

Enzymes practice questions

7 questions • 20 marks • mark scheme at the back

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Name

Total / 20

1 Which statement describes a catalyst? [1 mark]

- A. ☐ A substance that increases the rate of a reaction and is used up
- B. ☐ A substance that increases the rate of a reaction and is not changed by the reaction
- C. ☐ A substance that slows down a reaction and is not changed
- D. ☐ A substance that is made by a reaction and then destroyed

2 (a) State what is meant by an enzyme. [1] (b) Explain why enzymes are important in living organisms. [2] [3 marks]

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3 The shape of the active site of an enzyme is complementary to the shape of its substrate. [1 mark]
What does this show?

- A. ☐ The enzyme can act on many different substrates
- B. ☐ The substrate fits into the active site
- C. ☐ The substrate and enzyme have identical shapes
- D. ☐ The product is the same shape as the substrate

4 **Supplement** [4 marks]

Amylase breaks down starch but cannot break down protein. Explain this, using the terms active site, substrate, enzyme-substrate complex and product.

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Explain why the rate of an enzyme-controlled reaction increases as the temperature rises from 10 °C to the optimum temperature.

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A student investigated the effect of temperature on the breakdown of starch by amylase. She measured the time taken for all of the starch to be broken down. (a) State the optimum temperature shown by the results. [1] (b) Calculate the rate of reaction at 30 °C, using rate = 1000 ÷ time. [2] (c) Describe what the results show about amylase at 60 °C. [1]

Time taken for the starch to be broken down	
temperature / °C	time taken / s
20	240
30	125
40	50
50	80
60	no change after 300

Answer =

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Pepsin has an optimum pH of about 2. Explain what happens to the activity of pepsin when it is placed in a solution at pH 10.

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Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B (1)

2. [3]

- (a) a protein that functions as a biological catalyst (1) allow speeds up (metabolic) reactions
- (b) reactions would be too slow (1)
- to sustain life / to keep the organism alive (1) allow reactions must be fast enough for the organism's needs

3. [1]

B B (1)

4. [4] **Supplement**

- amylase is specific / only acts on one substrate (1)
- the active site of amylase is complementary in shape to starch (1) reject 'same shape'
- starch fits into the active site forming an enzyme-substrate complex (1)
- starch is changed into the product(s) (1)
- protein has a different shape and does not fit the active site (1) so no complex forms / no products made
- Max 4

5. [3] **Supplement**

- particles have more kinetic energy / move faster (1)
- higher frequency of effective collisions between substrate and active site (1) allow more (frequent) collisions
- more enzyme-substrate complexes formed per unit time (1) allow more products formed per second

6. [4]

- (a) 40 °C (1)
- (b) $1000 \div 125$ (1)
- = 8 (1) allow 8.0; credit correct working
- (c) no starch broken down / no reaction (1) allow the enzyme is denatured / shape of active site has changed

7. [4] **Supplement**

- activity decreases / stops (1)
- pH change alters the bonds / shape of the enzyme (1)
- the shape of the active site changes (1)
- substrate no longer fits / no enzyme-substrate complex forms / enzyme is denatured (1) reject 'killed'