Jonesville High School
Chemistry One

Overview:

This one trimester course is designed to give students a solid foundation in the basic concepts of Chemistry in a manner which should prepare the student to be a scientifically literate citizen. Chemistry I will also insure that the student is well equipped with the laboratory skills and scientific practices in order for them to be successful in Chem II. This class covers many of the old high school objectives described in the Michigan Merit curriculum for chemistry (Michigan Department of Education, 2006) with a direct focus on The Next Generation Science Standards which the state of Michigan adopted in 2016. The document that describes these expectations can be obtained from the Michigan Department of Education (www.mi.gov/mdoe). In addition, my goal is to guide students through common scientific practices with a series of relevant laboratory activities and demonstrations which enrich the curriculum and further promote mastery of the concepts and lab experiences.

Units of Study

Unit Title:	Length
1. Kinetic Molecular Theory & Solubility	2 weeks
○ Summative Assessment #1 = Kinetic Molecular Theory, Intermolecular Force & Solubility	
2. Collision Theory and Properties of Matter	2 weeks
○ Summative Assessment #2 = Density, Collision Theory, Introduction to Reaction Rate	
3. Subatomic Particles and Nuclear Processes	2 weeks
○ Summative Assessment #3 = A review of Subatomic Particles. Atomic Symbols and Nuclear Processes	
4. Chemical Reactions and Conservation	2 weeks
○ Summative Assessment #4 = Atoms, ions, molecules and periodic trends	
5. Conservation of Mass and Chemical Reactions	2.5 weeks
○ Summative Assessment #5 = Conservation of Mass & Chemical Reactions and the mole	
6. Properties of Acids and Bases	1.5 weeks
○ Summative Assessment #6 = Acid Base Reactions	

Text: Scientific Journal Articles
Required course for 10-11 graders
10th Grade/Chemistry 1:
Unit One Title: Kinetic Molecular Theory and Solubility

NGSS Standards:	**Learning Targets & "I can statements": (Performance Task)**	**Key Vocabulary and Case Studies:**	**Instructional Resources:**	**Suggested Assessment:**
MS-PS1-4: Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. **MS-PS1-2:** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	● Describe Chemistry. ● Describe Properties of matter. ● Develop a model that predicts and describes changes in particle motion as matter changes. ● Develop a model of changes in matter relate to changes in mass/volume. ● Identify physical changes within matter. ● Separate a mixture based on physical properties. ● Analyze a solubility curve. ● Describe freezing point depression	● Chemistry ● Matter ● Mass ● Volume ● Intermolecular forces ● Temperature ● Phase Change ● Chemical Change ● Bonds ● Kinetic Energy ● Solution/Mixture ● Physical Property ● Solubility ● Unsaturated ● Saturated ● Supersaturated ● Solubility Curve ● Freezing Point Depression ● Boiling Point Elevation ● ACS - Chemmatters salting the roads Journal Article.	● Steel Wool ● Ice ● Hot Plate ● Beaker ● Graduated Cylinder ● Beaker Tongs ● H_2O ● Computer ● Ammonia Chloride; NH_4Cl ● PASCO digital Thermometers ● Test Tubes ● Bunsen Burner ● Test Tube Rack ● NaCl ● Chromebook ● Google Sheets	**FA** - PHET - virtual kinetic molecular theory modeling activity. Students can develop a model that predicts and describes changes in particle motion, temp and state of a pure substance when thermal energy is added or removed. **SA -** Lab - Modeling physical changes in matter. Students can develop a model that predicts and describes changes in particle motion, temp and state of a pure substance when thermal energy is added or removed. **FA -** Separating a mixture. Students can describe

	and boiling point elevation			properties of a mixture by separating one based on physical properties. **FA -** Graphical analysis of solubility curves. Students can plot and analyze a solubility curve. **FA -** Lab - Creating a solubility curve. Students can collect data and analyze a solubility curve created in class to make predictions. **FA -** Lab - Boiling Point Elevation. Students can describe boiling point elevation. **FA** - Freezing Point depression Journal Analysis. Students can identify a real life application to freezing point depression. **SA -** Unit #1 Test - Modeling KMT and IMF & Analysis of Solubility curve.

