

Educational Resources from *Phenomenon Science Education*

Student Proficiency Goals for **NGSS HS-LS1-6**



Information about HS-LS1-6

NGSS Performance Expectation HS-LS1-6.

Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

Clarification Statement.

Emphasis is on using evidence from models and simulations to support explanations.

Assessment Limits.

Assessment does not include the details of the specific chemical reactions or identification of macromolecules.

Science and Engineering Practice (Constructing Explanations and Designing Solutions)

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

Disciplinary Core Idea (LS1.C: Organization for Matter and Energy Flow in Organisms)

- The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells.
- As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.

Crosscutting Concept (Energy and Matter)

- Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system.

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Student Proficiency Goals

SEP (Constructing Explanations and Designing Solutions):

- Students identify and describe evidence for how carbon, hydrogen, and oxygen from sugar molecules combine with other elements to form amino acids and/or other large carbon-based molecules.
- Students assume that current theories and laws describing the natural world have operated and will continue to operate as they do today.
- Students collect evidence from a variety of sources (e.g., models, scientific theories, their own investigations, and/or peer review).
- Students identify strengths and weaknesses in their evidence, including what source the evidence comes from; the validity and reliability of the evidence; and its ability to support an explanation for how carbon, hydrogen, and oxygen from sugar molecules combine with other elements to form amino acids and/or other large carbon-based molecules.
- Students construct and revise an explanation based on their strong evidence for how carbon, hydrogen, and oxygen from sugar molecules combine with other elements to form amino acids and/or other large carbon-based molecules.

IDCI (LS1.C Organization for Matter and Energy Flow in Organisms):

- Students know that sugar molecules contain carbon, hydrogen, and oxygen.
- Students know that sugars form the hydrocarbon backbones of amino acids and other carbon-based molecules.
- Students know that the elements in sugars can be combined with other elements to form larger molecules such as proteins and DNA.
- Students know that collections of large molecules can form organelles and cells.
- Students know that as matter and energy flow through different organizational levels of a living system, chemical elements are recombined in different ways to form different products.

CCC (Energy and Matter):

- Students consider the flow of energy into, within, and out of a system, as chemical elements are recombined in different ways to form different products.
- Students consider the flow of matter into, within, and out of a system, as chemical elements are recombined in different ways to form different products.