MOSCOW SCHOOL DISTRICT
CURRICULUM GUIDE
Subject/Course: Honors Chemistry
Grades 11/12

2 Semesters

Prerequisites: Algebra 1A and B, B or Better Grade Open to 11th & 12th Graders and Selection by Faculty

A class intended for the highly motivated student who wishes to explore chemistry to a greater depth and extent. Students will spend more time in creative lab activities than in the traditional chemistry class. Enrollment is by invitation only. Students are selected on the basis of staff referrals, standardized test scores (SRA) and a personal interview.

*****Because the curriculum builds from 1st semester to 2nd semester, if a student receives a grade lower than a "C" they will be re-assigned to regular chemistry for 2nd semester.

1st semester is the same basic structure as regular chemistry, however, topics are more in depth and less time spent on them.

Below are representative examples of objectives and curriculum that are not all inclusive of the Chemistry program at MHS.

Unit 1: Matter and Measurements

Goal – The student will:	***Objectives (to be reached by completion of Chemistry - 11th or 12th grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 1.1: The Study of Chemistry	1.1.1 Be able to explain the concept of matter. 1.1.2 Be able to explain how the structure of matter relates to the ways the atoms of elements are arranged. 1.1.3Describe how a molecule is formed and its uniqueness. 1.1.4 Explain why knowledge of chemistry is the central science.		. 	Kinetic Energy Potential Energy Radiant Energy
Goal 1.2 Classification of Matter	1.2.1 Be able to explain the concept of matter and its phases, mass, volume and density; both on a macroscopic and molecular level. 1.2.2Be able to classify and describe matter using the following concepts: pure substance, mixture,	Simple experiment with pop cans.	Classification of Matter Lab 8 test tubes with different types of matter	Scientific method Hypothesis Theory Law Gas Solid Liquid Plasma Physical Change

	homogeneous, heterogeneous, substance, mixture, solution, element, compound, atom and molecule. (Recognize that this system is based on different types of combinations.) 1.2.3Describe the separation of mixtures using: Filtration, Distillation, and Chromatography.			Chemical Change Matter Mass Law of conservation of Matter Chemical Property Physical Property Homogeneous heterogeneous solution mixture element compound substance Pure Distillation Chromatography filtration
Goal 1.3. Properties of Matter	1.3.1 Explain the Law of Constant Proportions (Proust) (also know as: Law of Definite Proportions) 1.3.2Describe and differentiate chemical and physical changes. 1.3.3Describe and differentiate chemical and physical properties	Safety symbols posted around lab.	Ppt on safety from Flinn	Beaker Erlenmeyer Graduated cylinder Watch glass
Goal 1.4 Units of Measurement	**Scientific Method** 1.4.1List and describe and be able to use the steps of the scientific method. 1.4.2Be able to identify the critical components of a well-designed experiment by being able to use Scientific Method. (This objective does not address the lab report but rather the actual experiment.) 1.4.3Know that a hypothesis for this chemistry class is written in an "if, if, then" statement. 1.4.4Be able to write up an experiment using the format provided by the teacher. 1.4.5Know that in the discussion portion of a	Measure tabletops and chair heights and compare to others'.	Discuss basic lab write-up procedures Lab: Use computers to graph.	Gram Milligram Centrigram Milliliter Centimeter Meter Cubic centimeter

	laboratory write-up that you must begin with; "My hypothesis was (correct/incorrect) based upon the following data from my data section ……..." 1.4.6Develop a general procedure for solving problems. 1.4.7Be able to develop methods for eliminating bias from your experiments. 1.4.8Be able to identify errors in you experiment. **Units of Measure** 1.4.9Describe the SI units for Length, Mass and Temperature and their abbreviations. 1.4.10Know how to calculate Density, Volume, and Mass using the Density formula: D=M/V 1.4.11Learn that water has a density of 1.0 gms/ml and that 1 ml = 1 cm^3. 1.4.12Know the prefixes mega, kilo, deci, centi, milli, micro nano, and pico.			
Goal 1.5 Uncertainty in Measurement	1.5. 1Be able to distinguish between precision and accuracy. 1.5.2 Explain what causes uncertainty in measurements. 1.5.3Compare accuracy and precision. 1.5.4Learn the concept of significant figures; including how to read a measurement from an instrument and how to interpret a reported measurement in terms of sig. figures. 1.5.6Be able to calculate with measurements using sig. figures {including rounding off). 1.5.7Be able to write numbers using Scientific Notation and vice versa. 1.5.8Be able to calculate		Exactly How, How Exact? Measurement	Accuracy Precision

	percent error. 1.5.9Be able to estimate the "expected possible maximum % error" in a measurement. 1.5.10Be able to construct a data table and a graph from data you have generated or which has been supplied to you.			
Goal 1.6 Dimensional Analysis	1.6.1. Be able to explain dimensional analysis. 1.6.2Be able to convert between the English and metric systems for length, mass and volume using dimensional analysis.	Use a beaker, graduated cylinder to discuss precision and accuracy and sig figs Find the density of an unknown object. Measure the precision of beaker vs grad cyclinder	Glassware: beakers and cylinders (two types)	Significant Figure Density Mass Volume gm/ml cc^3 Scientific Notationi Exponent % error
Goal 1.7 Problem Solving	1.7.1Be able to construct a data table and a graph from data you have generated or which has been supplied to you. 1.7.2Be able to explain dimensional analysis. 1.7.3Be able to convert between the English and metric systems for length, mass and volume using dimensional analysis.	Cool water as fast and as cold as possible	Use Excel to make graphs	Independent variable Dependent variable Axis Cell Dimensional analysis
Goal 1.8 Lab Safety	1.8.1Be able to recognize the safety signs and symbols for the laboratory. 1.8.2Be able to describe safety in the laboratory			

