbers. 6. determine the electron configurations of the elements using the aufbrau principle, the Pauli exclusion principle, and Hund's rule. 7. solve problems involving the relationship between wavelength and frequency of light 8. describe the Heisenberg Uncertainty Principle 9. describe phenomena of emission and absorption spectra to identify elements	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations: irradiated K	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites *The Quantum Universe* video, Smithsonian Video	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 6: Periodic Table

<u>Biblical Worldview Essential Questions</u>:
Can the origin of the elements help confirm scripture?
Where in scripture do you also see classification processes?

5 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. describe the early attempts at classifying elements. 2. use the periodic table to predict the electron configurations of elements. 3. explain the basis for the arrangement of the modern periodic table. 4. identify metals, nonmetals, and metalloids on the periodic table. 5. give examples of the relationship between an element's electron configuration and its placement on the periodic table 6. predict the chemical stability of atoms using the octet rule. 7. use examples to explain the periodic properties of elements. 8. state how atomic and ionic sizes change in groups and periods. 9. predict oxidation numbers of elements. 10. define ionization energy and electron affinity, and describe the factors that affect these properties.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 7: Ionic and Metallic Bonding

Biblical Worldview Essential Questions:
What does the precise nature of bonding tell us about creation?
If nature was truly "random" why is there an exact process for chemical bonding?

8 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. determine the number of valence electrons in an atom of a representative element. 2. represent an atom using electron dot structures. 3. use the octet rule to predict whether an atom will tend to form a cation or an anion.. 4. describe the formation of ionic bonds. 5. determine the correct chemical formula for the formula unit of ionic compounds. 6. list the three basic properties of ionic compounds. 7. describe the formation of metallic bonds. 8. describe the crystalline structure of metals. 9. distinguish between body-centered cubic, face-centered cubic, and hexagonal close-packed unit cells. 10. understand the formation and purpose of metal alloys	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises •	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Curriculum Guide Chemistry

Chapter 8: Covalent Bonding

Biblical Worldview Essential Questions:
Same as chapter 7, both chapters tie together.

10 Lessons
PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. describe the interaction between electrons in covalent bonding. 2. give examples of molecular compounds. 3. describe differences between molecular and ionic compounds. 4. use the octet rule and electron dot structures to determine the formation of single, double, and triple covalent bonds in common molecular compounds. 5. identify a coordinate covalent bond in a molecular compound. 6. use bond dissociation energies to determine relative covalent bond strengths. 7. describe valence shell electron pair repulsion (VSEPR) and use VSEPR theory to explain the bond angles in compounds 8. describe hybrid orbitals and use hybridization theory to explain the bond angles in compounds. 9. differentiate sigma and pi bonding and saturated and unsaturated carbon compounds. 10. name and write formulas for simple organic compounds. 11. distinguish between polar and nonpolar covalent bonds. 12. use electronegativities to predict the comparative polarities of bonds. 13. distinguish between intermolecular forces and intramolecular forces. 14. define dipole and compare the strengths of intermolecular forces based on dipole moments. 15. define and describe the type of van der Waals forces and list the three factors contributing to them. 16. understand how the intermolecular forces associated with polar molecules are used in separation of substances in paper chromatography 17. identify network solids and their properties.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 9: Chemical Names and Formulas

Biblical Worldview Essential Questions:
When did the naming process truly begin?
Why are names important?
Can you see God's hand in the combination of elements?

10 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. name monatomic and polyatomic ions. 2. name binary ionic compounds and ionic compounds with polyatomic ions. 3. name and write formulas for binary molecular compounds. 4. name and write formulas for common acids and bases. 5. state Dalton's Law of Definite Proportions and Law of Multiple Proportions. 6. demonstrate proficiency in writing chemical formulas. 7. define oxidation number and state oxidation numbers for common monatomic ions and charges for polyatomic ions. 8. demonstrate proficiency in naming chemical compounds.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 10: Chemical Quantities

Biblical Worldview Essential Questions:
Why are the details of math important to God?
How can math be used to confirm truths in scriptures?

