Chemistry Scope and Sequence

2019-2020

1st Six Weeks	**29 days**	**August 26-Oct. 4, 2019** *(Sept. 13, 2019-early release day)*	**The recommended number of class periods for each six weeks is less than the number of days give time for reteach, extended learning, assessment days and differentiated instruction** **Sept. 2, 2019-non-instructional day**
Introduction: Processes of Chemistry Investigations	**2 class periods**		**Chem 1A-Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS.** **1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.** **2A- Know the definition of science and understand that it has limitations** **2B- Know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories** **2C- Know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent**

			researchers. Unlike hypothesis, scientific theories are well established and highly reliable explanations, but maybe subject to change as new areas of science and new technologies are developed. **2D- Distinguish between scientific hypotheses and scientific theories** **2E- Plan and implement investigative procedures, including asking questions, formulating testable hypothesis, and selecting equipment and technology including graphing calculators, computers and probes, electronic balances, an adequate supply of consumable chemicals and sufficient scientific glassware such as beakers, Erlenmeyer Flasks, pipettes, graduated cylinders, volumetric flasks and burettes.** **2F- Collect data and make measurements with accuracy and precision.** **2G- Express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation and significant figures.** **2H- Organize, analyze, evaluate, make inferences and predict trends from data.** **2I- Communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals.** **3A- Analyze, evaluate and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.**

			3B-Communicate and apply scientific information extracted from various sources such as current events, published journal articles and marketing materials. **3C- Draw inferences based on data related to promotional materials for products and services.** **3D- Evaluate the impact of research on scientific thought, society and the environment.** **3E- Describe the connection between chemistry and future careers.** **3F-Describe the history of chemistry and contributions of scientists.**
Unit 01 Matter: Fundamental concepts of matter	**12 class periods**		**Chem 1A-Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS.** **1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.** **2E- Plan and implement investigative procedures, including asking questions, formulating testable hypothesis, and selecting equipment and technology including graphing calculators, computers and probes, electronic balances, an adequate supply of consumable chemicals and sufficient scientific glassware such as beakers, Erlenmeyer Flasks, pipettes, graduated cylinders, volumetric flasks and burettes.**

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			4D- Classify matter as pure substances or mixtures through investigation of their properties.
Unit 02 **Atomic Structure and the Periodic Table**	**14 class periods**	**Sept. 16-Oct. 3, 2019** **(Oct. 4, 2019- non-instructional day)**	**Chem 1A-Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS.** **1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.** **2A- Know the definition of science and understand that it has limitations** **2B- Know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories** **2C- Know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypothesis, scientific theories are well established and highly reliable explanations, but maybe subject to change as new areas of science and new technologies are developed.**

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			3D- Evaluate the impact of research on scientific thought, society and the environment. **3F-Describe the history of chemistry and contributions of scientists.** **5A- Explain the use of chemical and physical properties in the historical development of the Periodic Table.** **5B- Identify and explain the properties of chemical families including alkali metals, alkaline earth metals, halogens, noble gases, and transition metals using the Periodic Table.** **5C- Interpret periodic trends, including atomic radius, electronegativity and ionization energy using the Periodic Table.** **6A- Describe the experimental design and conclusions used in the development of modern atomic theory including Dalton's Postulates, Thomson's discovery of electron properties, Rutherford's nuclear atom and Bohr's nuclear atom.** **6B- Describe the mathematical relationships between energy, frequency and wavelength of light using the electromagnetic spectrum.** **6C- Calculate average atomic mass of an element using isotopic composition.** **(End of 1st 6 Weeks)**

2nd 6 Weeks	**25 days**	**Oct. 7-Nov. 7, 2019** *(Nov. 8, 2019-non-instructional day)*	
Unit 03 **Atomic and Nuclear Chemistry**	**8 class periods**		Chem 1A-Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers. 1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS. 1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials. 2E- Plan and implement investigative procedures, including asking questions, formulating testable hypothesis, and selecting equipment and technology including graphing calculators, computers and probes, electronic balances, an adequate supply of consumable chemicals and sufficient scientific glassware such as beakers, Erlenmeyer Flasks, pipettes, graduated cylinders, volumetric flasks and burrettes. 2F- Collect data and make measurements with accuracy and precision. 2G- Express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation and significant figures.

