Chemistry, 1st 4.5 weeks
2017-18

Big Ideas/Key Concepts:

- Understandings about scientific inquiry and the ability to conduct inquiry that are essential for living in the 21st century
- Society benefits when engineers apply scientific discoveries to design materials and processes that develop into enabling technologies
- Science applies mathematics to investigate questions, solve problems, and communicate findings

Embedded Inquiry (See below)

- **SPI 3221 Inq.1-**select a description or scenario that reevaluates and/or extends a scientific finding
- **SPI 3221.inq 2-** Analyze the components of a properly designed scientific investigation
- **SPI 3221 Inq. 3-**Determine appropriate tools to gather precise and accurate data
- **SPI 3221 Inq. 4-**Evaluate the accuracy and precision of data
- **SPI 3221 Inq. 5-**Defend a conclusion based on scientific evidence
- **SPI 3221 Inq.6-**determine why a conclusion is free of bias
- **SPI 3221 Inq.7-**Compare conclusions that offer different but acceptable explanations for the same set of data

Embedded Technology & Engineering

- **SPI 3221.T/E.1** Distinguish among tools and procedures best suited to conduct a specified scientific inquiry
- **SPI 3221. T/E .2** Evaluate a protocol to determine the degree to which an engineering design process was successfully applied.
- **SPI 3221. T/E .3** Evaluate the overall benefit to cost to ratio of a new technology
- **SPI 3221. T/E .4** Use design principles to determine if a new technology will improve the quality of life for an intended audience

Embedded Mathematics *(Checks for Understanding)*

- *9* **3221.Math.1** Use a variety of appropriate notations (e.g., exponential, functional, square root).
- *9* **3221.Math.2** Select and apply appropriate methods for computing with real numbers and evaluate the reasonableness of the results.
- *9* **3221.Math.3** Apply algebraic properties, formulas, and relationships to perform operations on real-world problems (e.g., solve for density, determine the concentration of a solution in a variety of units: ppm, ppb, molarity, molality, and percent composition) calculate heats of reactions and phase changes, and manipulate gas law equations.
- *9* **3221.Math.4** Interpret rates of change from graphical and numerical data (e.g., phase diagrams, solubility graphs, colligative properties, nuclear decay or half-life).
- *9* **3221.Math.5** Analyze graphs to describe the behavior of functions (e.g., concentration of a solution, phase diagrams, solubility graphs, colligative properties, nuclear decay half-life).

- *9* **3221.Math.6** Model real-world phenomena using functions and graphs.
- *9* **3221.Math.7** Apply and interpret algebraic properties in symbolic manipulation (e.g., density, concentration of a solution, chemical equations, effect of volume, temperature or pressure on behavior of a gas, percent composition of elements in a compound, molar mass, number of moles, and molar volume, amount of products or reactants given mole, molarity, volume at STP or mass amounts, heat loss or gain using mass, temperature change and specific heat, and half-life of an isotope).
- *9* **3221.Math.8** Apply and communicate measurement units, concepts and relationships in algebraic problem-solving situations.
- *9* **3221.Math.9** Select appropriate units, scales, and measurement tools for problem situations involving proportional reasoning and dimensional analysis.
- *9* **3221.Math.10** Select, construct, and analyze appropriate graphical representations for a data set.
- *9* **3221.Math.11** Identify and solve different types of stoichiometry problems (e.g., volume at STP to mass, moles to mass, molarity).
- *9* **3221.Math.12** Calculate the amount of product expected in an experiment and determine percent yield.
- *9* **3221.Math.13** Convert among the quantities of a substance: mass, number of moles, number of particles, molar volume at STP.

TN Academic Standards	Student Friendly "I Can" Statements	Prerequisite Knowledge	ACT Readiness	Instructional Time	TN Ready Questions/Resources	ACT Questions/Resources
SPI 3221 Inq.1-select a description or scenario that reevaluates and/or extends a scientific finding	I can select a description or scenario that reevaluates and/or extends a scientific finding	**SPI 3221.T/E.3** Evaluate the overall benefit to cost to ratio of a new technology	Interpretation of Data x01, x03 Scientific Investigation x01 Evaluation & Results x01 CLR02	Embedded		
SPI3221.inq 2- Analyze the components of a properly designed	I can analyze the components of a scientific investigation.	**SPI 3221.T/E.2**	Interpretation of Data 02	3 days		

