

Chemistry

Chemistry: Grades 11 & 12				
Learning Standards	Objectives	Resources	Time Allotment	SHS Student Expectations
Learning Standard #1 Properties of Matter				
Learning Standard # 1.1 Physical properties	The student will be able to: <ul style="list-style-type: none"> Identify and explain some of the physical properties that are used to classify matter. Identify and explain some of the chemical properties that are used to classify matter. 	Video: The Scientific Method Davis: ch. 1 pgs. 10-14 ch. 2 pgs. 29-31 Lab: Chemical and Physical properties Demo: Fe + S	4 days	1,2, 3, 5
Learning Standard # 1.2 Mixtures and pure substances	The student will be able to: <ul style="list-style-type: none"> Explain the difference between mixtures and pure substances Use the periodic table to name/write symbols of the elements. 	Davis: ch. 1 pgs. 15-24 Lab: Conservation of Mass	4 days	1,2, 3, 5
Learning Standard # 1.3 Four states of matter	The student will be able to: <ul style="list-style-type: none"> Describe the four states of matter in terms of energy, particle motion, and phase transition. 	Davis: ch. 1 pgs. 5-10 Lab: Melting Point Video: A Matter of State Demo: Acetone and styrofoam	4 days	1,2, 3, 5
Learning Standard # 1.4 Chemical and physical change	The student will be able to: <ul style="list-style-type: none"> Distinguish between chemical and physical changes 	Davis: ch. 2 pgs. 33-53	3 days	1, 3, 5
Learning Standard # 2 Atomic Structure				

<p>Learning Standard # 2.1 Atomic theory</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> Trace the development of atomic theory and the structure of the atom from the ancient Greeks to the present. Interpret Dalton's Atomic Theory in terms of the Laws of Conservation of Mass, Constant Composition, and Multiple Proportions. 	<p>Davis: ch. 3 pgs. 65-69 Lab: Dart analogy</p>	<p>3 days</p>	<p>1,2, 3, 5</p>
<p>Learning Standard # 2.2 Atomic structure</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> Identify the major components of the atom. Explain how they interact. 	<p>Davis: ch. 3 pgs. 70-74 Video: The Busy Electron Video: The Proton in Chemistry</p>	<p>3 day</p>	<p>1, 3, 5</p>
<p>Learning Standard # 2.3 Electromagnetic spectrum</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> Describe the electromagnetic spectrum in terms of wavelength and energy Identify regions of the electromagnetic Understand that matter has properties of both particles and waves 	<p>Transparencies Video: Color Davis: ch. 4 pgs. 91-97</p>	<p>3 days</p>	<p>1, 3, 5</p>
<p>Learning Standard # 2.4 Electron configuration</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> Write electron configuration (spdf notation) Write orbital notation Write Lewis electron dot structures 	<p>Lab: Molecular Models Video: Electron Configuration Davis: ch. 4 pgs. 91-97</p>	<p>2 days</p>	<p>1,2, 3, 5</p>
<p>Learning Standard # 2.5 Nuclear chemistry</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> Compare nuclear fission and nuclear fusion and mass defect Describe the process of radioactive decay as the spontaneous breakdown of certain unstable elements (radioactive) into new elements (radioactive or not) Describe alpha, beta and gamma 	<p>Davis: ch. 22 pgs. 701-721 Video: Nuclear Energy</p>	<p>2 days</p>	<p>1,2, 3, 5</p>