Text: Scientific Journal Articles
Required course for 10-11 graders
10th Grade/Chemistry 1:
Unit Two Title: Collision Theory and Properties of Matter

NGSS Standards:	**Learning Targets & "I can statements": (Performance Task)**	**Key Vocabulary and Case Studies:**	**Instructional Resources:**	**Suggested Assessment:**
MS-PS1-5: Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. **MS-PS1-2:** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **HS-PS1-4** Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. **HS-PS1-5** Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	• Describe how mass relates to volume in matter. • Calculate density in lab. • Make predictions based on data collected in lab (Density). • Describe energy. • Describe how energy relates to the kinetic molecular theory. • Describe how energy relates to temperature. • Describe the perception of the transfer of energy. • Describe Bond Energy • Activation energy • Analyze an energy level diagram • Describe the collision theory. • Describe how a chemical reaction	• Matter • Mass • Volume • Density • Reactants • Products • Yield • Molecule • Bond • Energy • Temperature • Endothermic • Exothermic • Bond Energy • Activation energy • Energy Level Diagram • Collision Theory • Activation energy • Surface Area • Concentration	• Computers • Zn • Cu • Al • Graduated Cylinder • H_2O • Scale • Vernier Thermometers • Baking Soda • Vinegar • Magnesium • 0.5 M HCl • Graph Paper • Stop Watches • Scale • Food Dye • Mortar & Pestle • Alka Seltzer • PASCO Thermometers • Hot plate • Solid H_2O • Graph Paper • Vinegar • Baking Soda	**FA -** Students can calculate density. **SA -** Students can make an educated prediction about what a metal is based on measurements in mass and volume conducted in lab. **SA -** Students can make predictions about matter based on density calculated in lab. **FA -** Student can describe the difference between temperature and heat. **FA -** Student can describe how energy is transferred from one substance to another.

	occurs between two molecules. ● Using the collision theory, describe how temperature, concentration and surface area influence the rate of a chemical reaction.		● Chromebook ● Schoology	**FA -** Student can observe a chemical reaction and describe the difference between bond energy in reactants and products. **FA -** Students can create and describe an energy level diagram. **FA -** Students can create a model of and effective collision using the collision theory. **FA -** Students can design a lab to investigate the influence of surface area , temperature and concentration on reaction rate. **FA -** Students can create a graph to show show how S.A, Temp and Conc. influence reaction rate. **SA -** Unit 2 Test: Collision Theory and Properties of Matter.

Text: Scientific Journal Articles
Required course for 10-11 graders
10th Grade/Chemistry 1:
Unit Three Title: Subatomic Particles and Nuclear Processes

NGSS Standards:	**Learning Targets & "I can statements": (Performance Task)**	**Key Vocabulary and Case Studies:**	**Instructional Resources:**	**Suggested Assessment:**
HS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures. **HS-PS1-8** Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. **HS-PS2-6** Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.	• Identify Subatomic particles. • Read and identify subatomic particles based off of atomic symbols. • Construct a physical model to illustrate the substructures of an atom. • Create a model showing how nuclear process occur, and write an essay about why the nuclear structure is important in the functioning of designed materials.	• Smallest bits of matter - NPR article. • Periodic Table • Atom • Proton • Neutron • Electron • Charge • Mass • Radius • Nucleus • Electron Cloud • Fission • Fusion • Radiation • Half Life • Decay • Alpha Decay • Beta Decay • Gamma Radiation • Nuclear Medicine • Nuclear Energy • Nuclear Weapons	• Computer • Subatomic particle modeling set • Pennies (½ life modeling activity) • Shoe boxes	**FA -** PHET - subatomic particles. **FA -** Subatomic particles worksheet. **FA -** PHET ½ Life **FA -** PHET alpha decay **FA -** PHET beta decay **FA -** Fission/Fusion **FA -** Gamma decay **SA -** Research project in practical uses of nuclear chemistry in society. **SA -** Unit 3 Test: Subatomic Particles and Nuclear Processes.

Text: Scientific Journal Articles
Required course for 10-11 graders
10th Grade/Chemistry 1:
Unit Four Title: Atoms, Ions, Molecules and Periodic Trends