			3A- Analyze, evaluate and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student. 3F-Describe the history of chemistry and contributions of scientists Science Content Standards 6A- Describe the experimental design and conclusions used in the development of modern atomic theory including Dalton's Postulates, Thomson's discovery of electron properties, Rutherford's nuclear atom and Bohr's nuclear atom. 6B- Describe the mathematical relationships between energy, frequency and wavelength of light using the electromagnetic spectrum. 6C- Calculate average atomic mass of an element using isotopic composition. **12A- Describe the characteristics of alpha, beta and gamma radioactive decay processes in terms of balanced nuclear equations.** **12B- Compare fission and fusion reactions.**
Unit 04 Chemical Bonding	**10 class periods**		**Chem 1A-Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability,**

			corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS. **1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.** **2E- Plan and implement investigative procedures, including asking questions, formulating testable hypothesis, and selecting equipment and technology including graphing calculators, computers and probes, electronic balances, an adequate supply of consumable chemicals and sufficient scientific glassware such as beakers, Erlenmeyer Flasks, pipettes, graduated cylinders, volumetric flasks and burrettes.** **2F- Collect data and make measurements with accuracy and precision.** **2H- Organize, analyze, evaluate, make inferences and predict trends from data.** **2I- Communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals.** **Science Content Standards** 7A- Name ionic compounds containing main group or transition metals, covalent compounds, acids and bases, using International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules. 7B- Write the chemical formulas of ionic compounds containing representative elements, transition metals and common polyatomic ions,

			covalent compounds and acids and bases. 7C- Construct electron dot formulas to illustrate ionic and covalent bonds. 7D- Describe metallic bonding and explain metallic properties such as thermal and electrical conductivity, malleability and ductility 7E- Classify molecular structure for molecules with linear, trigonal planar and tetrahedral electron pair geometries as explained by Valence Shell Electron Pair Repulsion (VSEPR) theory.
Unit 05 **Chemical Reactions**	**3 class periods**		**1A- Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS.** **1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.** **2E- Plan and implement investigative procedures, including asking questions, formulating testable hypothesis, and selecting equipment and technology including graphing calculators, computers and probes, electronic balances, an adequate supply of consumable chemicals and sufficient scientific glassware such as beakers, Erlenmeyer Flasks, pipettes,**

			graduated cylinders, volumetric flasks and burrettes. **2F- Collect data and make measurements with accuracy and precision.** **2H- Organize, analyze, evaluate, make inferences and predict trends from data.** **2I- Communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals.** **Science Content Standards** **8A- Define and use the concept of mole**
3rd 6 Weeks	**25 days**	**Nov. 11-Dec. 20, 2019** *(Nov. 25-29, 2019-Thanksgiving Break)* *(Dec. 20, 2019-early release day)* *(Dec. 23-Jan. 3, 2020-holidays)* *(Jan.6-7, 2020-non-instructional day)*	**Dec. 9-13, 2019-STAAR Week**
Unit 06 Chemical Equations and Reactions and	**12 class periods**		**1A- Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.**

Formula Stoichiometry			**1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS.** **1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.** **2E- Plan and implement investigative procedures, including asking questions, formulating testable hypothesis, and selecting equipment and technology including graphing calculators, computers and probes, electronic balances, an adequate supply of consumable chemicals and sufficient scientific glassware such as beakers, Erlenmeyer Flasks, pipettes, graduated cylinders, volumetric flasks and burettes.** **2F- Collect data and make measurements with accuracy and precision.** **2H- Organize, analyze, evaluate, make inferences and predict trends from data.** **2I- Communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals.** **3A- Analyze, evaluate and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.** **3B-Communicate and apply scientific information extracted from various sources such as current events,**

			published journal articles and marketing materials. **3- Draw inferences based on data related to promotional materials for products and services.** **3F-Describe the history of chemistry and contributions of scientists.** **Science Content Standards** **8A- Define and use the concept of mole** **8B- Calculate the number of atoms or molecules in a sample of material using Avogadro's number.** **8C- Calculate percent composition of compounds** **8D- Differentiate between empirical and molecular formulas** **8E- Write and balance chemical equations using the law of conservation of mass.** **8F- Differentiate among double replacement reactions, including acid-base reactions and precipitation reactions and oxidation-reduction reactions such as synthesis, decomposition, single replacement and combustion reactions.**
Unit 07 Stoichiometry: mathematical relationships between reactants and products	**6 class periods**		**1A- Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as**

