

## Physical Science 1 Progression

This progression is about the structure and properties of matter. Matter is composed of material that is too small to be seen, but is understood in terms of the types of atoms present and how they interact. Because of these interactions, matter can be found in different states (solid, liquid, gas), have identifiable properties (hardness, conductivity, etc.) and reactions (chemical and physical), which can be predicted.

In elementary grades, students learn that matter can be described and classified by its observable properties. Students investigate different kinds of materials to identify patterns such as similarities and differences in their observable properties. The properties could include color, texture, hardness and flexibility. Students plan and conduct an investigation in collaboration with others to produce data that will serve as evidence that answers a question. Also, students learn that matter can exist in various forms; solids and liquids.

At middle school, students learn that the properties of substances can change when they interact. Chemical and physical reactions can occur as a result of these interactions. Students understand substances are composed of molecules. If the molecules of a substance are all of one type, the substance is considered to be pure. Students are able to determine if a chemical change has occurred by analyzing and interpreting data of the properties of a substance before and after the substances interact. Chemical changes could include oxidization, burning sugar or steel wool, and mixing zinc with hydrogen chloride.

At the high school level, students learn about the periodic table. Students learn that the periodic table is designed based upon atomic structure; that is, it orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. Students also learn that the repeating patterns of the periodic table reflect patterns of outer electron states and that these patterns can be used to

predict and support explanations for the outcome of simple chemical reactions. For example, sodium and chloride (NaCl) combine to form a stable molecule because of their electron configuration and the desire for a molecule to reach stability.

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## Grade 4:

### Alternate KSA Aligned to KCAS for Science:

Make observations (could include looking for patterns) to describe and classify different kinds of materials by their observable properties.

2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]

SEP (Science and Engineering Practices)	DCI (Disciplinary Core Ideas)	CC (Crosscutting Concepts)
Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.	Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.	Patterns in the natural and human designed world can be observed.

## Grade 7:

### Alternate KSA Aligned to KCAS for Science:

**Interpret data on the characteristic physical and chemical properties of substances before and after the substances interact to determine if a chemical reaction has occurred.**

07-PS1-2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. [Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.]

SEP (Science and Engineering Practices)	DCI (Disciplinary Core Ideas)	CC (Crosscutting Concepts)
Analyze and interpret data to determine similarities and differences in findings.	Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.	Macroscopic patterns are related to the nature of microscopic and atomic-level structure.

## Grade 11:

### Alternate KSA Aligned to KCAS for Science:

**Construct an explanation for the outcome of a simple chemical reaction (specific to elements in families 1, 2, and 13-18), based on the outermost electron states of atoms and trends in the periodic table.**

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. [Clarification Statement: Examples of chemical reactions could include the reaction of sodium and chlorine, carbon and oxygen, or carbon and hydrogen.]

SEP (Science and Engineering Practices)	DCI (Disciplinary Core Ideas)	CC (Crosscutting Concepts)
Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the	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.	Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

natural world operate today as they did in the past and will continue to do so in the future.		
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