Course Title: Honors Chemistry I
Board Approval Date: March 17, 2020
Credit / Hours: 1.0

Course Description:

This course presents the introductory principles of chemistry at an advanced level. This course is designed for those students interested in a science or related field, who have shown a willingness to commit considerable time outside the classroom for practice, homework, and consistent studying. Strong emphasis is placed on high-level problem solving and the development of enhanced analytical and critical thinking skills. Students will be using lecture, laboratory skills, and higher level problem-solving skills to master introductory chemistry principles. Topics include atomic structure, solids, liquids, gases, bonding, chemical equations, solutions, stoichiometry, and introduction to acid/base theory.

Learning Activities / Modes of Assessment:

Large Group Instruction	Role Playing / Simulations
Tests and Quizzes	Computer Simulations
Teacher Observation	Lab Journals / Write-ups
Various Websites	Student Response Systems
Small Group Projects w/ Rubrics	Laboratory Experiments
Audio/Visual Media	Laboratory Reports

Instructional Resources:

Tzimopoulos, Nicholas D. *Modern Chemistry*. Holt, Rinehart and Winston, 2002.

Various Websites

Laboratory Experiments

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Introduction to Chemistry, Matter and the Laboratory 8 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. 3.2.C.A1.a -- Essential PROPERTIES OF MATTER - Differentiate between physical properties and chemical properties. 3.2.C.A1.b -- Essential PROPERTIES OF MATTER - Differentiate between pure substances and mixtures; differentiate between heterogeneous and homogeneous mixtures. 3.2.C.B3.a -- Important HEAT/HEAT TRANSFER - Describe the law of conservation of energy. 3.2.10.A4.c -- Important REACTIONS - Explain the difference between endothermic and exothermic reactions. Branches of Chemistry Scientific Method Laboratory Equipment/Uses Lab/Safety Procedures Types of Matter Changes of Matter	Chemistry lab can be conducted safely when procedures and equipment are known. Chemistry is the study of matter and the changes it undergoes. These changes in matter are accompanied by changes in energy.	Identify laboratory equipment. Locate and describe the uses of personal protective equipment and safety equipment. Describe safe laboratory practices. CHEM.A.1.1.2 -- Important Classify observations as qualitative and/or quantitative SI.11-12.1 - Examine the status of existing theories. SI.11-12.2 - Evaluate experimental information for relevance and adherence to science processes. SI.11-12.3 - Judge that conclusions are consistent and logical with experimental conditions. SI.11-12.4 - Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution. SI.11-12.5 - Communicate and defend a scientific argument. 11-12.R.S.3 - Follow precisely a complex multistep procedure when carrying out

Forms and States of Energy VOCAB: Bunsen burner evaporating dish crucible graduated cylinder Erlenmeyer flask Volumetric flask beaker tongs test tube test tube rack clay triangle ring stand clamp test tube holder eye wash safety shower fume hood fire blanket volatile Flammable Element Symbols/Names Types of Data (Qualitative/Quantitative) chemistry organic chemistry inorganic chemistry biochemistry physical chemistry analytical chemistry matter substance chemistry hypothesis theory law independent variable dependent variable Substance Compound Element Mixture heterogeneous mixture homogeneous mixture Matter		experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. 11-12.R.S.7 - Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. 11-12.R.S.8 - Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. 3.2.C.A1.a -- Essential PROPERTIES OF MATTER - Differentiate between physical properties and chemical properties. 3.2.C.A1.b -- Essential PROPERTIES OF MATTER - Differentiate between pure substances and mixtures; differentiate between heterogeneous and homogeneous mixtures. 3.2.C.A3.a -- Essential MATTER AND ENERGY - Describe the three normal states of matter in terms of energy, particle motion, and phase transitions. CHEM.A.1.1.1 -- Essential Classify physical or chemical

chemical property physical property intensive property extensive property Solution kinetic energy potential energy radiant energy Endothermic Exothermic chemical change physical change law of conservation of mass		changes within a system in terms of matter and/or energy. CHEM.A.1.1.2 -- Important Classify observations as qualitative and/or quantitative. CHEM.A.1.2.2 -- Important Differentiate between homogeneous and heterogeneous mixtures (e.g., how such mixtures can be separated). CHEM.B.1.2.2 -- Important Apply the law of definite proportions to the classification of elements and compounds as pure substances. 3.2.10.A3. -- Essential MATTER & ENERGY - Describe phases of matter according to the kinetic molecular theory. 3.2.10.A4.c - REACTIONS - Explain the difference between endothermic and exothermic reactions.

