

Enzymes and metabolism · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; current subject brief acquired; full Biology guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Enzymes · 1.1

Reasoning

An enzyme works quickly at one temperature and slowly at another. Heating can increase successful collisions, but excessive heat can change the active site. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Enzymes · 2.1

Reasoning

An enzyme is a biological catalyst. The substrate binds at an active site whose shape and chemical properties support the reaction. A catalyst increases rate without being used up overall. enzyme: A biological catalyst; denaturation : A structural change that disrupts function.

Enzymes · 3.1

Reasoning

Measure rate using product formed per unit time or a fixed endpoint. For an endpoint test, $1/\text{time}$ is a rate proxy if the same amount of product or substrate change defines the endpoint each time. For starch digestion, equilibrate enzyme and starch in a water bath, control pH with buffer, mix measured volumes, and test samples with iodine at fixed intervals. Use a clean spot for each test. Do not put iodine into the reaction mixture.

Enzymes · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: the endpoint is reached in 40 s. Use rate proxy = $1/\text{time}$. Rate proxy = $1/40 = 0.025$ per second. At 20 s the proxy is 0.050 per second, twice as large. This comparison is valid only if the same endpoint and starting concentrations are used.

Enzymes · 4.2

Reasoning

A fixed endpoint takes 50 s. Calculate the rate proxy $1/\text{time}$. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Enzymes · 5.1

Reasoning

An optimum is specific to the enzyme and conditions. Low temperature usually slows the reaction; it does not necessarily denature the enzyme. Endpoint intervals limit precision. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Enzymes · 5.2

Reasoning

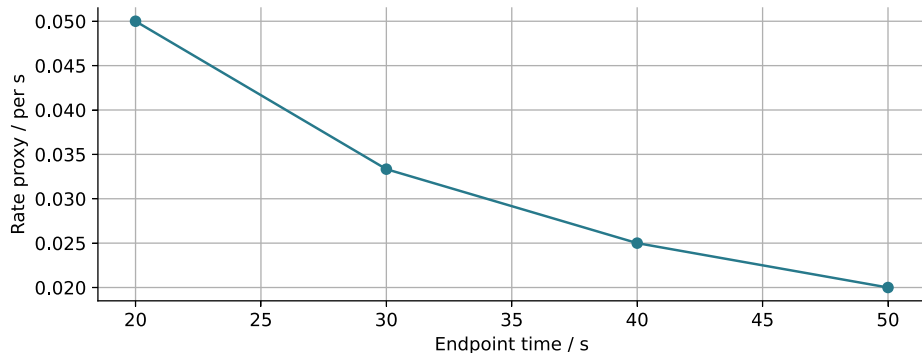
A low temperature always permanently denatures an enzyme. This claim is false: An optimum is specific to the enzyme and conditions. Low temperature usually slows the reaction; it does not necessarily denature the enzyme. Endpoint intervals limit precision.

Enzymes · 5.3

Reasoning

Enzyme rate and controlled measurements: Measure rate using product formed per unit time or a fixed endpoint. For an endpoint test, $1/\text{time}$ is a rate proxy if the same amount of product or substrate change defines the endpoint each time.

Enzymes · diagram



- Original teaching diagram: Enzyme rate and controlled measurements
- Use the labels and the stated model together.

Enzymes · original transfer

Your turn

One trial reaches a fixed endpoint in 20 s; another reaches twice as much product in 30 s. Can their rates be ranked by $1/\text{time}$? Explain using $\text{product}/\text{time}$.

Enzymes · transfer reasoning

Method and interpretation

No: endpoints differ. Relative product/time values are $1/20$ and $2/30$; the second average is $4/3$ of the first under comparable conditions. Reciprocal-time comparison requires the same endpoint.

Check yourself

- Explain enzyme using the stated model.
- Explain denaturation using the stated model.
- Change one value in the original transfer; explain which assumption still matters.