

Name of Course: Honors Chemistry

Grade Level: 9-12

School: ORHS

Major Assignments: No Major Assignments

Field Trips: None planned

How can parents access instructional materials? Canvas

Please attach a pacing guide for your course if you teach science or any high school subject.

Honors Chemistry

2018-2019

Term 1

Unit 1: Measurements and Calculations

Unit 2: Matter and Energy

- *State Standard: CHEM1.PS3.1: Contrast the concepts of temperature and heat flow in macroscopic and microscopic terms. Understand that heat is a form of energy and temperature is a measure of the average kinetic energy of a molecule.*
- *State Standard: CHEM1.PS3.2: Draw and interpret heating and cooling curves and phase diagrams. Analyze the energy involved in calorimetry by using the Law of Conservation of Energy quantitatively (use $q=mc\Delta t$) and qualitatively.*
- *State Standard: CHEM1.PS3.3: Distinguish between endothermic and exothermic reactions by constructing potential energy diagrams and explain the differences between the two using chemical terms (i.e. activation energy). Recognize when energy is absorbed or given off depending on the bonds formed and bonds broken.*
- *State Standard: CHEM1.PS3.4: Analyze energy changes to explain and defend the Law of Conservation of energy.*

Unit 3: Elements, Atoms, and Ions

- *State Standard: CHEM1.PS1.11: Develop and compare historical models of the atom (from Democritus to quantum mechanical model) and construct arguments to show how scientific knowledge evolves over time, based on experimental evidence, critique, and alternative interpretation.*
- *State Standard: Interpret the periodic table to describe an element's atomic make-up.*

Unit 4: Nomenclature

- *State Standard: CHEM1.PS1.13: Write the names of chemical compounds, including polyatomic ions using IUPAC criteria.*

Term 2

Unit 5: The Mole and Percent Composition

- *State Standard: CHEM1.PS1.1: Understand and be prepared to use values specific to chemical processes: the mole, molar mass, and percent composition.*

Unit 6: Chemical Reactions

- *State Standard: CHEM1.PS1.2: Demonstrate that atoms, and therefore mass, are conserved during a chemical reaction by balancing chemical equations.*
- *State Standard: CHEM1.PS1.4: Use the reactants in a chemical reaction to predict the products and identify reaction classes (synthesis, decomposition, combustion, single replacement, and double replacement).*

Unit 7: Stoichiometry

- *State Standard: CHEM1.PS1.3: Perform stoichiometric calculations involving the following relationships: mole-mole, mass-mass, mole-mass, mole-particle, and mass-particle. Show a qualitative understanding of the phenomenon of percent yield, limiting and excess reagents in a chemical reaction through pictorial and conceptual examples (states of matter liquid and solid; excluding volume of gases).*

Term 3

Unit 8: Modern Atomic Theory

Unit 9: Chemical Bonding

- *State Standard: CHEM1.PS1.12: Explain the origin and organization of the Periodic Table. Predict chemical and physical properties of main group elements (reactivity, number of subatomic particles, ion charge) based on location on the periodic table. Use the periodic table to draw Lewis dot structures.*
- *State Standard: CHEM1.PS1.12: Construct an argument to describe how the quantum mechanical model of the atom (i.e. patterns of valence and inner electrons) defines periodic properties. Use the periodic table to show an understanding of orbital notations through drawing and interpreting graphical representations (i.e. arrows representing electrons in an orbital).*
- *State Standard: CHEM1.PS1.12: Predict chemical and physical properties of main group elements (ionization energy, atomic radius, and electronegativity) based on location on the periodic table.*
- *State Standard: CHEM1.PS2.1: Draw, identify, and contrast graphical representation of chemical bonds (ionic, covalent, and metallic) based on chemical formulas. Construct and communicate explanations to show that atoms combine by transferring and sharing electrons.*
- *State Standard: CHEM1.PS1.13: Use Lewis dot structures and electronegativity differences of elements to predict the types of bonds that are formed during chemical reactions.*
- *State Standard: CHEM1.PS1.14: Use the Lewis dot structures and electronegativity differences to predict the polarities of simple molecules (linear, bent, triangular, tetrahedral). Construct an argument to explain how electronegativity affects the shape of basic chemical molecules.*
- *State Standard: CHEM1.PS4.1: Using a model, explain why elements emit and absorb characteristic frequencies of light and how this information is used.*

Term 4

Unit 10: Liquids and Solids

Unit 11: Gas Laws

- *State Standard: CHEM1.PS1.5: Conduct investigations to explore and characterize the behavior of gases (pressure, volume, and temperature), develop models to represent this behavior, and construct arguments to explain this behavior. Evaluate the relationship (qualitatively and quantitatively) at STP between pressure and volume (Boyle's Law), temperature and volume (Charles's Law), temperature and pressure (Gay-Lussac Law), and moles and volume (Avogadro's Law), and evaluate and explain the relationships with respect to kinetic-molecular theory. Be able to understand, establish, and predict the relationships between volume, temperature, and pressure using the combined gas law both qualitatively and quantitatively.*
- *State Standard: CHEM1.PS1.6: Use the ideal gas law, $PV=nRT$, to algebraically evaluate the relationship among the number of moles, volume, pressure, and temperature for ideal gases.*
- *State Standard: Identify and solve stoichiometry problems which interconvert volume of gases at STP, moles, and mass.*
- *State Standard: CHEM1.PS2.2: Understand the intermolecular forces created by the unequal distribution of charge result in varying degrees of attraction between molecules. Compare and contrast the intermolecular forces (hydrogen bonding, dipole-dipole bonding, and London dispersion forces) within different types of simple substances (only those following the octet rule) and predict and explain their effect on chemical and physical properties of those substances using models or graphical representations.*

Unit 12: Solutions

- *State Standard: CHEM1.PS1.7: Analyze solutions to identify solutes and solvents, quantitatively analyze concentrations (molarity, percent composition, and ppm), and perform separation methods, such as, evaporation, distillation, and/or chromatography and show conceptual understanding of distillation. Construct arguments to justify the use of certain separation methods under different circumstances.*
- *State Standard: CHEM1.PS1.15: Investigate, describe, and mathematically determine the effect of solute concentration on vapor pressure using the solute's van't Hoff factor on freezing point depression and boiling point elevation.*
- *State Standard: CHEM1.PS2.3: Construct a model to explain the process by which solutes dissolve in solvents and develop an argument to describe how intermolecular forces affect the solubility of different chemical compounds.*
- *State Standard: CHEM1.PS2.4: Conduct and investigation to determine how temperature, surface area, and stirring affect the rate of solubility. Construct an argument to explain the relationships observed in experimental data using collision theory.*

Unit 13: Acids and Bases

- *State Standard: CHEM1.PS1.8: Identify acids and bases as a special class of compounds with a specific set of properties.*

Unit 14: Nuclear Chemistry

- *State Standard: CHEM1.PS1.9: Draw models (qualitative models such as pictures or diagrams) to demonstrate an understanding of radioactive stability and decay. Understand and differentiate between fission and fusion reactions. Use models such as pictures (graphs or table) to explain the concept of half-life and its use in determining age of materials (such as radiometric dating).*
- *State Standard: CHEM1.PS1.10: Compare alpha, beta, and gamma radiation in terms of mass, charge, and penetrating power. Identify examples of applications of different radiation types in everyday life (such as its applications to cancer treatment).*

Each unit will be assessed through a summative assessment (test). State standards as well as local objectives will be assessed on each test.