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Measurements and Calculations 10 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. Scientific Method SI Units Metric Prefixes Temperature Conversions Unit Conversions Scientific Notation Types of Data (Qualitative/ Quantitative) Significant Figures Precision/Accuracy Taking Measurements Uncertainty in Measurement VOCAB: Control Conclusion qualitative data quantitative data base unit derived unit Density scientific notation dimensional analysis conversion factor significant figure Precision Accuracy percent error error	Chemistry is comprised of laboratory experiments and data manipulation.	CHEM.A.1.1.3 -- Important Utilize significant figures to communicate the uncertainty in a quantitative observation. CHEM.A.1.1.2 -- Important Classify observations as qualitative and/or quantitative. SI.8-10.6 -- Essential Explain the importance of accuracy and precision in making valid measurements.

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Atomic Structure 6 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. CHEM.A.2.1.1 -- Important Describe the evolution of atomic theory leading to the current model of the atom based on the works of Dalton, Thomson, Rutherford, and Bohr 3.2.C.A5.b -- Important UNIFYING THEMES - Describe Rutherford's "gold foil" experiment that led to the discovery of the nuclear atom. Identify the major components (protons, neutrons, and electrons) of the nuclear atom and explain how they interact 3.2.10.A5.a -- Important UNIFYING THEMES - MODELS Describe the historical development of models of the atom and how they contributed to modern atomic theory. 3.2.12.A2.a -- Important STRUCTURE OF MATTER - Distinguish among the isotopic forms of elements How the model of the atom was developed over time? Fundamental Particles of the atom	Atomic theory explains the pieces of an atom, their arrangement, and the ways they interact. Atomic theory is the foundation for the study of chemistry.	3.2.C.A5.a -- Essential UNIFYING THEMES - MODELS Recognize discoveries from Dalton (atomic theory), Thomson (the electron), Rutherford (the nucleus), and Bohr (planetary model of atom), and understand how each discovery leads to modern theory. 3.2.C.A3.c -- Important MATTER AND ENERGY - Describe the process of radioactive decay by using nuclear equations and explain the concept of half-life for an isotope. 3.2.C.A3.b -- Important MATTER AND ENERGY - Identify the three main types of radioactive decay and compare their properties. CHEM.A.2.1.2 -- Important Differentiate between the mass number of an isotope and the average atomic mass of an element. 3.2.10.A2.b -- Essential STRUCTURE OF MATTER - Explain why compounds are composed of integer ratios of elements. SI.8-10.3 -- Essential Identify questions and concepts that guide scientific investigations.

Isotopes Nuclear Reactions and Equations VOCAB: Atom Nucleus Proton Neutron Electron atomic number atomic mass mass number Isotope nuclear symbol nuclear reaction nuclear equation radioactivity radioactive decay alpha particle beta particle gamma ray half-life ion cation anion		SI.8-10.4 -- Essential Formulate and revise explanations and models using logic and evidence. 3.2.C.A5.b - UNIFYING THEMES - Describe Rutherford's "gold foil" experiment that led to the discovery of the nuclear atom. Identify the major components (protons, neutrons, and electrons) of the nuclear atom and explain how they interact. 3.2.C.A3.d - MATTER AND ENERGY - Compare and contrast nuclear fission and nuclear fusion. 3.2.12.A2.a - STRUCTURE OF MATTER - Distinguish among the isotopic forms of elements. CHEM.A.2.1.1 - Describe the evolution of atomic theory leading to the current model of the atom based on the works of Dalton, Thomson, Rutherford, and Bohr. 3.2.10.A5.a - UNIFYING THEMES - MODELS Describe the historical development of models of the atom and how they contributed to modern atomic theory. 3.2.12.A2.b - STRUCTURE OF MATTER - Explain the probabilistic nature of radioactive decay based on subatomic rearrangement in

