2017.18 Chemistry, Ongoing Expectations

Big Ideas/Key Concepts:
- Understandings about scientific inquiry and the ability to conduct inquiry 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.

Ongoing Expectations
Note: Do not teach a separate unit at year’s beginning. Embed inquiry, tech/engineering, and math throughout all 4 quarters within content where appropriate.

Honors Addendum
Note for Teachers of Honors: Do not teach the Honors Addendum at the end of the quarter. Embed the Honors Addendum within the regular Scope & Sequence (see end of quarter).

Embedded Inquiry
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 experimental data.
<table>
<thead>
<tr>
<th>Embedded Technology &amp; Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPI 3221.T/E.1</strong> Distinguish among tools and procedures best suited to conduct a specified scientific inquiry.</td>
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<tr>
<td><strong>SPI 3221.T/E.2</strong> Evaluate a protocol to determine the degree to which an engineering design process was successfully applied.</td>
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<tr>
<td><strong>SPI 3221.T/E.3</strong> Evaluate the overall benefit to cost ratio of a new technology.</td>
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<tr>
<td><strong>SPI 3221.T/E.4</strong> Use design principles to determine if a new technology will improve the quality of life for an intended audience.</td>
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<th>Embedded Mathematics</th>
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<tr>
<td><strong>SPI 3221.Math.1</strong> Use real numbers to represent real-world applications (e.g., slope, rate of change, probability, and proportionality)</td>
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<tr>
<td><strong>SPI 3221.Math.2</strong> Perform operations on algebraic expressions and informally justify the selected procedures.</td>
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<tr>
<td><strong>SPI 3221.Math.3</strong> Interpret graphs that depict real-world phenomena.</td>
</tr>
<tr>
<td><strong>SPI 3221.Math.4</strong> Apply measurement unit relationships including Avogadro’s number, molarity, molality, volume, and mass to balance chemical equations.</td>
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<tr>
<td><strong>SPI 3221.Math.5</strong> Use concepts of mass, length, area, and volume to estimate and solve real-world problems.</td>
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## 2017.18 Chemistry, Quarter 1

**Big Ideas/Key Concepts:**
- The properties of matter determine how it interacts with energy.

<table>
<thead>
<tr>
<th>Standards</th>
<th>Student Friendly “I Can” Statements</th>
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<tbody>
<tr>
<td><strong>Matter and Energy</strong>&lt;br&gt;<strong>Properties of Matter:</strong>&lt;br&gt;SPI 3221.2.1 Distinguish among elements, compounds, solutions, colloids, and suspensions.</td>
<td><strong>Matter and Energy</strong>&lt;br&gt;<strong>Properties of Matter:</strong>&lt;br&gt;I can distinguish among elements, compounds and the following mixtures: solutions, colloids and suspensions. I can identify a mixture as homogeneous or heterogeneous, i.e.: solutions are examples of homogeneous mixtures; suspensions are examples of heterogeneous mixtures; colloids can be considered either homogeneous or heterogeneous.</td>
</tr>
<tr>
<td>SPI 3221.T/E.1 Distinguish among tools and procedures best suited to conduct a specified scientific inquiry.</td>
<td>I can correctly use and read tools while measuring properties of matter, such as: a thermometer, balance, metric ruler, graduated cylinder, pipette and burette.</td>
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<tr>
<td>SPI 3221.Inq.3 Determine appropriate tools to gather precise and accurate data.</td>
<td>I can evaluate the accuracy and precision of data.</td>
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<tr>
<td>SPI 3221.2.4 Identify properties of matter (e.g., physical: density, boiling point, melting point, or chemical: ability to rust or tarnish, be sour) or changes in matter (e.g., physical: phase change, shape, color, or chemical: formation of a gas or precipitate).</td>
<td>I can define, identify and analyze physical and chemical properties to determine the identity of a substance.</td>
</tr>
<tr>
<td>CHE.WCE.1: Analyze the physical and chemical properties of a substance to determine its identity.</td>
<td>I can compare, contrast and communicate the difference between a physical and chemical change.</td>
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<tr>
<td>CHE.WCE.2: Analyze physical and chemical changes of a substance.</td>
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</tbody>
</table>
**Interactions of Matter**

**Naming and Formulas:**

<table>
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<tr>
<th>CHE.WCE.3: Compare and contrast the properties of metals, nonmetals and metalloids.</th>
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<td>SPI 3221.3.1 Analyze ionic and covalent compounds in terms of their formation (electron transfer versus sharing), names, chemical formulas (e.g., molecular: H₂O, CO₂, NH₃; empirical: NaCl, CaBr₂, Al(NO₃)₃), percent composition, and molar masses.</td>
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| CHE.WCE.4: Model ionic and molecular (covalent) bonding. |

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<th>CHE.WCE.5: Name and write formulas for binary ionic compounds, polyvalent cations, polyatomic ions and molecular compounds.</th>
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<tr>
<td>SPI 3221.3.7 Classify substances as acids or bases based on their formulas and how they react with litmus and phenolphthalein.</td>
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<td>I can identify and describe the properties of metals, nonmetals, and metalloids.</td>
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<td>I can analyze the characteristics of ionic and molecular (covalent) compounds.</td>
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<td>I can compare and contrast the attractive forces within compounds and molecules, and their effect on chemical and physical properties.</td>
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<td>I can model representations of bonds, ionic and molecular (covalent), to show that atoms combine by transferring or sharing electrons.</td>
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<td>I can name a binary ionic compound given its formula.</td>
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<td>I can employ a table of polyvalent cations and polyatomic ions to name and write the chemical formula of ionic compounds, such as:</td>
</tr>
<tr>
<td>... NH₄⁺ Ammonium</td>
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<tr>
<td>... NO₃⁻ Nitrate</td>
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<tr>
<td>... NO₂⁻ Nitrite</td>
</tr>
<tr>
<td>... HCO₃⁻ Hydrogen Carbonate</td>
</tr>
<tr>
<td>... ClO₄⁻ Perchlorate</td>
</tr>
<tr>
<td>... ClO₃⁻ Chlorate</td>
</tr>
<tr>
<td>... ClO₂⁻ Chlorite</td>
</tr>
<tr>
<td>... ClO⁻ Hypochlorite</td>
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<td>I can name a molecular (covalent) compound given its formula and write the formula given its name.</td>
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<td>I can identify acids and bases based on formulas.</td>
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<td>I can name a binary acid given its formula and write the formula given its name.</td>
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