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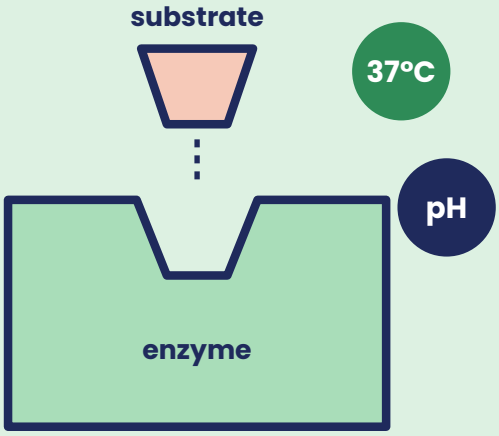
Year 10–11 • Cambridge IGCSE Biology 0610

Enzymes



Topic Practice Paper

Exam-style questions on catalysts, the active site, the effect of temperature and pH, and enzyme investigations. Time: 50 minutes.

Catalysts | Active site | Temperature | pH | Denaturing | Practicals

KEY IDEAS IN THIS PAPER

CORE + EXTENDED

Name: _____ Class: _____

Date set: _____ Date due: _____

What's inside

Question 1	Enzymes and the active site	**9 marks**
Question 2	The effect of temperature on amylase	**13 marks**
Question 3	The effect of pH	**8 marks**
Question 4	Catalase in potato (practical)	**8 marks**
Question 5	How enzymes work [Extended]	**7 marks**

Instructions

- Answer all questions in the spaces provided.
- You need a pen, pencil, ruler and calculator.
- [Extended] parts: Core candidates may skip (Core total: 31).
- Marks for each question are shown in [ ].

Total score

/ 45

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Enzymes – Topic Practice Paper

Cambridge IGCSE Biology 0610 style. Answer all questions. Parts marked **[Extended]** are for Extended candidates; Core candidates may leave them out.

Question 1 — Enzymes and the active site

Enzymes are biological catalysts.

(a) State what is meant by a *catalyst*. **[2]**

.....

.....

(b) State the type of molecule that all enzymes are made of. **[1]**

.....

(c) Explain why living organisms need enzymes. **[1]**

.....

.....

(d) Fig. 1.1 shows how an enzyme works.

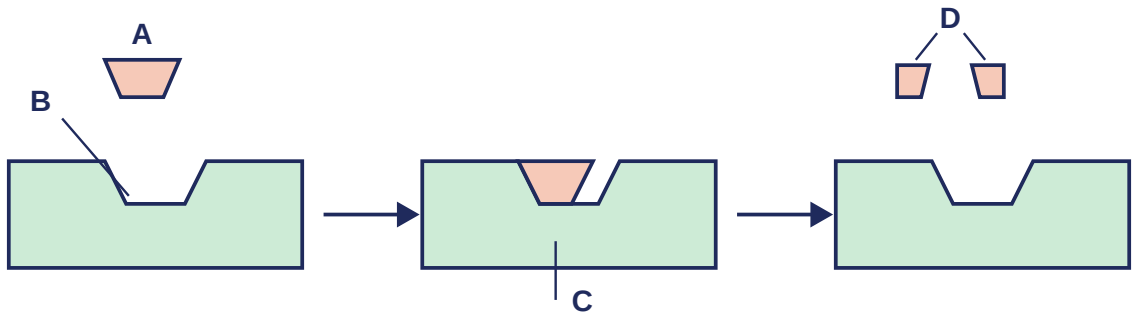

Fig. 1.1

Use letters from Fig. 1.1 to identify: **[3]**

(i) the substrate .....

(ii) the active site .....

(iii) the products .....

(e) **[Extended]** This enzyme can only break down one type of substrate. Explain why, using the idea of shape. **[2]**

.....

.....

Total for this question: _____ / 9

Question 2 The effect of temperature on amylase

A student investigates the effect of temperature on the enzyme amylase. Amylase breaks down starch. The student mixes amylase with starch solution in water baths at different temperatures. Every 10 s, a drop of the mixture is tested with iodine solution on a spotting tile.

(a) State the colour of iodine solution when: **[2]**

(i) starch is present .....

(ii) all the starch has been broken down .....

Table 2.1 shows the time taken for all the starch to be broken down. Rate is calculated as 1000 ÷ time.

temperature / °C	10	20	30	40	50	60
time / s	400	200	100	60	120	>600
rate	2.5	5.0	10.0		8.3	0

Table 2.1

At 60 °C the starch was still present after 600 s.