Unit 1.5: The Mole

Goal – The student will:	***Objectives (to be reached by completion of Chemistry—11^{th} or 12^{th} grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 1.5.1 Chemical Measurements	1.5.1.1Define a mole and describe its importance 3. Be able to determine the AMU of any compound. 1.5.1.2 Identify and use Avogadro's number (N) and describe how it is related to a mole 1.5.1.3Describe the number of atoms in 1 mole of an element. 1.5.1.4Describe the number	Ws on what is a mole	Dimensional Analysis card chart	Dimensional analysis Mole Molar mass

	of molecules in a mole of any molecular compound. 1.5.1.5Describe the number of molecules in 1 mole of H_2 and 1 mole of Cl_2. 1.5.1.6Define molar mass and explain how it relates the mass of a substance to the number of particles in that substance.			
Goal 1.5.2 Mole Conversions	1.5.2.1 Know how to convert among the number of particles, moles, and the mass of a given substance. (use the chart your teacher has provided) (pg 323-329) and using dimensional analysis. 1.5.2.2 Define molar volume of gas. 1.5.2.3Define STP as it relates to this chapter. 1.5.2.4 Explain how to determine the number of particles in a given volume of gas at STP.			STP
Goal 1.5.3. Empirical and Molecular Formulas	1.5.3.1Explain how to find the percentage composition from a given formula. 1.5.3.2 Explain how to use the percentage composition to determine the empirical formula of an unknown sample. 1.5.3.3 Recognize and explain the differences between empirical and molecular formulas. 1.5.3.4Determine empirical formulas of unknown compounds.			

Unit 2: Energy and Matter

Goal – The student will:	***Objectives (to be reached by completion of Chemistry—11th or 12th grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 2.1: The Atomic Theory of Matter and 2.2 The Discovery of Atomic Structure	2.1.1Know the history of the atom and how a cathode ray tube works; you learned in this assignment: **Honors Chapter 2 Timeline Activity: History of**	Create a timeline of the discover of the atom and technology available	Project using Inspiration software Use Vernier probes to take	

	the Atom 2.1.2Explain how we use symbols to represent the 100 plus symbols on the periodic table. 2.1.3Explain how the scanning tunneling microscope invented in 1981 helps us in chemistry. 2.1.4Describe electric current in terms of moving electrons.		measure, change, and graph the temperature of water. Computers for research Computer generated flashcards	
Goal 2.2				
Goal 2.3 The Modern View of Atomic Structure	2.3.1Know that the charge of an electron is 1.60×10^{-19} C (Coulomb) and the mass of an electron (9.11×10^{-28} gram); Proton charge $+1.602 \times 10^{-19}$ C and what this means when we say +1 or -1 charge. 2.3.2Name and describe the properties of the three subatomic particles and their locations in an atom. 2.3.3Describe the relative masses of electrons, protons and neutrons. 2.3.4Define an Angstrom and what it is used to measure. 2.3.5Learn the evidence and be able to describe the "planetary" model of the atom (nucleus and electron cloud). 2.3.6Be able to determine the number of protons, neutrons, and electrons in an atom or ion. 2.3.7Describe the diameter range of a typical atom and the relative size of the nucleus of an atom. 2.3.8Describe why an atom is electrically neutral. 2.3.9Show why Dalton's second postulate (all atoms of a give element are identical) is not entirely true when describing an isotope. 2.3.10Describe what an AMU is roughly equal to; and what is the AMU the		Use computers to find conversion factors. Movie: discover of the atom	Calorie Energy Activation Energy Fahrenheit Celsius Kelvin Scale Absolute Zero

