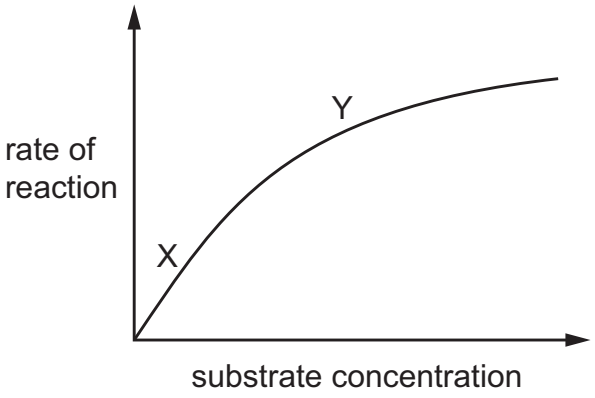
1. Question | 5090 May-June 2023 P1 V1 Q6

6 The graph shows the effect of substrate concentration on the rate of an enzyme-controlled reaction.

The results have been obtained using a fixed concentration of enzyme at a temperature of 30 °C.



Which statement explains the shape of the graph from X to Y?

A Denaturation of the enzyme molecules is increasing.

B The enzyme active sites are not all occupied.

C The concentration of substrate molecules is decreasing.

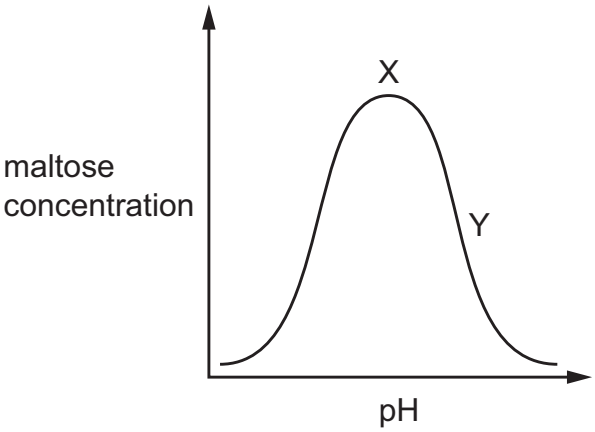
D The frequency of effective collisions between enzyme active sites and substrate molecules is decreasing.

5090 Biology Paper 1 - Enzymes

Topical questions | 23 questions

2. Question | 5090 May-June 2023 P1 V2 Q6

6 The graph shows the concentration of maltose produced when amylase digests starch at different pH values.



What explains the shape of the graph between point X and point Y?

A The enzyme is completely denatured and does not work at all.

B The enzyme molecules have less kinetic energy.

C The shape of the enzyme active site is changing and does not fit the substrate so well.

D The substrate molecules have more kinetic energy.

3. Question | 5090 Oct-Nov 2023 P1 V1 Q6

6 Enzymes are involved in many reactions in living cells.

Which statement describes the action of enzymes?

A Enzymes are able to start up reactions that would otherwise not occur.