		the atomic nucleus. 3.2.12.A3. - MATTER & ENERGY - Explain how matter is transformed into energy in nuclear reactions according to the equation E=mc2. SI.11-12.1 - Examine the status of existing theories. SI.8-10.1 - Compare and contrast scientific theories.

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Quantum Theory and Electron Configurations 7 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. 3.2.C.A2.a -- Essential STRUCTURE OF MATTER - Compare the electron configurations for the first twenty elements of the periodic table. 3.2.C.A2.b -- Essential STRUCTURE OF MATTER - Relate the position of an element on the periodic table to its electron configuration and compare its reactivity to the reactivity of other elements in the table. CHEM.A.2.2.3 -- Important Explain the relationship between the electron configuration and the atomic structure of a given atom or ion (e.g., energy levels and/or orbitals with electrons, distribution of electrons in orbitals, shapes of orbitals). 3.2.10.A5.a -- Important UNIFYING THEMES - MODELS Describe the historical development of models of the atom and how they contributed to modern atomic theory. How to draw a Bohr model diagram.	How does the number and arrangement of electrons determine the properties of an element?	3.2.C.A2.a -- Essential STRUCTURE OF MATTER - Compare the electron configurations for the first twenty elements of the periodic table. 3.2.C.A2.b -- Essential STRUCTURE OF MATTER - Relate the position of an element on the periodic table to its electron configuration and compare its reactivity to the reactivity of other elements in the table. CHEM.A.2.2.1 -- Important Predict the ground state electronic configuration and/or orbital diagram for a given atom or ion. CHEM.A.2.2.4 -- Important Relate the existence of quantized energy levels to atomic emission spectra. CHEM.A.2.2.2 -- Essential Predict characteristics of an atom or an ion based on its location on the periodic table (e.g., number of valence electrons, potential types of bonds, reactivity). 3.2.12.A2.c -- Important STRUCTURE OF MATTER - Explain how light is absorbed or emitted by electron orbital transitions.

How an electron is able to absorb/emit energy. Electromagnetic Spectrum Characteristics of Light Emission Spectra Quantum Numbers Electron Configurations and Rules How to draw orbital notations How to draw Lewis dot diagrams VOCAB: electromagnetic radiation wavelength Frequency Amplitude quantized photon electromagnetic spectrum Planck's constant energy level Quanta photoelectric effect atomic emission spectrum ground state excited state Heisenberg Uncertainty Principle quantum number Energy level Sublevel atomic orbital electron configuration aufbau principle Pauli exclusion principle Hund's rule valence electrons octet rule Ion Lewis Dot Structure		SI.8-10.2 -- Essential Know that both direct and indirect observations are used by scientists to study the natural world and universe. SI.8-10.3 -- Essential Identify questions and concepts that guide scientific investigations. CHEM.A.2.2.3 - Explain the relationship between the electron configuration and the atomic structure of a given atom or ion (e.g., energy levels and/or orbitals with electrons, distribution of electrons in orbitals, shapes of orbitals). 3.2.10.A5.a - UNIFYING THEMES - MODELS Describe the historical development of models of the atom and how they contributed to modern atomic theory. SI.11-12.1 - Examine the status of existing theories. 11-12.W.1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. 11-12.W.1a - Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims,