	sum of and why the C-12 atom was used to define an AMU 2.3.11Be able to use the periodic table to find the following information about and element: number of protons, neutrons and electrons; atomic number, atomic mass number; atomic mass and mass per mole (g.a.w.)			
Goal 2.4. The Periodic Table	2.4.1Describe how elements are arranged on the Periodic Table. 2.4.2Explain what a "group" and period is on the periodic Table is and what makes them a group. 2.4.3Be able to state where metallic elements, not metallic elements and metalloids are located on the Periodic Table.	Use flashcards to create a period table		
Goal 2.5. Molecules and Molecular Compounds	2.5.1Define molecule and chemical formula and molecular compounds 2.5.2Distinguish between molecular formulas and Empirical Formulas.			Element Compound Atom Homogeneous Heterogeneous Mixture Solution Element Compound Molecule
Goal 2.6 Ions and Ionic Compounds	2.6.1Learn how to make basic Lewis Dot diagrams, 2.6.2Learn what ions are and how to predict ion charges from the periodic table. 2.6.3Learn what is meant by a polyatomic ion. 2.6.4Know what a Cation and an Anion is. 2.6.5Learn what is meant by oxidation state and how to read it from the periodic table. 2.6.6Learn how to write the formulas of binary compounds using only the periodic table and the information memorized from figure 2.18. Add the following to the figure information: "the third	Lab: Separate a heterogeneous mixture.		Distillation Filtration Separation Pure substance

	column from the left is only +3 charge." 2.6.7Define what an ION is and how they are described as negative or positive and write an example of a positive and negative ion.			
Goal 2.7 Naming Inorganic Compounds	2.7.1Learn how "-ic" and "-ous" are used to distinguish between differently charged ions of the same metal. 2.7.2Learn how to name binary compounds 2.7.3Know how to use the naming card your teacher gives you. 2.7.4Learn how to name and write formulas for acids and their related salts. Memorize the reference acids. 2.7.5Learn how to use the reference acids to determine the charges on ions. 2.7.6Learn how to name and write formulas for compounds which contain no metals. 2.7.7Learn what ions are and how to predict ion charges from the periodic table. 2.7.8Know how to write Lewis Dot diagrams for any given substance. 2.7.9Know how to write Lewis Dot diagrams for Ions.		Use the naming chart on the card	

Unit 3: Atomic Structure

Goal – The student will:	***Objectives (to be reached by completion of Chemistry—11th or 12th grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 3.1: Early Models of the Atom	3.1.1Define the term atom. 3.1.2 Discuss how Democritus first proposed the atom. 3.1.3 Explain the Law of Constant Composition by Joseph Louis Proust 3.1.4 List the 4 postulates of John Dalton's Atomic Theory of Matter.	Compare and contrast the cloud and pudding pie and orbital view of the atom	Video: Discovery of the atom PPT: Atom	Macroscopic Microscopic Democritus Law of Constant Composition Dalton's Atomic Theory of Matter

	3.1.5 Explain how we use symbols to represent the 100 plus symbols on the periodic table. 3.1.6 Explain how the scanning tunneling microscope invented in 1981 helps us in chemistry. 3.1.7 Give examples of submicroscopic and microscopic world of chemistry.			
Goal 3.2 Discovering Atomic Structure	3.2.1 Discuss how atomic structure is related to electricity. 3.2.2 Describe electric current in terms of moving electrons. 3.2.3 Describe how a cathode ray tube (CRT) is made and works and the location of cathode and anode. 3.2.4 Explain what studies of cathode rays and radioactivity revealed (concluded) about atoms (include JJ. Thompson, and Robert Millikan's experiments and what they found out and named). 3.2.5 What is the charge of an electron 1.60×10^{-19} C (Coulomb) and the mass of an electron (9.11×10^{-28} gram). 3.2.6 Describe how Henri Becquerel discovered radioactivity. 3.2.7 Describe what alpha, beta and particles are and their respective charges. 3.2.8 Describe what gamma particles are. 3.2.9 Discuss Rutherford's alpha-scattering experiment and how it showed the existence of the nucleus and its contents.		Timeline Project using Inspiration software	Atomic Structure Electric Current Electron Cathode Ray Tube Cathode Anode Radioactivity Millikan Oil drop Experiment Thompson experiments Coulomb Gram Alpha particles Beta Particles Rutherford's Alpha Scattering Experiment
Goal 3.3 Modern Atomic Theory	3.3.1 Name and describe the properties of the three subatomic particles and their locations in an atom. 3.3.2 Describe the relative masses of electrons,	Have students design models of the nucleus of the atom and cloud diagrams.	PPT: Electron Hotel	Electron Nucleus Proton Neutron Atomic Symbol Atomic Mass

	protons and neutrons. 3.3.3 Learn the evidence and be able to describe the "planetary" model of the atom (nucleus and electron cloud). 3.3.4 Be able to determine the number of protons, neutrons, and electrons in an atom or ion. 3.3.5 Define isotopes and atomic mass unit (amu). 3.3.6 Describe the diameter range of a typical atom and the relative size of the nucleus of an atom. 3.3.7 Describe what Henry Mosely found out about the unique positive charge in an atom's nucleus and its atomic number. 3.3.8 Describe why an atom is electrically neutral. 3.3.9 Define what an ION is and how they are described as negative or positive and write an example of a positive and negative ion. 3.3.10 Show why Dalton's second postulate (all atoms of a give element are identical) is not entirely true when describing an isotope. 3.3.11 Explain how the isotopes of the same element differ. 3.3.12 Be able to show the chemical symbols for ions and isotopes and give examples to show the difference. 3.3.12 Describe what an AMU is roughly equal to; and what is the AMU the sum of 3.3.13 Describe what the AMU is defined as using the Carbon-12 atom. 3.3.14 Define atomic mass in terms of how it is calculated. 3.3.15 Be able to use the periodic table to find the following information		Vernier Lab: Ions	G.A.W. Isotope AMU Positive Ion Negative Ion Electrically Neutral Carbon-12 Mole