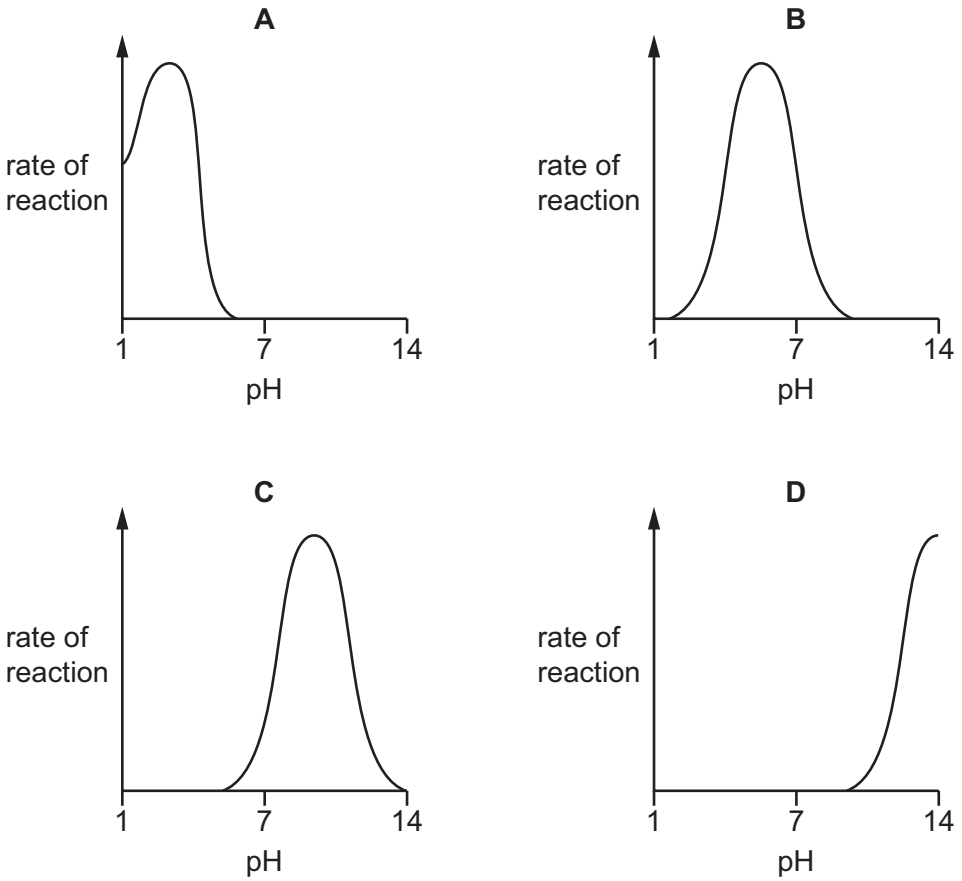
B Enzymes can only act inside living cells or organisms.

C Enzymes increase the rate of chemical reactions.

D One enzyme can catalyse a number of different reactions.

4. Question | 5090 Oct-Nov 2023 P1 V1 Q13

13 Which graph best represents the effect of pH on the action of gastric protease?



5. Question | 5090 Oct-Nov 2023 P1 V2 Q6

6 Which statement describes enzyme-catalysed reactions?

A All enzymes work best at the same pH.

B As an enzyme-catalysed reaction progresses, the concentration of reactants increases.

C As the temperature of an enzyme-catalysed reaction increases from 0 °C to 20 °C, the frequency of effective collisions increases.

D Enzymes are denatured as the temperature of an enzyme-catalysed reaction is lowered from 20 °C to 0 °C.

6. Question | 5090 Specimen 2023 P1 Q8

8 Enzyme action can be explained by the lock and key hypothesis.

Which row is correct for the active site and for the substrate?

	active site is on the enzyme	active site is on the substrate	substrate is the lock	substrate is the key
A	✓	×	✓	×
B	✓	×	×	✓
C	×	✓	✓	×
D	×	✓	×	✓

✓ = yes
× = no

7. Question | 5090 May-June 2024 P1 V1 Q6

6 Enzymes are biological catalysts.

Which type of molecule can be an enzyme?

