

ChemMatters Magazine October 2021

Chemistry Concepts & Standard Alignments (NGSS, CCSS)



Correlations to Next Generation Science Standards

Article	Chemistry Concepts	NGSS Connections
<i>What's the Deal with Climate Change?</i>	Chemical change Physical properties Renewable energy Observations Gases	<p>HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.</p> <p>HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.</p> <p>HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.</p> <p>Disciplinary Core Ideas:</p> <ul style="list-style-type: none"> PS1.A: Structure and Properties of Matter ESS2.A: Earth Materials and Systems ETS1.C: Optimizing the Design Solution <p>Crosscutting Concepts:</p> <ul style="list-style-type: none"> Cause and effect Energy and matter Stability and change Systems and system models <p>Science and Engineering Practices:</p> <ul style="list-style-type: none"> Developing and using models Analyzing and interpreting data <p>Nature of Science:</p> <ul style="list-style-type: none"> Scientific knowledge is based on empirical evidence.
<i>Why a Pennsylvania Town Has Been Burning for 60 Years</i>	Activation energy Exothermic and endothermic Heat of combustion Chemical change	<p>HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends on the changes in total bond energy.</p> <p>HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraint, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.</p> <p>Disciplinary Core Ideas:</p> <ul style="list-style-type: none"> PS1.A: Structure and Properties of Matter ETS1.C: Optimizing the Design Solution <p>Crosscutting Concepts:</p> <ul style="list-style-type: none"> Structure and function Scale, proportion, and quantity Energy and matter <p>Science and Engineering Practices:</p> <ul style="list-style-type: none"> Planning and carrying out investigations

		<p>Nature of Science:</p> <ul style="list-style-type: none"> Scientific knowledge assumes an order and consistency in natural systems.
<p>Science Solves the Mystery of an Ancient, Deadly Ritual</p>	<p>Physical properties</p> <p>Identifying an unknown</p> <p>Gases</p> <p>Radioactive isotopes</p>	<p>HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.</p> <p>HS-ESS2-3. Develop a model based on evidence of Earth’s interior to describe the cycling of matter by thermal convection.</p> <p>Disciplinary Core Ideas:</p> <ul style="list-style-type: none"> LS1.C: Organization for matter and Energy Flow in Organisms ESS2.3: Plate Tectonics and Large-Scale System Interactions <p>Crosscutting Concepts:</p> <ul style="list-style-type: none"> Cause and effect Energy and matter Stability and change <p>Science and Engineering Practices:</p> <ul style="list-style-type: none"> Analyzing and interpreting data Engaging in argument from evidence <p>Nature of Science:</p> <ul style="list-style-type: none"> Scientific knowledge is based on empirical evidence.
<p>Copying Nature to Fight Climate Change</p>	<p>Chemical change</p> <p>Electrochemistry</p> <p>Catalysts</p> <p>Intramolecular forces</p>	<p>HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</p> <p>HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.</p> <p>HS-ETS1-3.</p> <p>Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraint, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.</p> <p>Disciplinary Core Ideas:</p> <ul style="list-style-type: none"> LS1.C: Organization for Matter and Energy Flow in Organisms PS1.A: Structure and Properties of Matter ETS1.C: Optimizing the Design Solution <p>Crosscutting Concepts:</p> <ul style="list-style-type: none"> Structure and function Systems and system models Energy and matter <p>Science and Engineering Practices:</p> <ul style="list-style-type: none"> Planning and carrying out investigations <p>Nature of Science:</p> <ul style="list-style-type: none"> Science investigations use a variety of methods Scientific knowledge assumes an order and consistency in natural systems.

Correlations to Common Core State Standards



Note: ELA-Literacy **Common Core State Standards** Connections for all articles

- **ELA-Literacy.RST.9-10.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- **ELA-Literacy.RST.9-10.2:** Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- **ELA-Literacy.RST.9-10.5:** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).
- **ELA-Literacy.RST.9-10.8:** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
- **ELA-Literacy.RST.11-12.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- **ELA-Literacy.RST.11-12.2:** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- **ELA-Literacy.RST.11-12.4:** 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*.
- **ELA-Literacy.RST.11-12.6:** Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

In addition, the teacher could assign writing to include the following **Common Core State Standards**:

- **ELA-Literacy.WHST.9-10.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- **ELA-Literacy.WHST.9-10.2F:** Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
- **ELA-Literacy.WHST.11-12.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- **ELA-Literacy.WHST.11-12.2E:** Provide a concluding statement or section that follows from or supports the argument presented.