

MS-PS1-1 Matter and its Interactions

California Science Test—Item Content Specifications

# MS-PS1-1 Matter and its Interactions

Students who demonstrate understanding can:

Develop models to describe the atomic composition of simple molecules and extended structures.

[Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms.] [*Assessment Boundary: Assessment does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete description of all individual atoms in a complex molecule or extended structure is not required.*]

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Developing and Using Models  Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.  Develop a model to predict and/or describe phenomena. | PS1.A: Structure and Properties of Matter  7. Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.  11. Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). | Scale, Proportion, and Quantity  Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. |

## 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.

2.1 Ability to develop models

### 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.

2.1.1 Ability to determine components of a scientific event, system, or design solution

2.1.2 Ability to determine the relationships among multiple components of a scientific event, system, or design solution

2.1.4 Ability to represent mechanisms, relationships, and connections to illustrate, explain, or predict a scientific event

### Disciplinary Core Idea Assessment Targets

#### PS1.A.7

* Describe that some complex molecules are composed of repeating subunits
* Describe how pure substances are composed of one or more types of atoms that are combined with one another in various and characteristic ways
* Describe how some substances are made up of individual atoms, simple molecules, or extended structures of the same element
* Describe how some substances are made up of molecules composed of two or more atoms of different elements that are covalently bonded
* Describe that some substances are made up of different types of atoms (or ions) that repeat to form extended three-dimensional structures
* Identify the components (e.g., atoms, bonds, molecules) of molecular-level models
* Distinguish among the different types of structures illustrated by molecular-level models

#### PS1.A.11

* Identify structures that are characteristic of substances that are solids in the standard state (i.e., extended structures and complex molecules with strong intermolecular attractions)

### Crosscutting Concept Assessment Target(s)

CCC3 Identify that time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides a description of a substance and a list of relevant and irrelevant components, such as representations of atoms, bonds, or molecules:

* Selects the appropriate components to develop a model that illustrates the substance based on the description (2.1.1, PS1.A.7, and CCC3)

Task provides a description of a substance and an incomplete molecular-model or complete molecular-level models:

* Selects components to complete the model to illustrate the substance based on the description (2.1.1, PS1.A.7, and CCC3)
* Selects the model that illustrates the substance based on the description (2.1.1, PS1.A.7, and CCC3)

Task provides a molecular-level model illustrating the structure of a solid:

* Identifies a description of the solid based on the model (2.1.3, PS1.A.11, and CCC3)
* Identifies the components in the model (2.1.3, PS1.A.11, and CCC3)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* The placement and number of atoms within a molecule
* Brittle, crystalline structures or long, complex structures (including polymers)
* Similarities and differences among structural isomers (molecules with the same type and number of atoms with different spatial arrangements)

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Pure substances cannot be broken down into other pure substances.
* Pure substances can always be visually identified by consistency among physical features alone.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-PS1-1 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-PS1-1 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-PS1-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)

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>

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