	about and element: number of protons, neutrons and electrons; atomic number, atomic mass number; atomic mass and mass per mole (g.a.w.) 3.3.16 Explain how an ion differs from an atom and an isotope.			
Goal 3.4 Changes in the Nucleus	3.4.1 Describe the changes that may occur in the nucleus of a radioactive element. 3.4.2 Name and describe the force that keeps the positive charged particles in an atoms nucleus from repelling each other and flying apart and how neutrons are involved in this 3.4.3 Describe why all nuclei with the atomic numbers greater than 83 are radioactive. 3.4.4 Write a nuclear equation to represent radioactive decay. 3.4.5 Compare and contrast alpha, beta and gamma radiation. 3.4.6 Define radioactivity 3.4.7 Describe how carbon-14 can be used to date objects.	Identify on the periodic table the elements most likely to be radioactive and why.	Ppt: radioactivity.	Nuclear Equation Radiation Carbon-14

Unit 4: Electron Configuration and Periodic Properties

Goal – The student will:	***Objectives (to be reached by completion of Chemistry—11th or 12th grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 4.1: Wave Nature of Light	4.1.1Explain and draw a wave in terms of its frequency, wavelength. speed and amplitude 4.1.2Know that Roy G. Biv corresponds to the first letter in order of the visible spectrum. 4.1.3Know which color has the shortest wavelength and highest frequency and which has the longest wavelength and lowest frequency	Lab: Gas tubes and atomic spectra	Power source and Gas tubes. .	Wave Frequency Wavelength Speed Amplitude Speed of Light ROY G. BIV

Goal 4.2 Quantum Theory	4.21 Give an example that shows the spectrum of radiation emitted by an object changes with its temperature. 4.2.2 Define the word quantum 4.2.3 W hat is Plank's constant and its value Explain what is meant by energy quantization 4.2.4 Explain why quanta jumps are not seen in the every day world but it does affect atoms 4.2.5 Explain what the photoelectric effect causes 4.2.6 Explain why violet light releases electrons from metal but red light does not 4.2.7 Know what the energy quanta of light called 4.2.8 Explain why x-rays can damage humans and radio waves do not 4.2.9 Explain how energy of a quantum of radiant energy is related to frequency 4.2.10 Explain why x-rays technicians wear film badges to monitor radiation exposure		Quantum chart	Spectrum Quantum Theory Planks Constant Photo-Electric Effect Quanta Quantizationi X-Rays Radio Waves
Goal 4.3. Another Look at the Atom	4.3.1 What are the "areas" called that atoms can gain or loose energy 4.3.2 Describe the difference between a line spectrum and a continuous spectrum 4.3.3 Explain how passing electricity thru an element in gasses states produces a line spectrum 4.3.4 Explain what a Bohr quantum number is a how they are numbered in an atom 4.3.5 Explain the difference between ground state and excited state of the energy of an atom and how its change produces a line spectra	Discuss how we know where electrons might or might not be.	Quantum Theory	Continuous Spectrum Line Spectrum Bohr Quantum Number Ground State Excited State Heisenberg Uncertainty Principal

	4.3.6 Describe lights dual nature. 4.3.7 State the Heisenberg Uncertainty Principle and how it relates to electrons in an atom			
Goal 4.4. **A New Approach to the Atom**	4.4.1 Explain why electrons do not have orbits but can be found in orbitals (based upon probabilities) as stated in the quantum mechanical model of an atom. 4.4.1 Define orbital. 4.4.2 Describe the shapes of "s", "p", "d", "f" orbitals 4.4.3Compare "s", "p", "d", "f" orbitals in terms of size and energy 4.4.5 Explain what is meant by "electron density 4.4.6 Describe how you can tell how many sublevels there are for each principal quantum number n = 1 thru n = 4 and name the sublevels for each fig 4-28. 4.4.7 State how many orbitals are in each of the s, p, d, f sublevels 4.4.8 Describe how electrons spin and how they are drawn to show this 4.4.9 Write the maximum number of electrons in each s,p,d,f sublevels and the resulting orbitals. 4.4.10 Know how to make dot diagrams from the electron configuration.	Show students how to use the periodic table to determine orbital filling.		Orbit Orbital Probability Electron Density
Goal 4.5. Electron Configuration	4.5.1 Describe which electrons of an element's electron configuration would come in contact with another element and may 'stick" it to the element to make a molecule. 4.5.2 Explain and give examples of how to determine the electron configuration of an element 4.5.3 Explain Aufbau Principle 4.5.4 State the Pauli	Introduce Dot diagrams and valence electrons Explain how elements "stick" together.	Use Internet sites to see and do electron arrow diagrams and filling.	Ball and stick Model Aufbau Principle Pauli Exclusion Principle Hunds Rule Electron Configuration