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4th 6 Weeks	**27 days**	**Jan. 8-Feb. 13, 2020** *(Jan. 17 and Jan 20, 2020 – non-instructional Day)* *Feb. 14, 2020- non-instructional day)*	
Unit 07 – Stoichiometry (continued)	**10 class periods**		**1A- Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as**

			summarized on the Material Safety Data Sheet or the MSDS. **1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.** **2E- Plan and implement investigative procedures, including asking questions, formulating testable hypothesis, and selecting equipment and technology including graphing calculators, computers and probes, electronic balances, an adequate supply of consumable chemicals and sufficient scientific glassware such as beakers, Erlenmeyer Flasks, pipettes, graduated cylinders, volumetric flasks and burettes.** **2F- Collect data and make measurements with accuracy and precision.** **2G- Express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation and significant figures.** **2H- Organize, analyze, evaluate, make inferences and predict trends from data.** **2I- Communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals.** **3A- Analyze, evaluate and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational**

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Unit 08 **Gases and Gas Laws**	**12 class periods**		**1A-Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS.**

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			3E- Describe the connection between chemistry and future careers. **3F-Describe the history of chemistry and contributions of scientists.** **Science Content Standards** **8A- Define and use the concept of mole** **8G- Perform stoichiometric calculations including determination of mass and gas volume relationships between reactants and products and percent yield.** **9A- Describe and calculate the relations between volume, pressure, number of moles and temperature for an ideal gas as described by Boyle's Law, Charles Law, Avogadro's Law, Dalton's Law of partial Pressure and the Ideal Gas Law.** **9B- Describe the postulates of kinetic molecular theory.**
5th 6 Weeks	**29 days**	**Feb. 17-April 3, 2020** *(March 6, 202-early release day)* *(March 9-13-Spring Break)*	

Unit 09 Solutions	**15 class periods**		**1A-Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS.** **1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.** **2E- Plan and implement investigative procedures, including asking questions, formulating testable hypothesis, and selecting equipment and technology including graphing calculators, computers and probes, electronic balances, an adequate supply of consumable chemicals and sufficient scientific glassware such as beakers, Erlenmeyer Flasks, pipettes, graduated cylinders, volumetric flasks and burettes.** **2F- Collect data and make measurements with accuracy and precision.** **2G- Express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation and significant figures.** **2H- Organize, analyze, evaluate, make inferences and predict trends from data.** **2I- Communicate valid conclusions supported by the data through**

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			dissolutions such as temperature, agitation and surface area
Unit 10 **Acids and Bases**	**10 class periods**		**1A-Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS.** **1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.** **2A- Know the definition of science and understand that it has limitations** **2B- Know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories** **2C- Know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypothesis, scientific theories are well established and highly reliable explanations, but maybe subject to change as new areas of science and new technologies are developed.** **2D- Distinguish between scientific hypotheses and scientific theories**

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			3D- Evaluate the impact of research on scientific thought, society and the environment. **3F-Describe the history of chemistry and contributions of scientists.** **Science Content Standards** **10G- Define acids and bases and distinguish between Arrhenius and Bronsted-Lowry definitions and predict products in acid-base reactions that form water.** **10H- Define pH and calculate the pH of a solution using the hydrogen ion concentration**
6th 6 Weeks	**35 days**	**April 6-May 28, 2020** *(April 10, 13 and 14, 2020- non-instructional day)* *May 25- non-instructional Day)* *(May 28-last day of classes)*	**STAAR Weeks** **April 6-9, 2020** **May 4-8, 2020** **May 11-15, 2020**
Unit 11 Thermochemistry	**12 class periods**		**1A-Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.** **1B- Know specific hazards of chemical substances such as flammability, corrosiveness and radioactivity as summarized on the Material Safety Data Sheet or the MSDS.**

			1C- Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials. **2E- Plan and implement investigative procedures, including asking questions, formulating testable hypothesis, and selecting equipment and technology including graphing calculators, computers and probes, electronic balances, an adequate supply of consumable chemicals and sufficient scientific glassware such as beakers, Erlenmeyer Flasks, pipettes, graduated cylinders, volumetric flasks and burettes.** **2F- Collect data and make measurements with accuracy and precision.** **2G- Express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation and significant figures.** **2H- Organize, analyze, evaluate, make inferences and predict trends from data.** **2I- Communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals.** **3A- Analyze, evaluate and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.** **3B-Communicate and apply scientific information extracted from various**

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Unit 12 Nuclear Chemistry (revisit)	**4 class periods**		**12A- Describe the characteristics of alpha, beta and gamma radioactive decay processes in terms of balanced nuclear equations.** **12B- Compare fission and fusion reactions.**
Research Presentations	**5 days**		**All standards**
Review and Final Exam	**5 class periods**		**All standards**