scientific investigation	I can explain all of the safety procedures that are required to successfully complete a lab.	Evaluate a protocol to determine the degree to which an engineering design process was successfully applied.	Scientific Investigation x01, x02, x03, x05 CLR01, REL02			
SPI3221 Inq. 3-Determine appropriate tools to gather precise and accurate data	I can determine the the appropriate tools to gather precise and accurate data	**SPI 3221.T/E.1** Distinguish among tools and procedures best suited to conduct a specified scientific inquiry	Scientific Investigation x02	.25 day		
SPI3221 Inq. 4-Evaluate the accuracy and precision of data	I can evaluate the accuracy and precision of data	*9* **3221.Math.2** Select and apply appropriate methods for computing with real	Interpretation of Data x04 Scientific Investigation x01	.25 day		

		numbers and evaluate the reasonableness of the results.				
SPI 3221 Inq. 5-Defend a conclusion based on scientific evidence	I can defend a conclusion based on scientific evidence	**SPI 3221. T/E .3** Evaluate the overall benefit to cost to ratio of a new technology **SPI 3221. T/E .4** Use design principles to determine if a new technology will improve the quality of life for an intended audience	Evaluation of Models x02, x05 CLR02	.25 day		
SPI 3221 Inq.6-determine why a conclusion is free of bias	I can determine why a conclusion is free of bias		CLR02			

SPI 3221 Inq.7- Compare conclusions that offer different but acceptable explanations for the same set of data	I can compare conclusions that offer different but acceptable explanations for the same set of data		Interpretation of Data x02 Scientific Investigation x04 Evaluation/Results x02, x03 REL02	.25 day		
SPI 3221 T/E.1- Distinguish among tools and procedures best suited to conduct a specified scientific inquiry	I can correctly use and read tools such as a thermometer, balance, metric ruler, graduated cylinder, pipette and burette.	*9* **3221.Math.1** Use a variety of appropriate notations (e.g., exponential, functional, square root). *9* **3221.Math.2** Select and apply appropriate methods for computing with real numbers and evaluate the reasonablenes	Scientific Investigation x01, x02, x03	.25 day		

		s of the results.				
SPI 3221.2.1- Distinguish among elements, compounds and mixtures	I can distinguish among elements, compounds and mixtures			2 days		
SPI 3221.2.4- Identify properties of matter such as density, boiling and melting points, ability to rust or tarnish, and changes in matter such as phase changes, shape, color or formation of a gas or precipitate	I can identify physical properties of matter such as density, boiling and melting points to determine the identity of a substance. I can identify chemical properties such as the ability to rust or tarnish, and changes in matter such as phase changes, shape, color or formation of a gas or precipitate	*9* **3221.Math.2** Select and apply appropriate methods for computing with real numbers and evaluate the reasonableness of the results. *9* **3221.Math.3** Apply algebraic properties, formulas, and relationships to perform operations on		3 days		

		real-world problems (e.g., solve for density, determine the concentration of a solution in a variety of units: ppm, ppb, molarity, molality, and percent composition) calculate heats of reactions and phase changes, and manipulate gas law equations. *9* **3221.Math.4** Interpret rates of change from graphical and numerical data (e.g., phase diagrams,				

		solubility graphs, colligative properties, nuclear decay or half-life). *9* **3221.Math.5** Analyze graphs to describe the behavior of functions (e.g., concentration of a solution, phase diagrams, solubility graphs, colligative properties, nuclear decay half-life). *9* **3221.Math.6** Model real-world phenomena using functions and				

		graphs. *9* **3221.Math.7** Apply and interpret algebraic properties in symbolic manipulation (e.g., density, concentration of a solution, chemical equations, effect of volume, temperature or pressure on behavior of a gas, percent composition of elements in a compound, molar mass, number of moles, and molar volume, amount of products or reactants given mole,				

		molarity, volume at STP or mass amounts, heat loss or gain using mass, temperature change and specific heat, and half-life of an isotope). *9* **3221.Math.8** Apply and communicate measurement units, concepts and relationships in algebraic problem-solving situations. **SPI 3221.T/E.1** Distinguish among tools and procedures best suited to conduct a specified				

		scientific inquiry				
SPI 3221.1.1- compare and contrast major models of the atom (ie.Bohr and Quantum Mechanical Model)	I can compare and contrast major models of the atom (ie.Bohr and Quantum Mechanical Model)			2 days		
SPI 3221.1.2- Interpret the periodic table to describe an element's atomic make up	I can interpret the periodic table to describe an element's atomic make up			3 days		