	Exclusion Principle 4.5.5 State Hund's Rule 4.5.6 Be able to fill in electrons as arrows to show electron configuration Fig 4-31 4.5.7 Be able to write out the electron configuration of any element on the periodic table. ($1s^2 2s^2 2p^2$) 4..5.8 From the electron configuration, be able to identify the element.			
Goal 4.6 Honors Editions	4.6.1 Be able to relate deBroglie's hypothesis to the quantum theory of light. 6.4-198 4.6.2Be able to explain the wave-particle duality of nature. 6.4 4.6.3What is meant by the wave-mechanical view of an atom? 4.6.4Be able to explain what an atomic emission spectrum is and how it is obtained. 4.6.5Be able to construct the allowable positions of electrons around the atom using the 4 quantum numbers. 4.6.6Distinguish between ground state, excited state, level, sublevel and orbital. 4.6.7Know the shapes of the s,p,d, and f orbitals. 4.6.8Be able to determine the allowable shapes, number of orbitals, number of electrons and number of lobes of the orbitals on any level. 4.6.9Be able to identify 4 quantum numbers for any electrons in an atom when given its orbital location. 4.6.10Be able to read the periodic table in terms of electron configuration. 4.6.11Learn the diagonal rule. 4.6.12 Be able to draw the electron-dot symbol for any atom or any compound. 4.6.13Be able to identify			

	the outer shell of any atom. 4.6.14Learn how to use the octet rule and apply it to objective 11. 4.6.15Review the mole concept, balancing equations and naming compounds. 4.6.16Be able to apply the equation for a straight line to a graphing problem and be able to interpret a graph's intercepts and slope. 4.6.17Be able to explain the orbital filling order found in atoms. You should be able to list the order and explain why that particular order is correct. 4.6.18 Be able to explain the difference between an ionic and a covalent bond on the basis of electron configuration. 4.6.19Be able to describe the path of any electron in the first three levels and explain the meaning of "electron clouds". 4.6.20Be able to determine the structure (composition) of an atom based on its atomic number, mass number, nuclear composition or electron configuration.			

Unit 5: The Periodic Table

Goal – The student will:	***Objectives (to be reached by completion of Chemistry—11th or 12th grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 5.1: Development of the Periodic Table	5.1.1 Describe how and why we needed to organize elements when we found over 62 of them. 5.1.2 Discuss how Mendeleev is ultimately credited with the general arrangement of the periodic table as we know it and what he based the arrangement on (2 things) 5.1.3 Using the periodic		Video: Mendeleev .	Mendeleev Periodic Table Periodic Law

	table, describe how scientists predicted that some elements had their atomic mass incorrect and that there were still undiscovered elements. 5.1.4 State what Moseley discovered and how this altered the way Mendeleev arranged the elements. 5.1.5 State Periodic Law.			
Goal 5.2 Reading the Periodic Table	5.2.1 Know all the information that can be found in each "square" on the Periodic Table. 5.2.2 Describe which areas of the Periodic Table are called Groups/families and why. 5.2.3 Be able to name the vertical groups' family names as: halogens, noble gasses, alkali metals, alkaline earth metals, Carbon group. 5.2.4 Describe what is unusual about the square for Hydrogen and why; include its alternate location. 5.2.5 Describe what a period is on the Periodic Table and how many there are. 5.2.6 Be able to locate the metals, nonmetals and the transition metals, semimetals on the periodic table. 5.2.7 Be able to state the physical properties of nonmetals and the transition metals, semimetals. 5.2.8 Be able to find valence electrons using the periodic table. 5.2.9 Be able to identify the s, p ,d ,f blocks on the periodic table 5.2.10 Be able to use the periodic table to identify the electron configuration of ANY element. 5.2.11 Be able to draw electron dot diagrams for	Look at examples of metals Draw e dot diagrams for the first element in the S and P areas.		Periodic Family Periodic Period Periodic Group Halogen Noble Gas Alkali Metal Alkaline Earth Metal Carbon Group Hydrogen Metals Nonmetals Dot Diagram Oxidation Number Inner Transition Metals Transition Metals

	molecules using the periodic table. 5.2.12 Identify the location of the Inner transition metals and the transition metals			
Goal 5.3. Periodic Trends	5.3.1 Define the term periodic trend 5.3.2 Be able to define atomic radius and how it is determined. 5.3.3 Be able to explain the periodic trend for Atomic Radius and give the structural basis for the trend 5.3.4 Be able to explain Ionic Size and what happens to it with gain and loss of electrons and why. 5.3.5 Be able to explain the periodic trend for Ionic Size and give the structural basis for the trend. 5.3.6 Be able to define Ionization Energy and how it is determined and the units it is measured in. 5.3.7 Be able to explain the 2 periodic trends of Ionization Energy 5.3.8 Describe what successive ionization energies are. 5.3.9 Be able to define Electron Affinity and discuss how it is related to number of electrons it needs to fill its outer energy level. 5.3.10 Be able to discuss Electron Affinity in terms of being negative and positive. 5.3.11 Be able to state general rules for Electron Affinity because they change irregularly across a period or down a group. 5.3.12 Know the principle of the OCTET RULE and how it is related to ionization energies and electron affinities. 5.3.13 Define Electronegativity 5.1.13 Be able to explain	Draw the Dot diagrams on the periodic tables above the appropriate families	Ppt: Periodic Trends Have students graph 3 types of trends to see trends for families on the periodic table.	Periodic Trend Atomic Radius Ionic Size Ionization Energy Electron Affinity Octet Rule Electronegativity

	the periodic trend for Electronegativity. **UPGRADE YOUR PERIODIC TABLE WITH ALL THE NEW CHANGES**			