A carbohydrate

B fat

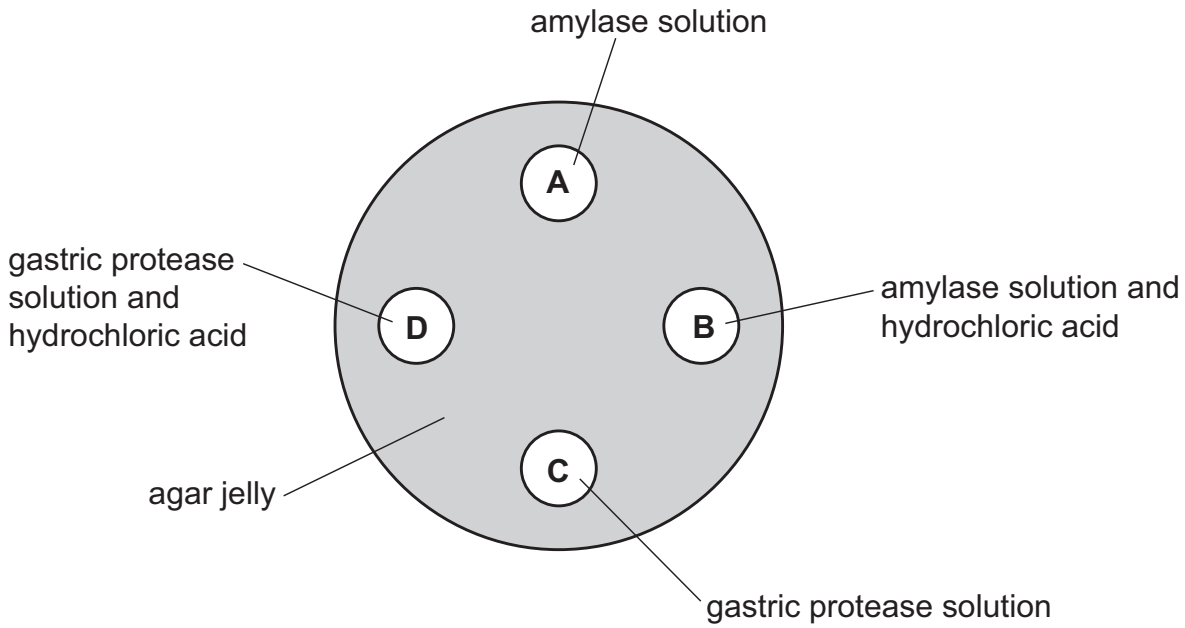
C nucleotide

D protein

8. Question | 5090 May-June 2024 P1 V1 Q12

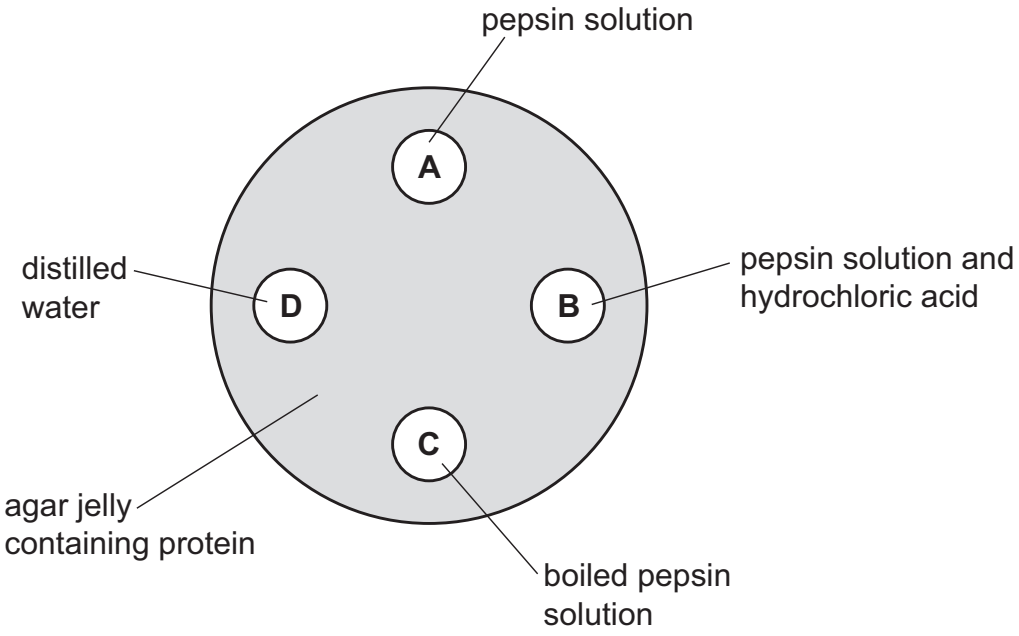
12 A dish is filled with agar jelly containing starch. Four holes are cut in the jelly and each hole is filled as shown in the diagram.