	particles <ul style="list-style-type: none"> • Write balanced nuclear reactions • Explain the difference between stable and unstable isotopes • Explain the concept of half life of a radioactive element 			
Learning Standard # 3 Periodicity				
Learning Standard # 3.1 Element arrangement	<ul style="list-style-type: none"> • Explain the relationship of an element's position on the periodic table to its atomic number and mass • Use the periodic table to identify metal, nonmetals, and metalloids • Use the periodic table to identify families (groups), periods, valence electrons and reactivity with other elements 	Lab: Periodicity Video: The Power of the Periodic Table Davis: ch. 5 pgs 123- 127 Demo: Na and K in Water	6 days	1,3,5
Learning Standard # 3.2 Electron configuration	<ul style="list-style-type: none"> • Relate the position of an element on the periodic table to its electron configuration 	Davis: ch. 5 pgs 128-139	2 days	1,5
Learning Standard # 3.3 Periodic trends	<ul style="list-style-type: none"> • Identify trends on the periodic table (ionization energy, electronegativity, electron affinity, and relative size of atoms and ions) 	Davis: ch. 5 pgs 140-154 Lab: Periodic Table	3 days	1,2,3,4,5
Learning Standard # 4 Chemical Bonding				
Learning Standard # 4.1 Ionic and covalent bonds	<ul style="list-style-type: none"> • Explain how elements combine to form compounds through both ionic and covalent bonding 	Davis: ch. 6 pgs 161-169 Lab: Ionic and Covalent Bonds	4 days	1,2,3
Learning Standard # 4.2 Molecular models	<ul style="list-style-type: none"> • Draw Lewis dot structures for simple molecules • Draw orbital models for simple molecules • Relate electronegativity and 	Davis: ch. 6 pgs 181-199 Lab: Molecular Model kit Video: Chemical Bonds	5 days	1,2,3,4,5

	<p>ionization energy to the type of bonding an element is likely to undergo</p> <ul style="list-style-type: none"> Predict the geometry of simple molecules and their polarity (VSEPR theory) 			
<p>Learning Standard # 4.3 Chemical formulas</p>	<ul style="list-style-type: none"> Predict chemical formulas based on the number of valence electrons Name and write the chemical formulas for simple ionic and molecular compounds, including those that contain common polyatomic ions 	<p>Davis: ch. 6 pgs 203-213 Lab: Set 1 reactions between ions</p>	3 days	1,2,3,4
<p>Learning Standard # 5 Chemical reactions and Stoichiometry</p>				
<p>Learning Standard # 5.1 Stoichiometry</p>	<ul style="list-style-type: none"> Balance chemical reactions by applying the law of conservation of mass Calculate % yield Calculate mass-mass, mass-volume, and volume-volume problems for chemical reactions 	<p>Davis: ch. 9 pgs 275-294 Lab: Copper and Sulfur</p>	4 days	1,2,3,4
<p>Learning Standard # 5.2 Types of chemical reactions</p>	<ul style="list-style-type: none"> Recognize synthesis, decomposition, single displacement, double displacement, and neutralization reactions 	<p>Davis: ch. 8 pgs 256-264 Lab: Types of reactions Lab: Mg + HCl</p>	5 days	1,2,3,4
<p>Learning Standard # 5.3 Mole Concept</p>	<ul style="list-style-type: none"> Understand the mole concept in terms of number of particles, mass, and gaseous volume Calculate molar mass, % composition, empirical formulas, and molecular formulas 	<p>Davis: ch. 3 pgs 75-85 Lab: Mole/Mass Davis: ch. 7 pgs 221-233 Lab: Determination of the percentage of water in a hydrate</p>	4 days	1,2,3,4,5
<p>Learning Standard # 6 Gases and Kinetic molecular theory</p>				