Unit 6: Groups of Elements (not covered specifically—integrated in other units)

Goal – The student will:	*Objectives (to be reached by completion of Chemistry—11th or 12th grade)*	*Samples of Applications*	*Curriculum Materials (including technological resources)*	*Key Vocabulary*
Goal 6.1: Student Project on Chemistry of Groups of Elements	6.1.1 Students will follow the following guidelines for their project: a) Typed, neat and organized b) Due the 3rd teaching day of this week Hydrogen (include an explanation as to why it is in two places.) 6.1.2 Groups assigned ar as follows: Alkali metals -- Alkaline Earth Metals Transition Metals Chromium Iron Copper Silver Gold Lanthanides (every other one) Actinides (every other one) Boron group Carbon group Nitrogen group Oxygen group Halogen group Noble gasses 6.1.3 Students will meet the following criteria in their projects: You want to answer "what makes them a group?" For each element in the group determine: 1) use shortcut method to show its elemental address (configuration) and dot diagram 2) boiling point degrees C		Computer research and paper generation .	Malleable Ductile Reactivness Boiling Point Melting Point

	3) melting point degrees C 4) describe its reactivness with other elements or molecules 5) physical properties (shiny, ductile, good conductor etc) 6) Source of the element (where do you find it) 7) other properties of the element 8) describe other elements this one is combined with to make an alloy. 9) Use(s)of the element 10) A paragraph as to why this is called a family. 6.1.6Show and explain the chemical equations (reactions) that go along any type of industrial or ecological contamination your metal is involved in.			

Unit 7: Chemical Formulas and Bonding

Goal – The student will:	***Objectives (to be reached by completion of Chemistry—11th or 12th grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 7.1: **Ionic Bonding**	7.1.1 Describe the ions (and molecules) that metals and nonmetals tend to form and give examples. 7.1.2 Describe ionic compounds in detail using the terms: cations and anions, electrically neutral and use chemical symbols to show them. 7.1.3 Describe the physical properties of ionic compounds including their interaction with water. 7.1.4 Describe why sodium chloride is more stable than elemental sodium and chlorine; show this using the octet rule. 7.1.5 Learn what ions are and how to predict ion charges from the periodic table (do not include transition and inner transition metals). 7.1.6 Learn what is meant	Students should delineate metals and non metals and transition metals on their periodic tables.	. Ppt dot diagrams Naming card and chart of polyatomic ions	Cation Anion Octet Rule Monoatomic Polyatomic Lewis Dot Diagram Multivalent Chemical Formula Salt Metal Crossover method Charges Oxidation State number Reference Acid Binary Ionic Compounds

	by oxidation state and which have one and multiple oxidation states. 7.1.7 Describe which electrons in an electron configuration are essential in bonding. 7.1.8 Be able to draw Lewis Dot diagrams for elements and molecules 7.1.9 Distinguish and give examples of monatomic and polyatomic ions. 7.1.10 Learn ways to name elements that are multivalent. 7.1.11 Know how to name and write formulas for acids and their related salts using the chart provided by your teacher. 7.1.12 Know how to name and write formulas for compounds which contain no metals. 7.1.13 Describe how you can identify an Ionic and a molecular compound by the location of its elements on the periodic table. 7.1.14 Learn how to use the reference acids to determine charges found in ions. 7.1.15 Give examples of empirical formulas for Binary Ionic Compounds and how the criss-cross (crossover) method works to make them electronically neutral.	Add dot diagrams to top of student period table families.		
Goal 7.2 Covalent Bonding	7.2.1 Describe the physical differences between compounds with ionic and covalent bonds and give examples of those compounds. 7.2.2 Explain the difference between single, double and triple covalent bonds using dots and lines. 7.2.3 Compare and contrast polar, nonpolar, and covalent bonds and use the EN table to mark them (-. +, δ)	Polarity Lab	Ppt bonding	Ionic bond Covalent Bond Polar Covalent Bond Single Bond Double Bond Triple Bond Line Diagram Dot Diagram Non polar Polar

Goal 7.3. Naming Chemical Compounds	7.3.1 Define the term hydrate and anhydrous substances, and explain how a hydrate is named such as $CuSO_4 \bullet H_20$ as copper II sulfate pentahydrate. 7.3.2 Define acid as a molecular substance that dissolves in water to produce hydrogen H^+ ions (cation) and a (reference) anion.			Anhydrous Hydrate
Goal 7.4 Balancing Chemical Equations and Identifying / Writing Types of Reactions	7.4.1 Be able to balance chemical equations. 7.4.2 Be able to write chemical reactions using the 5 types of chemical reactions on your card.		Solubility Lab Honors studets are to change the rate of the reaction so that it doubles	Direct Combination Reaction Additon Reaction Decomposition Reaction Single replacement reaction Double replacement Reaction Compustion reaction