10 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. use the factor-label method in calculations. 2. use scientific notation to express and evaluate large and small measurements. 3. use the Avogadro constant to define the mole and to calculate molecular and molar mass. 4. perform conversions using mole-mass and mole-volume relationships. 5. use the molar mass to calculate the percentage composition, and empirical formulas. 6. determine the formulas of hydrates. 7. demonstrate the use of coefficients to represent the number of formula units of a substance. 8. distinguish between molecular and empirical formulas.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 11: Chemical Reactions

Biblical Worldview Essential Questions:
Is balance important in the Christian life?
What happens when aspects of life, including chemical reactions, are out of balance?

5 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. write chemical equations to represent reactions. 2. use coefficients to balance chemical equations. 3. differentiate among the five general types of chemical reactions. 4. write net ionic equations. 5. predict the formation of a precipitate using solubility rules.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 12: Stoichiometry

Biblical Worldview Essential Questions:
Same as chapter 11, chapters tie together.
Plus:
What does our "yield" tell us about our starting "reactants"?

8 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. interpret balanced chemical equations in terms of particles, moles, and masses. 2. determine the mass of a reactant or product based on the mass of another reactant or product in a reaction. 3. solve mass-mass and volume-volume stoichiometry problems. 4. determine the limiting reactant in a chemical reaction. 5. calculate the actual yield of a product as a percentage of the theoretical yield.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 13: States of Matter

Biblical Worldview Essential Questions:
What happens when we reach our "boiling point"?
How can the pressure of a gas relate to the pressures of the Christian life?

6 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. list and explain the basic assumptions of the kinetic theory. 2. relate pressure to molecular motion. 3. relate temperature and energy transfer to molecular motion. 4. explain the properties of liquids and changes of state in terms of the kinetic theory. 5. describe evaporation and condensation using the kinetic theory. 6. understand vapor pressure as a dynamic equilibrium between evaporation and condensation in a closed container. 7. define boiling point in terms of vapor pressure and describe affects of pressure on boiling point. 8. describe characteristics of all solid substances. 9. distinguish among cubic, body-centered cubic, and face-centered cubic cells. 10. list the three allotropes of carbon. 11. explain the relationship of melting point to bonding type and to crystal type. 12. distinguish between crystalline solids and amorphous solid. 13. differentiate among the three states of matter. 14. define sublimation. 15. understand changes of state in terms of a pressure-temperature phase diagram. 16. describe characteristics of substances in each of three common states of matter in terms of the kinetic theory and bonding in the substances.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites *The Race to Catch a Buckyball*, NOVA video, 1995	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 14: The Behavior of Gases

Biblical Worldview Essential Questions:
Same as chapter 13, chapters tie together.

6 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. solve problems involving the gas laws that relate pressure, temperature , and volume. 2. explain the concept of an ideal gas. 3. describe the conditions of STP. 4. solve problems involving the change of more than one condition for gases. 5. explain Dalton's law of partial pressure and solve problems using it. 6. explain Graham's law of effusion and solve problems using it. 7. differentiate between an ideal gas and a real gas. 8. state Avogadro's principle. 9. define molar volume. 10. explain and use the ideal gas equation. 11. compute the molecular mass of a gas from its mass, temperature, pressure, and volume.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 15: Water and its Properties

Biblical Worldview Essential Questions:
How does the existence of water prove God's hand in creation?
Why can water defy many chemistry rules, yet everything else follows them?

8 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. explain how the unique properties of water are a consequence of it being a very polar molecule. 2. describe the intermolecular force known as hydrogen bonding. 3. describe the phenomena of surface tension, vapor pressure, and open framework of ice in terms of hydrogen bonding. 4. describe and explain the process of solvation, dissociation, and dissolving. 5. distinguish between electrolytic and non-electrolytic solutions. 6. distinguish between strong electrolytes and weak electrolytes. 7. describe the formation of hydrated ionic compounds. 8. distinguish between efflorescent and hygroscopic hydratres. 9. describe the formation of a solution by deliquescence. 10. distinguish among colloids, solutions, and suspensions. 11. classify colloids. 12. describe properties of colloids and explain how these properties depend upon particle size.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites *Where the Waters Flow*, Moody Bible Institute video	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 17: Thermochemistry

Biblical Worldview Essential Questions:
How does the law of conservation of energy confirm creation?
How can entropy relate to the struggles in our spiritual walk?