		reasons, and evidence. 11-12.W.1c - Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. 11-12.W.1d - Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. 11-12.W.1e - Provide a concluding statement or section that follows from and supports the argument presented. 11-12.W.2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content. 11-12.R.S.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Periodicity 8 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. CHEM.A.2.3.1 -- Important Explain how the periodicity of chemical properties led to the arrangement of elements on the periodic table. CHEM.A.2.3.2 -- Important Compare and/or predict the properties (e.g., electron affinity, ionization energy, chemical reactivity, electronegativity, atomic radius) of selected elements by using their locations on the periodic table and known trends. 3.2.C.A2.b -- Essential STRUCTURE OF MATTER - Relate the position of an element on the periodic table to its electron configuration and compare its reactivity to the reactivity of other elements in the table. The History of the Development of the Periodic Table Classifications/Families of the Periodic Table How the elements are organized. Periodic Trends	The periodic table is organized in repeating patterns.	3.2.C.A1.c -- Essential PROPERTIES OF MATTER - Explain the relationship of an element's position on the periodic table to its atomic number, ionization energy, electro-negativity, atomic size, and classification of elements. CHEM.A.2.2.2 -- Essential Predict characteristics of an atom or an ion based on its location on the periodic table CHEM.A.2.3.1 -- Important Explain how the periodicity of chemical properties led to the arrangement of elements on the periodic table. CHEM.A.2.3.2 -- Important Compare and/or predict the properties (e.g., electron affinity, ionization energy, chemical reactivity, electronegativity, atomic radius) of selected elements by using their locations on the periodic table and known trends. 3.2.C.A2.b -- Essential STRUCTURE OF MATTER - Relate the position of an element on the periodic table to its electron configuration and compare its reactivity to the reactivity of other elements in the table.

How to draw Lewis dot diagrams VOCAB: group/family periods metals nonmetals metalloids/semi-metals alkali metals alkaline-earth metals transition metals halogens noble gases electronegativity ionization energy electron affinity atomic radius malleable ductile periodic law ions cation anion shells effective nuclear charge Lewis Dot Structure		3.2.10.A1.a -- Important PROPERTIES OF MATTER - Predict properties of elements using trends of the periodic table. 11-12.R.S.4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Chemical Bonding and Molecular Structure 9 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. 3.2.C.A2.c -- Important STRUCTURE OF MATTER - Explain how atoms combine to form compounds through both ionic and covalent bonding. 3.2.12.A5.a -- Compact UNIFYING THEMES - MODELS/PATTERNS Use VSEPR theory to predict the molecular geometry of simple molecules. 3.2.12.A1.b -- Compact PROPERTIES OF MATTER - Compare and contrast the unique properties of water to other liquids. CHEM.A.1.2.5 -- Compact Describe how chemical bonding can affect whether a substance dissolves in a given liquid. CHEM.B.1.3.1 -- Essential Explain how atoms combine to form compounds through ionic and covalent bonding. CHEM.B.1.4.1 -- Compact Recognize and describe different types of models that can be used to illustrate the bonds that hold atoms together in a compound (e.g.,	Chemical bonding is a result of attractive forces between particles. Properties of substances are directly related to the shape of the molecules they form.	3.2.C.A1.d -- Essential PROPERTIES OF MATTER - Use electro-negativity to explain the difference between polar and nonpolar covalent bonds. 3.2.C.A2.c -- Important STRUCTURE OF MATTER - Explain how atoms combine to form compounds through both ionic and covalent bonding. CHEM.A.1.1.4 -- Essential Relate the physical properties of matter to its atomic or molecular structure. CHEM.A.1.2.1 -- Important Compare properties of solutions containing ionic or molecular solutes (e.g., dissolving, dissociating). CHEM.B.1.3.2 -- Essential Classify a bond as being polar covalent, nonpolar covalent, or ionic. CHEM.B.1.3.3 -- Important Use illustrations to predict the polarity of a molecule. CHEM.B.1.4.2 -- Important Utilize Lewis dot structures to predict the structure and bonding in simple compounds. CHEM.A.2.2.2 -- Essential

