

Enzymes Digestion

GCSE Biology · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Use the lock and key model to explain why amylase digests starch but not protein. (3 marks)

Step 1 · Active site

Amylase has an active site with a specific shape.

Step 2 · Fit

Only starch molecules are complementary to (fit) this shape, forming an enzyme–substrate complex.

Step 3 · Protein

Protein molecules are a different shape, so they do not fit the active site and are not broken down.

Answer: The active site is complementary only to starch

Check: Use the words active site, specific shape and fit (complementary).

2. Now try one with the steps

Explain what happens to enzyme activity rises from 20 °C to 60 °C. (4 marks)

Step 1 · Up to the optimum

Step 2 · Optimum

Step 3 · Above the optimum

Step 4 · Result

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. What is an enzyme? [2]

2. Name the part of an enzyme where the substrate binds. [1]

3. Name the type of enzyme that breaks down lipids, and give the products. [2]
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4. Give the three places where protease enzymes are produced. [3]
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5. State two functions of bile. [2]
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6. Explain why an enzyme stops working at very high temperatures. [2]
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7. Explain why enzymes are described [2]
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8. A reaction produced 45 cm³ of gas in 90 s. Calculate the mean rate in cm³/s. [1]
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9. The time for a reaction to finish was 50 s. Calculate the rate using rate = 1000 ÷ time. [1]
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10. Explain why emulsifying fats increases the rate of fat digestion. [2]
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11. The stomach protease works best at pH 2. Explain why it stops working when it reaches the small intestine. [3]
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12. Explain why increasing the temperature from 10 °C to 30 °C increases the rate of an enzyme-controlled reaction. [2]
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13. Rates at 30 °C and 40 °C were 12 and 18 units. Calculate the percentage increase. [2]

14. Explain why the 'induced fit' model is sometimes used instead of lock and key. [2]

4. Before you hand it in

"The enzyme was killed by the heat."

Say the enzyme was DENATURED: its active site changed shape.

"At low temperatures the enzyme is denatured."

At low temperature there are fewer collisions; activity returns when warmed. Denaturing happens at high temperature or extreme pH.

"The active site and substrate are the same shape."

Use 'complementary': the substrate's shape fits into the active site.

Thinking a longer time means a faster rate

A reaction that takes longer is SLOWER. Rate = $1 \div \text{time}$ (or $1000 \div \text{time}$).