9 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. distinguish between exothermic and endothermic reactions. 2. understand the law of conservation of energy as it relates to chemical reactions. 3. describe conditions under which heat is transferred. 4. convert between units used to measure energy. 5. describe endothermic and exothermic processes and state the function of activation energy. 6. perform calculations involving specific heat and heat capacity. 7. solve calorimetry problems. 8. express enthalpy changes in balanced chemical equations. 9. calculate enthalpy changes in chemical reactions. 10. calculate heat absorbed or released during changes of state using molar heats of fusion and vaporization. 11. calculate heat absorbed or released during the formation of solutions using molar heat of solution. 12. calculate heats of reaction using Hess's law of heat summation. 13. calculate heats of reaction using standard heats of formation.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 18: Reaction Rate and Equilibrium

Biblical Worldview Essential Questions:
What "catalysts" are in our lives that cause us to either stumble or grow in our faith?
When a "stress" is applied to our lives, what fruits will come out?

13 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. define reaction rate and express it in correct units 2. describe reaction rates using collision theory and activation energy. 3. list and describe the factors affecting reaction rates. 4. distinguish between thermodynamic stability and kinetic stability. 5. distinguish among heterogeneous catalyst, homogeneous catalyst, and inhibitor. 6. determine an equilibrium constant expression for a system at equilibrium. 7. describe reversible reactions and chemical equilibrium. 8. use LeChatelier's principle to explain the effects of changes in concentration, pressure, and temperature on an equilibrium system. 9. calculate equilibrium constants and concentrations of reactants or products for a reaction. 10. relate relative amounts of the product and reactant to the equilibrium constant. 11. calculate the solubility product constant for insoluble ionic compounds. 12. use the solubility product constant to calculate the common ion effect and whether a precipitate will form. 13. relate Gibbs free energy to the spontaneity of reactions and to equilibrium. 14. describe and give examples of changes in entropy. 15. perform calculations involving Gibbs free energy and entropy or equilibrium constants. 16. understand the progress of chemical reactions in terms of rate laws and reaction mechanisms.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 19: Acids, Bases, and Salts

Biblical Worldview Essential Questions:
What can we do to "neutralize" situations in our lives before they become "acidic"?

12 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. list characteristics of acids and bases. 2. distinguish the definitions of acids and bases as outlined in the theories of Arrhenius, Bronsted-Lowry, and Lewis. 3. name acids and bases. 4. define and give examples of strong and weak acids and bases. 5. explain the concept of neutralization and the composition of a salt. 6. name salts. 7. write net ionic equations. 8. derive and use ionization constants. 9. discuss the auto-ionization of water and solve problems using the ion product constant for water. 10. explain how the pH scale is used for measuring solution acidity. 11. solve problems involving pH, pOH, hydrogen ion concentration, and hydroxide ion concentration. 12. derive and use dissociation constants of weak acids and bases. 13. describe the processes of hydrolysis and buffering. 14. state the principles and uses of indicators. 15. explain the process of titration and perform calculations using the data from titrations.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports

Chapter 20: Oxidation-Reduction

Biblical Worldview Essential Questions:

Review beginning questions from previous chapters to sum up the year. No new question would apply here.
Why is precision and accuracy important in understanding the exactness of God?
Why are the details of math important to God?
What happens when aspects of life, including chemical reactions, are out of balance?

6 Lessons

PA#1, PA#2, PA#3

Objectives	Methods	Resources	Assessment
The students will 1. compare the process of oxidation with the process of reduction. 2. explain an oxidizing agent and a reducing agent. 3. describe how to assign oxidation numbers to atoms in compounds. 4. state how to identify oxidation-reduction reactions. 5. explain the concept of half-reactions. 6. determine how to balance redox equations by the half-reaction method.	• teacher lecture • teacher working examples on the board • student guided practice of problems in book • cooperative learning groups • partner work • worksheets • homework • related internet websites • demonstrations and laboratory exercises	*Prentice Hall Chemistry*; Antony C. Wilbraham et. al., 2005, Pearson Prentice Hall • Teacher's Wraparound Edition • Student's Edition • Core Teaching Resources • Guided Reading and Study Workbook • Small-Scale Chemistry Laboratory Manual Lab Activities supplied from outside sources like Jefferson Lab and science websites	• Check homework • Quizzes • Tests • Oral response • Lab reports