computer models, ball and stick models, graphical models, structural formulas, Lewis dot structures). How and why chemical bonds are formed Types of Bonds and Their Characteristics Molecular Structure Intermolecular Forces VOCAB: chemical bond electrolyte covalent bond polar nonpolar metallic bond diatomic element alloy molecule VSEPR theory linear trigonal planar tetrahedral trigonal pyramidal bent/angular octahedral trigonal bipyramidal square planar T-shaped square pyramidal dipole moment lewis structure bond angle hybridization resonance sigma bond pi bond single bond double bond triple bond		Predict characteristics of an atom or an ion based on its location on the periodic table (e.g., number of valence electrons, potential types of bonds, reactivity). 3.2.C.A2.e -- Essential STRUCTURE OF MATTER - Draw Lewis dot structures for simple molecules and ionic compounds. 3.2.10.A2.a -- Essential STRUCTURE OF MATTER - Compare and contrast different bond types that result in the formation of molecules and compounds. 3.2.12.A5.a - UNIFYING THEMES - MODELS/ PATTERNS Use VSEPR theory to predict the molecular geometry of simple molecules. 3.2.12.A1.b - PROPERTIES OF MATTER - Compare and contrast the unique properties of water to other liquids. CHEM.A.1.2.5 - Describe how chemical bonding can affect whether a substance dissolves in a given liquid. CHEM.B.1.3.1 - Explain how atoms combine to form compounds through ionic and covalent bonding. CHEM.B.1.4.1 - Recognize and describe different types of models that can be used to illustrate the bonds that hold atoms together in a

		compound (e.g., computer models, ball and stick models, graphical models, models, structural formulas, Lewis dot structures).

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Formula Writing and Nomenclature 6 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. Types of Chemical Formulas How to write formulas for chemical compounds How to name chemical formulas Greek Prefixes (1-10) Roman numerals (I-VI) VOCAB: polyatomic ion binary compound hydrate acid coefficient charge oxidation number subscript superscript ternary compounds base monatomic ion	Chemical names and formulas are combinations are different substances through chemical bonds.	3.2.10.A2.a -- Essential STRUCTURE OF MATTER - Compare and contrast different bond types that result in the formation of molecules and compounds. CHEM.B.1.3.1 - Explain how atoms combine to form compounds through ionic and covalent bonding. 3.2.C.A2.d -- Essential STRUCTURE OF MATTER - Predict chemical formulas based on the number of valence electrons. 3.2.C.A2.f -- Essential STRUCTURE OF MATTER - Predict the chemical formulas for simple ionic and molecular compounds. CHEM.A.1.1.5 -- Essential Apply a systematic set of rules (IUPAC) for naming compounds and writing chemical formulas (e.g., binary covalent, binary ionic, ionic compounds containing polyatomic ions). 3.2.10.A2.b -- Essential STRUCTURE OF MATTER - Explain why compounds are composed of integer ratios of elements

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Chemical Reactions 8 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. Types of Chemical Formulas How to write formulas for chemical compounds How to name chemical formulas Greek Prefixes (1-10) Roman numerals (I-VI) 3.2.C.A4.a -- Important REACTIONS - Predict how combinations of substances can result in physical and/or chemical changes. VOCAB: polyatomic ion binary compound hydrate acid chemical reaction chemical equation reactant product coefficient aqueous solution synthesis decomposition single replacement activity series double replacement neutralization base	Chemical names and formulas are combinations are different substances through chemical bonds. Chemical reactions are predictable	3.2.10.A2.a -- Essential STRUCTURE OF MATTER - Compare and contrast different bond types that result in the formation of molecules and compounds. CHEM.B.1.3.1 - Explain how atoms combine to form compounds through ionic and covalent bonding. 3.2.C.A2.d -- Essential STRUCTURE OF MATTER - Predict chemical formulas based on the number of valence electrons. 3.2.C.A2.f -- Essential STRUCTURE OF MATTER - Predict the chemical formulas for simple ionic and molecular compounds. CHEM.A.1.1.5 -- Essential Apply a systematic set of rules (IUPAC) for naming compounds and writing chemical formulas (e.g., binary covalent, binary ionic, ionic compounds containing polyatomic ions). 3.2.C.A4.d -- Essential REACTIONS - Classify chemical reactions as synthesis (combination), decomposition, single displacement (replacement), double displacement, and combustion.

