

Enzyme action and activity: practice questions

7 questions · 18 marks · mark scheme at the back

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Name

Total / 18

1 Which statement describes the active site of an enzyme? [1 mark]

- A. ☐ The part of the substrate that is broken down
- B. ☐ The region of the enzyme with a shape complementary to the substrate
- C. ☐ The place in the cell where enzymes are made
- D. ☐ The part of the enzyme that is used up in the reaction

2 Explain why an enzyme only catalyses one type of reaction. [3 marks]

3 A student boiled a solution of an enzyme and then added it to its substrate. No reaction took place. Explain why. [3 marks]

- 4** A student measured the volume of product made by an enzyme in 2 minutes at different temperatures. The results are shown in the table. Describe and explain the effect of temperature on the activity of the enzyme. **[4 marks]**

Volume of product made in 2 minutes	
Temperature (°C)	Volume of product (cm ³)
10	2
20	5
30	11
40	18
50	6
60	0

- 5** The rate of an enzyme-controlled reaction stops increasing when the substrate concentration is increased above a certain level. Explain why. **[2 marks]**

- 6** A student investigates the effect of pH on the rate at which amylase breaks down starch. **[3 marks]**
 She tests samples of the mixture with iodine solution. (a) Describe how she could tell that all the starch had been broken down. (1) (b) State two variables she should control. (2)

- 7** An enzyme-controlled reaction produced 21 cm^3 of gas in 30 seconds. Calculate the rate of reaction in cm^3/s . **[2 marks]**

Answer =

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]

- the active site of the enzyme has a specific shape (1)
- only a substrate with a complementary shape fits into the active site (1)
- other molecules do not fit, so they cannot form an enzyme-substrate complex / are not catalysed (1)

3. [3]

- the high temperature denatured the enzyme (1)
- the shape of the active site changed (1)
- so the substrate no longer fits / no enzyme-substrate complex can form (1)

4. [4]

- the rate increases as the temperature increases from 10 °C to 40 °C (1)
- because particles have more kinetic energy / move faster so there are more collisions between enzyme and substrate (1)
- above 40 °C / at 50 °C and 60 °C the rate decreases (1) allow optimum is around 40 °C (35–45 °C)
- because the enzyme is denatured / the shape of the active site changes (1)

5. [2]

- all the active sites are occupied / in use (1)
- so extra substrate cannot be converted any faster / the enzyme concentration is now limiting the rate (1)

6. [3]

- (a) iodine solution stays orange-brown / does not turn blue-black (1)
- (b) any two from: temperature (1)
- volume of amylase / enzyme (1)
- concentration of amylase / enzyme (1)
- volume of starch solution (1)
- concentration of starch solution (1) do not accept pH
- Max 3 (max 2 for part (b))

7. [2]

- rate = $21 \div 30$ (1)
- 0.7 cm³/s (1) correct answer with no working gains full marks