(b) Calculate the rate at 40 °C. Write your answer in Table 2.1. **[1]**

.....

(c) On the grid in Fig. 2.1, plot the rates from Table 2.1 and join the points with straight lines. **[3]**

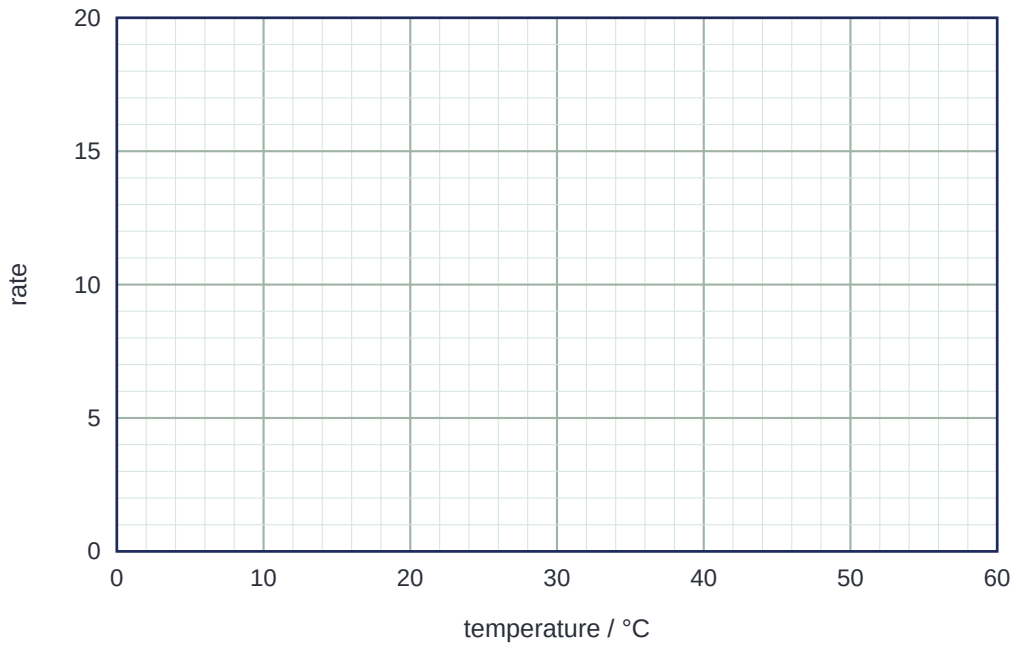

Fig. 2.1

(d) Use your graph to state the optimum temperature for this amylase. **[1]**

temperature = ... °C

(e) **[Extended]** Explain why the rate increases between 10 °C and 40 °C. Use ideas about kinetic energy and collisions. **[2]**

.....

.....

.....

(f) Explain why the starch is not broken down at 60 °C. **[2]**

.....

.....

.....

(g) State **two** variables the student should keep the same. **[2]**

1

.....

2

.....

Total for this question: _____ / 13

Question 3 The effect of pH

Fig. 3.1 shows the effect of pH on the activity of two digestive enzymes, X and Y.