salt combustion solubility rules soluble insoluble precipitate driving force ion cation anion spectator ions		3.2.C.A4.c -- Essential REACTIONS - Balance chemical equations by applying the laws of conservation of mass. 3.2.10.A2.b -- Essential STRUCTURE OF MATTER - Explain why compounds are composed of integer ratios of elements CHEM.B.2.1.4 -- Important Predict products of simple chemical reactions (e.g., synthesis, decomposition, single replacement, double replacement, combustion). CHEM.B.2.1.5 -- Essential Balance chemical equations by applying the Law of Conservation of Matter. CHEM.B.2.1.3 -- Important Classify reactions as synthesis, decomposition, single replacement, double replacement, or combustion. 3.2.10.A4.a -- Essential REACTIONS - Describe chemical reactions in terms of atomic rearrangement and/or electron transfer. 3.2.12.A4.b -- Important REACTIONS - Describe the interactions between acids and bases. 3.2.C.A4.a - REACTIONS - Predict how combinations of substances can result in physical and/or chemical changes

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Chemical Composition and The Mole 8 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. 3.2.10.A5.b -- Important UNIFYING THEMES - SCALE Apply the mole concept to determine number of particles and molar mass for elements and compounds. What a mole is How a mole is used Calculations using formulas and chemical equations VOCAB: mole avogadro's number molar mass percent composition ratio empirical formula molecular formula molecule formula unit ion atom	The mole is essential to chemistry, and we use it for chemical calculations.	3.2.C.A4.e -- Essential REACTIONS - Use stoichiometry to predict quantitative relationships in a chemical reaction. 3.2.C.A2.g -- Essential STRUCTURE OF MATTER - Use the mole concept to determine number of particles and molar mass for elements and compounds. 3.2.C.A2.h -- Important STRUCTURE OF MATTER - Determine percent compositions, empirical formulas, and molecular formulas. CHEM.B.1.1.1 -- Essential Apply the mole concept to representative particles (e.g., counting, determining mass of atoms, ions, molecules, and/or formula units). CHEM.B.1.2.3 -- Compact Relate the percent composition and mass of each element present in a compound. 3.2.10.A5.b - UNIFYING THEMES - SCALE Apply the mole concept to determine number of particles and molar mass for elements and compounds.

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Stoichiometry 6 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. 3.2.10.A4.b -- Important REACTIONS - Predict the amounts of products and reactants in a chemical reaction using mole relationships. 3.2.10.A5.b -- Important UNIFYING THEMES - SCALE Apply the mole concept to determine number of particles and molar mass for elements and compounds. CHEM.B.2.1.1 -- Compact Describe the roles of limiting and excess reactants in chemical reactions. How a mole is used Calculations using formulas and chemical equations Limiting Reagents VOCAB: mole Avogadro's number molar mass mole ratio STP molar volume (22.4L/mol) stoichiometry percent composition limiting reactant percent yield	The mole is essential to chemistry, and we use it for chemical calculations.	3.2.C.A4.e -- Essential REACTIONS - Use stoichiometry to predict quantitative relationships in a chemical reaction. 3.2.C.A2.g -- Essential STRUCTURE OF MATTER - Use the mole concept to determine number of particles and molar mass for elements and compounds. 3.2.C.A2.h -- Important STRUCTURE OF MATTER - Determine percent compositions, empirical formulas, and molecular formulas. CHEM.B.1.1.1 -- Essential Apply the mole concept to representative particles (e.g., counting, determining mass of atoms, ions, molecules, and/or formula units). CHEM.B.1.2.3 -- Compact Relate the percent composition and mass of each element present in a compound. CHEM.B.2.1.2 -- Important Use stoichiometric relationships to calculate the amounts of reactants and products involved in a chemical reaction.

