

MS-PS1-3 Matter and its Interactions

California Science Test—Item Content Specifications

# MS-PS1-3 Matter and its Interactions

Students who demonstrate understanding can:

Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

[Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.] [*Assessment Boundary: Assessment is limited to qualitative information.*]

Continue to the next page for the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Obtaining, Evaluating, and Communicating Information  Obtaining, evaluating, and communicating information in 6–8 builds on K–5 and progresses to evaluating the merit and validity of ideas and methods.  Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or now supported by evidence. | PS1.A: Structure and Properties of Matter   1. Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.   PS1.B: Chemical Reactions   1. Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. | Structure and Function  Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.  Connections to Engineering, Technology, and Applications of Science  Interdependence of Science, Engineering, and Technology  Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.  Influence of Science, Engineering and Technology on Society and the Natural World  The uses of technologies and any limitation on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. |

## Assessment Targets

Assessment targets describe the focal knowledge, skills, and abilities for a given three-dimensional Performance Expectation. Please refer to the Introduction for a complete description of assessment targets.

### Science and Engineering Subpractice(s)

Please refer to appendix A for a complete list of Science and Engineering Practices (SEP) subpractices. Note that the list in this section is not exhaustive.

8.1 Ability to comprehend and evaluate text in terms of its validity, reliability, and sources

### Science and Engineering Subpractice Assessment Targets

Please refer to appendix A for a complete list of SEP subpractice assessment targets. Note that the list in this section is not exhaustive.

8.1.1 Ability to obtain relevant information through conducting searches in print and online sources and evaluate the reliability of the obtained information

8.1.2 Ability to recognize, interpret, and critique key ideas in scientific and engineering text, including a mix of words, symbols, tables, diagrams, and graphs

8.1.3 Ability to summarize information from a single source and/or combine and synthesize information from multiple sources to address a question or solve a problem

### Disciplinary Core Idea Assessment Targets

#### PS1.A.8

* Identify physical and chemical properties characteristic of certain materials that can be used to identify the material or to identify if a change within that material has occurred
* Describe that the properties of synthetic material contribute to the function of the synthetic material

#### PS1.B.4

* Describe new substances (products, synthetic materials) as rearrangements of the original substances (reactants, natural resources) that form during a chemical reaction of the constituent atoms
* Describe that the properties of the reactants (natural resources) are different from the properties of the products (synthetic materials)
* Describe the benefits afforded by a synthetic material that has a particular chemical property in terms of societal need for certain resources (e.g., energy, clothing, food, housing, etc.)
* Describe the negative effects of synthetic material production (including consequences of resource extraction/creation, limitation of constituent resources, potential dependence on a synthetic material, etc.)

### Crosscutting Concept Assessment Target(s)

CCC6 Design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides both different types of information (e.g., tables, graphs, text) about synthetic materials derived from natural resources and a guiding question:

* Recognizes and interprets the relevant information to answer the guiding question (8.1.1, PS1.A.8, PS1.B.4, and CCC6)

Task provides context and multiple sources of information, which vary in relevance and reliability, about synthetic materials derived from natural resources:

* Evaluates the relevance and reliability of the sources (8.1.2, PS1.A.8, PS1.B.4, and CCC6)

Task provides both information from multiple sources and a question regarding the natural resource constituents of a synthetic product and what that synthetic product is used for:

* Synthesizes the information from the multiple sources to answer the question (8.1.3, PS1.A.8, PS1.B.4, and CCC6)

## California Environmental Principles and Concepts

* EP2: The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationships with human societies.

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Chemical processes involved in the production of synthetic materials (e.g., plastics, medicines)
* The ways chemical and physical properties contribute to the function of synthetic materials (e.g., artificial sweeteners, plastics)
* Costs and benefits to society associated with the production and use of synthetic materials (e.g., alternative fuels, synthetic fibers)
* Evaluation of the reliability or validity of sources of information about synthetic materials (e.g., plastics, alternative fuels, artificial sweeteners)

## Common Misconceptions

Note that the list in this section is not exhaustive.

* All synthetic materials are made up of polymers.
* Synthetic materials are more toxic than natural materials.
* Synthetic materials are always beneficial to society.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-PS1-3 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-PS1-3 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-PS1-3%20Evidence%20Statements%20June%202015%20asterisks.pdf)

California Environmental Principles and Concepts <http://californiaeei.org/abouteei/epc/>

California Education and the Environment Initiative <http://californiaeei.org/>

The *2016 Science Framework for California Public Schools Kindergarten through Grade 12*

Appendix 1: Progression of the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in Kindergarten through Grade 12 <https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix1.pdf>

Appendix 2: Connections to California Environmental Principles and Concepts <https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix2.pdf>

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