

5E Lesson Plan

Subject / grade level: Grade 9 **Enzymes**

Materials:

- “Do you Want to Eat That?!” Activity Sheet
- “Steps to Inquiry” Guide
- Materials for student exploration
 - Apples, potatoes or pears (pears brown the fastest)
 - Various substances that denature enzymes (salt, vinegar, lemon juice, alcohol, hydrogen peroxide, etc)
 - Other methods of denaturation (ice, hot plate with beaker of water, etc)
 - Other substances (water, milk, etc)

NGSSS

[SC.912.L.18.11](#) Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity. Assessed as [SC.912.L.18.1](#).

Benchmark Clarifications

- Students will identify and/or describe the effect of environmental factors on enzyme activity.

NGSS (Performance Expectations)

[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.

Common Core State Standards Connections:

ELA/Literacy -

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS1-6)

Essential Questions Addressed:

What is the role of enzymes in the body?

Differentiation strategies to meet diverse learner needs:

- Lower lexile level students may need to work together on the read portions (2-7).
- Teachers may differentiate the Directed Note Taking by providing students with the notes and only require them to find the paragraph and decided on the classification.
- There are 3 different levels of the “Steps to Inquiry” guide. Use the one that best fits your students’ abilities.

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ENGAGEMENT (Part 1)

- The students are presented with either pictures of or actual browned fruit/vegetables and posed with a question, “Do you want to eat that?! Why or why not?”
- After a brief discussion period students are posed with two questions to ponder in pairs. Give students about 3 minutes prior to class discussion.

Think-pair-share

1. Write a list of fruits that turn brown when you cut them open.
2. What do you think is causing the fruit to turn brown?

EXPLORATION (Part 2-7)

- In an attempt to model the experimental process, students will be presented with two articles as if they had begun the research to answer the above referenced question themselves. Articles will be analyzed utilizing the Directed Note Taking Technique to break down the complex text individually. Students should take about 5-7 minutes per article prior to class or group discussion.

EXPLANATION (Part 8)

- Teachers may prefer to break from the worksheet and incorporate their lecture on enzymes at this point and come back to part 6 questions or they may have lectured on enzymes the day before and may use Part 6 questions to reactivate that important information.

ELABORATION (Part 9)

- Students will investigate their claim (substance X will denature the browning enzyme and can be safely used on food) using the “Steps to Inquiry” guide.

EVALUATION

- Student will write their conclusion in the CER format which will be scored according to the CER rubric.