Physical Science Frameworks Pacing Guide

Properties of Matter

Crosscutting Concepts: Energy & Matter; Patterns; Structure & Function; Scale, Proportion & Quantity
Topics: Structure of atoms and element; Trends in Periodic Table; Compounds- properties, bonds and naming; Energy in atoms, elements and compounds

7-week Instructional Segment

Anchoring Phenomenon	GSE	Sample Lessons	Disciplinary Core Ideas	Science and Engineering Practices	Instructional Notes
Overall: Elements and compounds are used to make a car or rocket operate. Unit: Na+ and Cl- behave very differently and have different physical and chemical properties as elements than as a compound (NaCl).	SPS1a,b,c, SPS2a,b,c, SPS7a	**Elements and the Compounds They Form**	A Framework for K-12 Science Education: ***By the end of grade 12*** ● Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. ● The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. ● The repeating patterns of this table reflect patterns of outer electron states. ● The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. ● Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules. ● Chemical processes and properties of	Developing and using models Analyzing and Interpreting Data Constructing Explanations	Additional teacher notes are provided in the instructional segment Safety Elemental Na and Cl are dangerous and not appropriate in a classroom Chemicals should always be handled according to SDS By the end of this unit, students are using the following language in their speaking and writing during EXPLAIN or ELABORATE. -Atomic Structure -Properties -Patterns -Element -Trend -Compound -Stable -Properties

			materials underlie many important biological and geophysical phenomena. ● Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. ● The strong and weak nuclear interactions are important inside atomic nuclei—for example, they determine the patterns of which nuclear isotopes are stable and what kind of decays occur for unstable ones.		-Bonds

This instructional segment will connect to the overall energy standard SPS7a- as the energy contained within atoms is harnessed in chemical bonds, and through nuclear reactions. The overall phenomena of the course of a car or rocket (as determined by student and teacher interest) should be an over-arching theme of this instructional segment and returned to often as new understanding is added from the content. Additionally, this instructional segment connects directly to Stability and Change in Reactions as the understanding of the atom is essential in the understanding of these concepts.