<p>Learning Standard # 6.1 Laws of ideal gases: equation of state for an ideal gas</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Use the ideal gas law. • Define the molar volume for an ideal gas. • Define STP. 	<p>Lab: Determination of the molar volume of a gas Lab: Determination of R Davis: ch. 11 pgs. 340-346</p>	4 days	1,2, 3, 5
<p>Learning Standard # 6.2 Laws of ideal gases: partial pressures</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • State the relationship between partial pressures and total pressure and between partial pressure and mole fraction. 	<p>Demo: Collapsing can Davis: ch. 10 pgs. 322-325</p>	2 days	1, 3, 5
<p>Learning Standard # 6.3 Kinetic molecular theory: interpretation of ideal gas laws on the basis of this theory</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Present the basic postulates of the kinetic molecular theory. 	<p>Video: Davis: ch. 10 pgs. 303-306 Lab: Oxygen and Hydrogen</p>	5 days	1,2, 3, 5
<p>Learning Standard # 6.4 Kinetic molecular theory: Avogadro's hypothesis and the mole concept</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Do stoichiometric calculations for reactions involving gases. • Calculate molar mass from gas density. 	<p>Davis: ch. 11 pgs. 347-350</p>	3 days	1,2, 3,4, 5
<p>Learning Standard # 6.5 Kinetic molecular theory: dependence of kinetic energy of molecules on temperature</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Define temperature. • Describe effusion and diffusion. 	<p>Davis: ch. 11 pgs. 351-353</p>	1 day	1, 3, 5
<p>Learning Standard # 7 Solutions</p>				
<p>Learning Standard # 7.1 Solution process</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Describe the process by which solutes dissolve in solvents • Use a solubility curve to determine saturation values at different temperatures 	<p>Davis: ch. 13 pgs. 395-406 Lab: Solutions</p>	3 days	1,2, 3,4, 5
<p>Learning Standard # 7.2 Rate of dissolving</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Identify and explain the factors that affect the rate of dissolving • Calculate concentration in terms of molarity and percent by mass 	<p>Davis: ch. 13 pgs. 401-405 Lab: Molarity</p>	4 days	1,2, 3,4, 5

<p>Learning Standard # 7.3 Ionic equations</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Write dissociation, overall, and net ionic equations for precipitation reactions in aqueous solutions • Predict possible products for ionic equations of precipitation reactions in aqueous solutions 	<p>Davis: ch. 14 pgs. 425-435 Lab: Writing Equations Sets 2-5</p>	<p>6 days</p>	<p>1,2, 3,4, 5</p>
<p>Learning Standard # 8 Acids and Bases</p>				
<p>Learning Standard # 8.1 Acid-base theory</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Define Arrhenius' theory of acids and bases in terms of the presence of hydronium and hydroxide ions • Define Bronsted's theory of acids and bases in terms of proton donor and acceptor • Relate acid-base concentrations to the pH scale 	<p>Davis: ch. 14 pgs. 453-471 Lab: Titration Davis: ch. 15 pgs. 485-488</p>	<p>5 days</p>	<p>1,2, 3,4, 5</p>
<p>Learning Standard # 8.2 Acid-base neutralization</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Describe an acid-base titration and identify the equivalence point • Calculate the pH of aqueous solutions • Explain how indicators are used in titrations and how they are selected 	<p>Davis: ch. 14 pgs. 471-475 Lab: Titration of vinegar</p>	<p>5 days</p>	<p>1,2, 3,4, 5</p>
<p>Learning Standard # 9 Equilibrium and Kinetics</p>				
<p>Learning Standard # 9.1 Equilibrium expression</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Write the equilibrium expression and calculate the equilibrium constant for a reaction 	<p>Davis: ch. 18 pgs. 555-559</p>	<p>4 days</p>	<p>1,2, 3</p>
<p>Learning Standard # 9.2 LeChatelier's principle</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Predict the shift in equilibrium when the system is subjected to a stress • Identify the factors that affect the rate of a chemical reaction 	<p>Davis: ch. 18 pgs. 553-566 Lab: LeChatelier's Principle</p>	<p>5 days</p>	<p>1,2, 3,4, 5</p>

	(temperature, concentration) and the factors that can cause a shift in equilibrium (concentration, pressure, volume, temperature)			
Learning Standard # 9.3 Reaction rate	The student will be able to: <ul style="list-style-type: none"> • Explain rates of reaction in terms of collision frequency, energy of collisions, and orientation of colliding molecules. • Define the role of activation energy in a chemical reaction • Sketch and label a kinetic energy distribution curve and a potential energy diagram • Explain how a catalyst speeds up a chemical reaction 	Davis: ch. 17 pgs. 531-540 Video: Driving Forces Lab: Equilibrium	6 days	1, 3, 5
Learning Standard # 10 Thermochemistry (Enthalpy)				
Learning Standard # 10.1 Law of conservation of energy	The student will be able to: <ul style="list-style-type: none"> • Interpret the law of conservation of energy 	Davis: ch. 1 page 15	2 days	1, 3, 5
Learning Standard # 10.2 Energy changes	The student will be able to: <ul style="list-style-type: none"> • Analyze the energy changes involved in physical and chemical processes • Calculate heat of reaction using Hess's Law 	Davis: ch. 17 pgs. 511-520 Lab: Hess's Law	4 days	1,2, 3,4, 5
Learning Standard # 11 Oxidation-Reduction and Electrochemistry				
Learning Standard # 11.1 Oxidation-Reduction	The student will be able to: <ul style="list-style-type: none"> • Describe the chemical processes known as oxidation-reduction • Assign oxidation numbers • Balance oxidation-reduction equations 	Davis: ch. 19 pgs. 591-606 Lab: Oxidation-Reduction	4 days	1,2, 3,4, 5
Learning Standard # 11.2 Electrochemistry	<ul style="list-style-type: none"> • Explain how a typical battery works 	Davis: ch. 19 pgs. 607-612 Lab: Electrochemistry	3 days	1,3,5

Learning Standard # 12 Descriptive chemistry				
Learning Standard # 12.1 Chemical reactivity and products of chemical reactions	The student will be able to: <ul style="list-style-type: none"> Predict the products of chemical reactions. Write complete, balanced chemical equations for chemical reactions. 	Davis: ch. 8 pgs. 241-254 Lab: Colorful precipitates	4 days	1,2, 3,4, 5
Learning Standard # 12.2 Relationships in the periodic table; horizontal, vertical, and diagonal with examples of from alkali metals, alkaline earth metals, halogens, and the first series of transition elements	The student will be able to: <ul style="list-style-type: none"> Show general trends in ionization energy, electron affinity, and atomic radius in the periodic table. Show what types of information can be obtained from the periodic table. 	Davis: ch 5 pgs 123-154 Video: Periodic Table Lab: Periodicity	5 days	1,2, 3,4, 5
Learning Standard # 12.3 Introduction to organic chemistry: hydrocarbons and functional groups	The student will be able to: <ul style="list-style-type: none"> Name simple alkanes, alkenes, and alkynes. Discuss isomerism in organic molecules. Recognize basic organic functional groups. 	Davis: ch 20 pgs 625-653 Lab: Polymers Video: The Age of Polymers	4 days	1, 3, 5
Learning Standard # 13 Laboratory		All of the labs listed above pertain to this standard. Students keep a laboratory notebook of all of their labs.		
Learning Standard # 13.1 Making observations of chemical reactions and substances	The student will be able to: <ul style="list-style-type: none"> Observe chemical reactions in the laboratory. 	All labs	Continual	1,2, 3,4, 5
Learning Standard # 13.2 Recording data	The student will be able to: <ul style="list-style-type: none"> Record accurate and precise data. 	All labs	Continual	1,2, 3,4, 5
Learning Standard # 13.3 Calculating and interpreting results based on the quantitative data obtained	The student will be able to: <ul style="list-style-type: none"> Perform calculations describing laboratory experiments. Interpret the data and calculations of an experiment to reach conclusions about that experiment. 	All labs	Continual	1,2,3,4, 5

Learning Standard # 13.4 Communicating effectively the results of experimental work	The student will be able to: <ul style="list-style-type: none">• Write a conclusion summing up the laboratory results and explaining the chemical implications of an experiment.	All labs	Continual	1,2, 3,4, 5
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