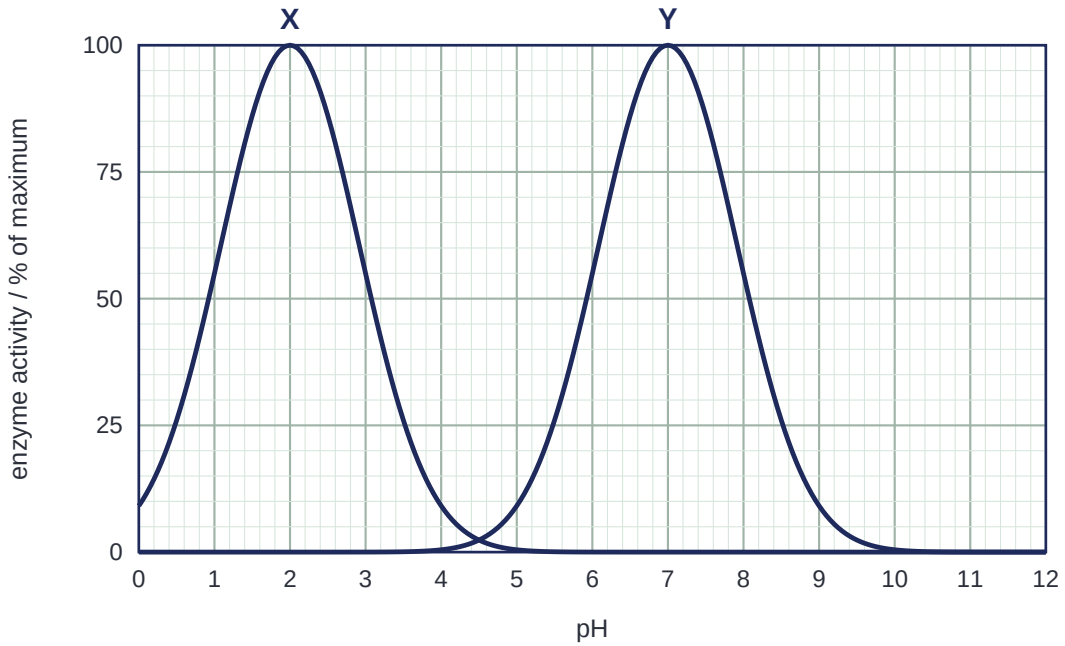

Fig. 3.1

(a) State the optimum pH of enzyme X. **[1]**

.....

(b) Enzyme X works in the stomach. Suggest why it works well there. **[1]**

.....

(c) Use Fig. 3.1 to find the activity of enzyme Y at pH 8. **[1]**

activity = ... %

(d) **[Extended]** Explain why the activity of enzyme Y is very low at pH 10. **[3]**

.....

.....

.....

(e) Enzyme Y is amylase. Name the substrate and the product of amylase. **[2]**

substrate ..... product .....

Total for this question: _____ / 8

Question 4 Catalase in potato

Potato cells contain the enzyme catalase. Catalase breaks down hydrogen peroxide into water and a gas. A student adds five potato discs to hydrogen peroxide solution and measures the height of the foam after 2 minutes (Fig. 4.1).

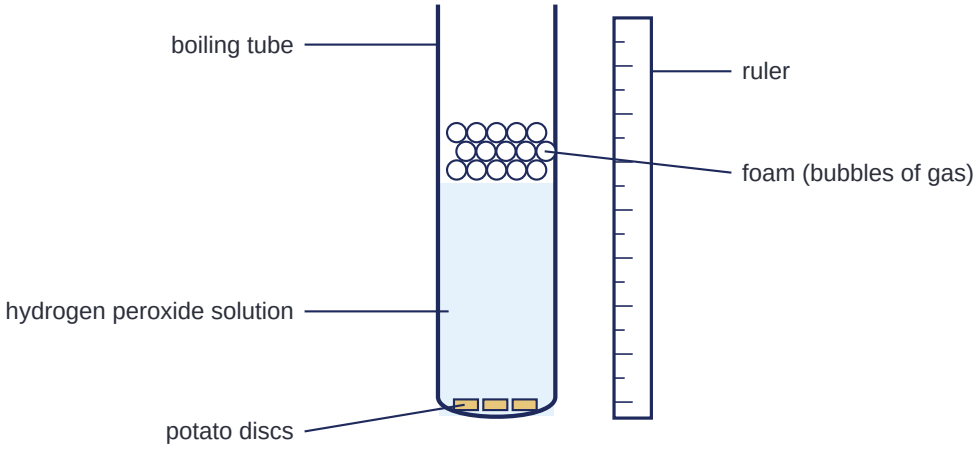

Fig. 4.1

(a) Name the gas in the foam. **[1]**

.....

(b) Describe a test for this gas and give the result. **[1]**

.....

.....

(c) The student repeats the experiment with five potato discs that have been **boiled**. Predict the height of the foam, and explain your answer. **[2]**

.....

.....

(d) Suggest why all the potato discs must be the same size. **[1]**

.....

(e) Suggest how the student could keep the temperature the same during the experiment. **[1]**

.....

(f) State **one** safety precaution when using hydrogen peroxide. **[1]**

.....

(g) Suggest why the student repeats each experiment three times. **[1]**

.....

Total for this question: _____ / 8

Question 5 How enzymes work [Extended]

(a) Explain how an enzyme breaks down its substrate. Use the terms **active site**, **enzyme-substrate complex** and **product** in your answer. **[3]**

.....

.....

.....

.....

(b) One tube of amylase and starch is kept at 5 °C, and another at 80 °C. Both tubes are then moved to 37 °C. The reaction starts in the tube from 5 °C but not in the tube from 80 °C. Explain this difference. **[2]**

.....

.....

.....

(c) Biological washing powders contain enzymes such as protease.

(i) Explain how protease helps to remove a blood stain from clothes. **[1]**

.....

.....

(ii) Suggest why these washing powders work less well at 90 °C. **[1]**

.....

Total for this question: _____ / 7

END OF PAPER – check your answers before handing in.