Unit 8: Molecular Geometry/Solubility/Reaction Rates

Goal – The student will:	***Objectives (to be reached by completion of Chemistry—11^{th} or 12^{th} grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 8.1: Solubility	8.1.1 Be able to determine solubility from chemical reactions using a solubility chart. 8.1.2 Be able to construct a lab to determine unknowns based on solubility. 8.1.3 Explain Collision Theory	Lab: Breathing	Breathing lab using Vernier and Internet	Solubility Reaction Rate Gas collection tray Collision Theory
Goal 8.2 Bonding	8.2.1 Be able to explain the concept of metal bonds. 8.2.2 Be able to discuss the properties of metals. 8.2.3 Review the strength of chemical bonds and the relation to chemical properties. Consider both intramolecular (chemical) and intermolecular (physical) bonds. 8.2.4 Be able to distinguish between bond types present in a molecule, on the basis	Lab: Zn + HCl—Change the rate of reaction by measuring H2 given off.	Vernier Calculate amout to half the Zn lab reaction	Metal Bonds

	of electronegativity.			
Goal 8.3 Molecular and Electron Geometry	8.3.1 Be able to create an electron dot diagram for any molecule. Include in the diagram designations of the charge distribution. 8.3.2 Be able to distinguish between the occurrence of atomic orbitals and hybrid orbitals. 8.3.3 Be able to explain how to name hybrid orbitals. 8.3.4 Be able to identify the number and types of groups attached to a hybridized atom in a molecule. 8.3.5 Distinguish between the terminology used to describe molecular geometry and Electron-pair geometry. 8.3.6 Be able to identify which hybrid orbitals occur in any given molecule by using its electron-dot diagram. 8.3.7 Be able to list the bond angles found in different molecules with hybrid orbitals. sp^3, sp^2, and sp hybrids. 8.3.8 Be able to distinguish between bond strength of single and multiple bonds. 8.3.9 Be able to recognize which molecules show resonance. Be able to explain the effect of resonance on the chemistry of the molecule.	Lab: Marshmallow +Dots –molecular geometry PPT hybridization Molecular models	Chemsketch Software: ACD Labs—chemical drawing on computers.	Hybridization Hybrid orbital Sigma Bond Pi bond Molecular Geometry Resonance Electron-pair geometry
Goal 8.4 Reaction Rates	8.4.1 Be able to graph and determine reaction rates with both slope and trend lines. 8.4.2 Be able to change rate of reactions by change the things that influence reaction rate.		Graphing in Excel	Trend Line

Unit 9: Metals

Goal – The student will:	*Objectives (to be reached by completion of Chemistry—11th or 12th grade)*	*Samples of Applications*	*Curriculum Materials (including technological resources)*	*Key Vocabulary*
Goal 9.1: Metallic Bonding	9.1.1 Students will understand metallic bonding	Reading guide and worksheet	.	
Goal 9.2 Student Project on Metals	9.2.1 Students will meet the following criteria in the project. 1) When was your element discovered? 2)Who discovered it? 3) How did it get its name? 4) Define and describe the physical properties of your element? 5) State of matter at room temperature, boiling point, melting point, **etc**. 6) Define and describe the chemical properties of your element? 7) Electronegativity, group, period, e- configuration, common ions, **etc.** 8) What does your element look like? – include at least 1 picture in this section 9) Where and how is it naturally found on earth? (How is it mined?) 10) What are its elemental forms and what are common compounds it makes, does it make a (an) alloy (s)? 11) What bonding patterns/shapes does it form? 12) What is the history of your element? 13) How was it used or known in the past? 14) What are common and rare uses of your element? 15) Is it used differently today than in the past – how? 16) Has it had a "good" or "bad" history so far? 17) What is the cost of your element (now and/or in the past)? Include a Graph.		Internet Research/ Library Research Word Processing	

	18) Why or how is your element related to modern medicine or the environment? 19) Give a minimum of 3 examples. 20) How is your element related to technology? 21) Give a minimum of 3 examples. **HONORS CHEM additional paragraphs--** 23) Show and explain the use of at least 2 IMPORTANT oxidation-reduction (redox) equations that go along with this research for your metal. 24) Show and explain the use of at least 3 additional IMPORTANT chemical equations (reactions) for your metal that go along with this research for your metal. 25)Conclusion Paragraph(s) Summarize what you have learned and why the reader should care about it. 26) BIBLIOGRAPHY – must be in correct format. See library website for details.			
Goal: 9.3 Ions of Metals and Their Properties	9.1.3 Students will discuss in class the environmental impact of ions of Chromiom +3 and +4	Movie	Video	