NGSS Standards:	**Learning Targets & "I can statements": (Performance Task)**	**Key Vocabulary and Case Studies:**	**Instructional Resources:**	**Suggested Assessment:**
MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures. **HS-PS1-1** Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	• Describe the composition of subatomic particles within a molecule. • Identify Ionic, covalent and metallic bonds. • Describe properties molecules based on bond type. • Describe/create an alloy. • Properly name atoms, ions and molecules based on their bond type. • Describe patterns in the periodic table. • Use the periodic table to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms and trends in the periodic table. • Describe reactivity. • Make predictions about reactivity based on trends in the periodic table.	• Atom • Ion • Molecule • Bond • Cation • Anion • Charge • Mass number • Proton • Neutron • Electron • Valence Electron • Metal • Nonmetal • Ionic Bond • Covalent Bond • Metallic Bond • Alloy • Lewis Dot structure • Ionization energy • Electronegativity • Atomic Radius • Periodic Table • Reactivity	• Index Cards • Dot Stickers • Markers • Graph paper • Periodic Tables • 0.5 M HCl • Tin • HCl • Mg • Ca • Si • H_2O • Test Tubes • Test Tube Rack • Beakers • Graduated Cylinders. • Periodic Tables • Computers • Graph Paper • Journal Articles	**FA** - Illustrating electron dot diagrams. **FA -** Illustrating Ionic & Covalent bonds. **FA -** Lab - Properties of ionic and covalent compounds. **FA -** Metallic bonding - Alloy lab. **FA -** Periodic Trends Worksheet. **FA -** Using trends to describe bonding activity. **FA -** Graphical Analysis of periodic trends. **FA -** Lab - Using trends to describe properties in ionic and covalent compounds. **FA -** Lab - Using periodic trends to describe reactivity. **SA -** Unit 4 Test: Atoms, Ions, Molecules and periodic trends.

Text: Scientific Journal Articles
Required course for 10-11 graders
10th Grade/Chemistry 1:
Unit Five Title: Conservation of Mass and Chemical Reactions

NGSS Standards:	**Learning Targets & "I can statements": (Performance Task)**	**Key Vocabulary and Case Studies:**	**Instructional Resources:**	**Suggested Assessment:**
MS-PS1-1 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. **HS-PS1-2** Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. **HS-PS1-7** Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	• Use mathematical representations to describe the law of conservation. • I can describe how balancing chemical equations relates to the conservation of mass. • Use periodic trends to describe/predict the outcome of chemical reactions. • Identify different types of chemical reactions. • Given a type of chemical reaction write a chemical reaction.	• Matter • Mass • Conservation • Mole • Molar Mass • Coefficients • Subscripts • Balancing Chemical Reactions • Reactants • Products • Yield • Coefficient • Subscript • Synthesis Reaction • Decomposition Reaction • Combustion Reaction • Double Replacement Reaction • Single Replacement Reaction	• Computers • Vinegar • Baking Soda • Scale • Graph Paper • Magnesium • Bunsen Burner • Crucible • Computers • Combustion Demo apparatus • Flour • Candels • Butane Lighter • Mg • KI • Dish soap • HCl • NaOH • H_2O_2	**FA -** Students can convert mole conversions. **SA -** Mole conversion quiz. **FA -** Students can balance chemical reactions. **SA -** Balancing chemical reactions quiz. **FA -** Students can collect and organize/communicate data that supports the law of conservation. **FA -** Student can make predictions using trends in the periodic table about how atoms will interact. **FA** - Students can observe chemical reactions and identify the type of chemical reaction. **FA -** Given material and the type of reaction involved, students can predict the products involved in a chemical reaction. **SA -** Unit 5 Test: Conservation of Mass and Chemical Reactions.

Text: Scientific Journal Articles
Required course for 10-11 graders
10th Grade/Chemistry 1:
Unit Six Title: Properties of Acid, Base Reactions

NGSS Standards:	**Learning Targets & "I can statements": (Performance Task)**	**Key Vocabulary and Case Studies:**	**Instructional Resources:**	**Suggested Assessment:**
MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures. **HS-PS2-6** Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials. **HS-PS1-2** Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	• Describe properties of acids and bases. • Describe what an acid/base is under the Arrhenius model. • Describe what an acid/base is under the Bronsted-Lowry Model. • Describe what an indicator is and how it relates to pH. • Identify conjugate acid/bases in acid/base reactions. • Describe type of reaction that occurs in a acid/metal reaction. • Describe type of reaction that occurs in a neutralization reaction.	• Acid • Base • pH • Arrhenius Model • Bronsted-Lowry Model • Indicator • Hydronium ion • Hydroxide ion • Neutralization reaction • Conjugate Acid • Conjugate Base	• Wa heads • Litmus paper • Universal Indicator • 1 M NaOH • Vinegar • Red Cabbage • Various Household acids/bases • H_2O • 500 mL Graduated cylinders • 100 mL graduated cylinder • Mortar and Pestle • Test Tubes	**FA -** Conjugate acid/base worksheet. **FA -** Dilution and $[H_3O^+]$ & $[OH^-]$ **FA -** Red Cabbage indicator hydronium/hydroxide ion concentration lab. **FA -** Neutralization lab. **FA -** Acid/Base reaction lab. **SA -** Unit 6 Test: Properties of acid, base reactions.