		CHEM.B.1.2.2 -- Important Apply the law of definite proportions to the classification of elements and compounds as pure substances. CHEM.B.2.1.1 - Describe the roles of limiting and excess reactants in chemical reactions. 3.2.10.A4.b - REACTIONS - Predict the amounts of products and reactants in a chemical reaction using mole relationships. 3.2.10.A5.b - UNIFYING THEMES - SCALE Apply the mole concept to determine number of particles and molar mass for elements and compounds.

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Kinetic Theory – States of Matter – Gases 7 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. Relationships among the properties of gases (pressure, temperature, volume) How to describe a gas according to the kinetic molecular theory. How a gas can deviate from ideal behavior VOCAB: pressure Boyle's Law Charles' Law Gay-Lussac's Law ideal gas ideal gas law Dalton's Law of Partial pressures Graham's Law of Effusion Avogadro's hypothesis STP absolute zero ideal gas constant kinetic molecular theory molar volume	The physical characteristics of gases can be described using the gas laws and kinetic molecular theory.	3.2.C.A3.a -- Essential MATTER AND ENERGY - Describe the three normal states of matter in terms of energy, particle motion, and phase transitions. CHEM.B.2.2.1 -- Important Utilize mathematical relationships to predict changes in the number of particles, the temperature, the pressure, and the volume in a gaseous system (i.e., Boyle's law, Charles's law, Dalton's law of partial pressures, the combined gas law, and the ideal gas law). CHEM.B.2.2.2 -- Important Predict the amounts of reactants and products involved in a chemical reaction using molar volume of a gas at STP. 3.2.10.A3. -- Essential MATTER & ENERGY - Describe phases of matter according to the kinetic molecular theory. 11-12.R.S.4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

Curriculum: Dover Area School District
Course: Honors Chemistry I
TOPIC: Solution Chemistry 7 days

Know:	Understand:	Do:
Chemistry is the study of matter and the changes it undergoes. CHEM.A.1.2.4 --Describe various ways that concentration can be expressed and calculated (e.g., molarity, percent by mass, percent by volume). CHEM.A.1.2.5 -- Compact Describe how chemical bonding can affect whether a substance dissolves in a given liquid. 3.2.12.A1.b -- Compact PROPERTIES OF MATTER - Compare and contrast the unique properties of water to other liquids. Like dissolves like Colligative properties Factors that Affect Solubility VOCAB: dissolve solution solute solvent molarity molality mole fraction mass percent percent by volume saturated/unsaturated	Forces between molecules affect solubility.	CHEM.A.1.2.1 -- Important Compare properties of solutions containing ionic or molecular solutes (e.g., dissolving, dissociating). CHEM.A.1.2.3 - Describe how factors (e.g., temperature, concentration, surface area) can affect solubility. CHEM.A.1.2.4 - Describe various ways that concentration can be expressed and calculated (e.g., molarity, percent by mass, percent by volume). CHEM.A.1.2.5 - Describe how chemical bonding can affect whether a substance dissolves in a given liquid. 3.2.12.A1.a - PROPERTIES OF MATTER - Compare and contrast colligative properties of mixtures. 3.2.12.A1.b - PROPERTIES OF MATTER - Compare and contrast the unique properties of water to other liquids.

Honors Chemistry I Pacing Guide

Course: Honors Chemistry I

Course Unit (Topic)	Length of Instruction (Class Periods)
1. Introduction to Chemistry, Matter and the Laboratory	8 days
2. Measurements and Calculations	10 days
3. Atomic Structure	6 days
4. Quantum Theory and Electron Configurations	7 days
5. Periodicity	8 days
6. Chemical Bonding and Molecular Structure	9 days
7. Formula Writing and Nomenclature	6 days
8. Chemical Reactions	8 days
9. Chemical Composition and The Mole	8 days
10. Stoichiometry	6 days
11. Kinetic Theory – States of Matter – Gases	7 days
12. Solution Chemistry	7 days
	Total Days: 90 days