Unit 10: Mathematics of Chemical Equations

Goal – The student will:	***Objectives (to be reached by completion of Chemistry—11th or 12th grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 10.1: Stoichiometry	10.1.1Define Stoichiometry and describe its importance 10.1.2Relate Stoichiometry to balance chemical equations 10.1.3Explain how Hydrogen peroxide can be used to clean a cut, bleach hair, power a rocket. 10.1.4 Be able to read the following equation using	Molecular models	.	Organic Substituent Prefix: iso Prefix: neo Cycle Cis Trans Geometric isomer

	moles: $N_2H_4 + H_2O_2 \rightarrow N_2 + 4\ H_2O$ 10.1.5 Be able to determine molar ration between a reactant and a product. (Pg 350-351)or mole-mole problems 10.1.6 Be able to determine mass of each reactant and product in a balance chemical equation. (pg 352-353) 10.1.7 Determine which laws is conserved in a balanced chemical equation.			Structural isomer Condensed formula Expanded formula
Goal 10.2 Solving Stoichiometry Problems	10.2.1Be able to calculate Stoichiometry problems for mass-mass, mass-volume, volume-volume.(Use the card)	Functional Group Project Lab: Esters	Organic Unknown Lab Ester Synthesis Lab	Organic Family Alkane ALkene Alkyne Markonwnikoff'sRule Multi Step Synthesis
Goal 10.3	10.3.1Define Limiting reactant 10.3.2Explain how quantities of products are determined in a chemical reaction 10.3.3 Be able to calculate the percent yield of a chemical reaction. 10.3.4 Be able to calculate limiting reactant problems.			

Unit 11: Organic Chemistry

Goal – The student will:	***Objectives (to be reached by completion of Chemistry—11th or 12th grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 11.1: Naming	11.1.1 Learn how to assemble and use the four parts of an organic molecule's name. 11.1.2 Learn how to identify the longest chain of carbon atom and how to number it for locating substituents. 11.1.3 Learn the prefixes to designate up to 10 carbon atoms in a chain. 11.1.4 Learn the prefixes to indicate the number of	Molecular models	.	Organic Substituent Prefix: iso Prefix: neo Cycle Cis Trans Geometric isomer Structural isomer Condensed formula Expanded formula

	substituents. 11.1.5 Learn how to use the prefixes "iso" and "neo". 11.1.6 Learn how to designate a carbon group as a substituent. 11.1.7 Learn how to use the term "cyclo" 11.1.8 Learn the difference between "cis" and "trans" (geometric isomers). 11.1.9 Learn what is meant by the expression "structural isomer". Be able to generate structural isomers from a condensed formula.			
Goal 11.2 Functional Group and their Prep and Reactions	11.2.1 Learn the general formulae and how to identify the different organic families. 11.2.2 Learn the shapes of the molecules at the functional group. 11.2.3 Be able to explain the significance of molecular shape. 11.2.4 Learn the preparations of alkanes. 11.2.5 Learn the preparations of alkenes. 11.2.6 Learn the preparations of alkynes. 11.2.7 Learn the reactions of alkanes. 11.2.8Learn the reactions of alkenes. 11.2.9 Learn Markownikoff's Rule. 11.2.10 Learn the reactions of alkynes. 11.2.11 Learn how to do multi-step syntheses. 11.2.12 Learn the combustion reaction for each of the families.	Functional Group Project Lab: Esters	Organic Unknown Lab Ester Synthesis Lab	Organic Family Alkane ALkene Alkyne Markonwnikoff'sRule Multi Step Synthesis
Goal 11.3 Functional Groups Extras	11.3.1Learn how to write names and formulas for alcohols, aldehydes, ketones and carboxylic acids; learn how to use the prefixes, hydroxyl-, oxy- and carboxy-. 11.3.2Learn how to determine the physical bonds present in an organic			

	molecule. 11.3.4 Be able to classify an alcohol as wither primary, secondary, or tertiary by both its structure and the Luca's test. 11.3.5Be able to rank molecules by physical state, boiling point or solubility in either water or an organic solvent. 11.3.6Learn the preparations and reactions of alcohols, aldehydes, ketones and carboxylic acids. 11.3.7Be able to give at least one use for each of the organic families studied.			

Unit 12: Chemistry Forensics

Goal – The student will:	***Objectives (to be reached by completion of Chemistry—11th or 12th grade)***	***Samples of Applications***	***Curriculum Materials (including technological resources)***	***Key Vocabulary***
Goal 12.1:		Lab: Flinn Forensics Kits	Electrophoresis Chambers, Power supplies, etc. .	

Unit 13: Gas Laws

Goal – The student will:	*Objectives (to be reached by completion of Chemistry—11th or 12th grade)*	*Samples of Applications*	*Curriculum Materials (including technological resources)*	*Key Vocabulary*
Goal 13.1:				

Unit 14: Energy Laws

Goal – The student will:	*Objectives (to be reached by completion of Chemistry—11th or 12th grade)*	*Samples of Applications*	*Curriculum Materials (including technological resources)*	*Key Vocabulary*
Goal 14.1: