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| Pre-AICE Chemistry | | **Standards-Based Education Priority Standards** |
| **10th Grade** | | |
| *Matter Structure* | | |
| HS-PS1-1 | Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. | |
| 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. | |
| HS-PS2-6 | Communicate scientific and technical information about why the molecular-level structure is important to the functioning of designed materials. | |
| HS-PS3-2 | Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields. | |
| HS-PS3-4 | Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). | |
| PAC-1 | Describe the formation of chemical bonds. | |
| *Matter Interactions* | | |
| 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-PS1-4 | 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. | |
| HS-PS1-6 | Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. | |
| HS-PS1-7 | Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. | |
| PAC-2 | Write names and formulas of chemical compounds and use them to construct chemical equations. | |
| PAC-3 | Describe reversible reactions and reactions that involve reduction and oxidation. | |
| PAC-4 | Perform stoichiometric calculations involving the mole. | |
| *Earth's Systems* | | |
| HS-ESS1-5 | Evaluate evidence of the past and current movement of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. | |
| HS-ESS1-6 | Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth’s formation and early history. | |
| HS-ESS2-1 | Develop a model to illustrate how Earth’s internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features. | |
| 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’s systems. | |
| HS-ESS2-3 | Develop a model based on evidence of Earth’s interior to describe the cycling of matter by thermal convection. | |
| HS-ESS2-5 | Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. | |
| *Earth and Human Activity* | | |
| HS-ESS2-6 | Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. | |
| HS-ESS2-7 | Construct an argument based on evidence about the simultaneous coevolution of Earth’s systems and life on Earth. | |
| HS-ESS3-2 | Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios. | |
| HS-ESS3-3 | Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. | |
| HS-ESS3-4 | Evaluate or refine a technological solution that reduces the impacts of human activities on natural systems. | |
| HS-ESS3-5 | Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. | |
| HS-ESS3-6 | Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. | |
| *Engineering* | | |
| 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. | |
| HS-ETS1-2 | Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. | |
| HS-ETS1-3 | Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. | |
| HS-ETS1-4 | Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. | |
| *Literacy in Science* | | |
| 9-10.RST.1 | Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. | |
| 9-10.RST.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. | |
| 9-10.RST.3 | Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. | |
| 9-10.RST.9 | Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. | |
| 9-10.WHST.1 | Write arguments focused on discipline-specific content. | |
| 9-10.WHST.7 | Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. | |