After 30 minutes, which hole will be surrounded by the largest area without starch?



12 A dish is filled with agar jelly containing protein. Four holes are cut in the jelly and each hole is filled as shown in the diagram.

After 30 minutes, which hole will be surrounded by the largest area without protein?

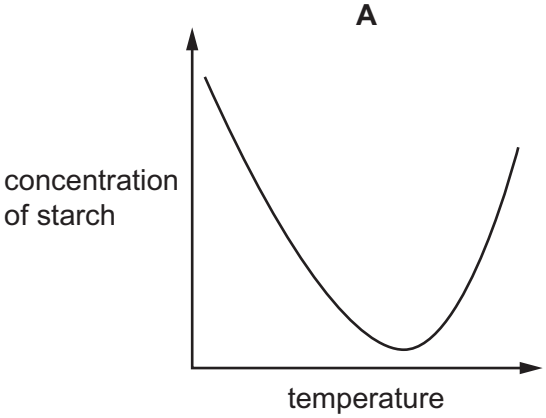


10. Question | 5090 Oct-Nov 2024 P1 V1 Q6

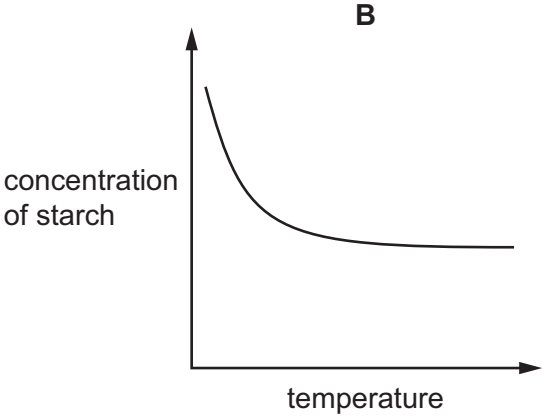
6 Some students investigated the effect of temperature on the digestion of starch to form maltose. They added equal volumes of amylase and starch solution to a number of test-tubes. The test-tubes were left for 30 minutes at a range of temperatures between 10 °C and 60 °C. They then measured the concentration of starch in each test-tube.

Which graph was produced from these results?

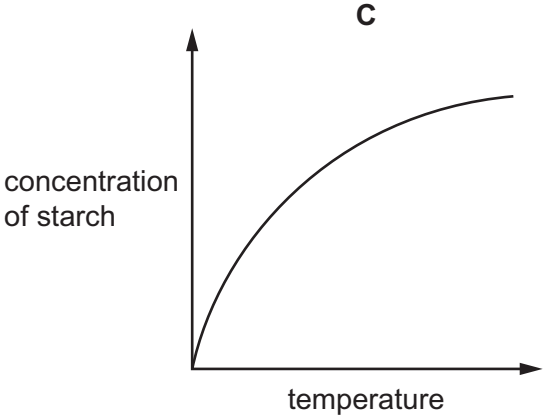
A



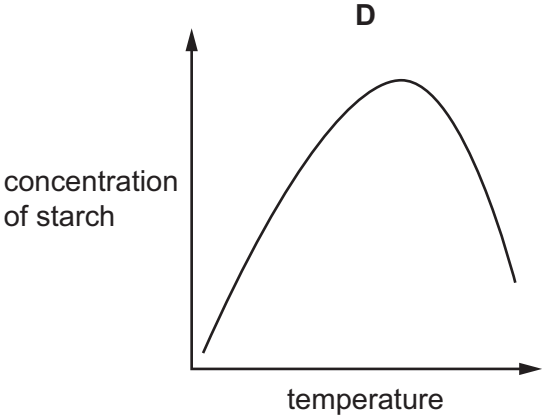
B



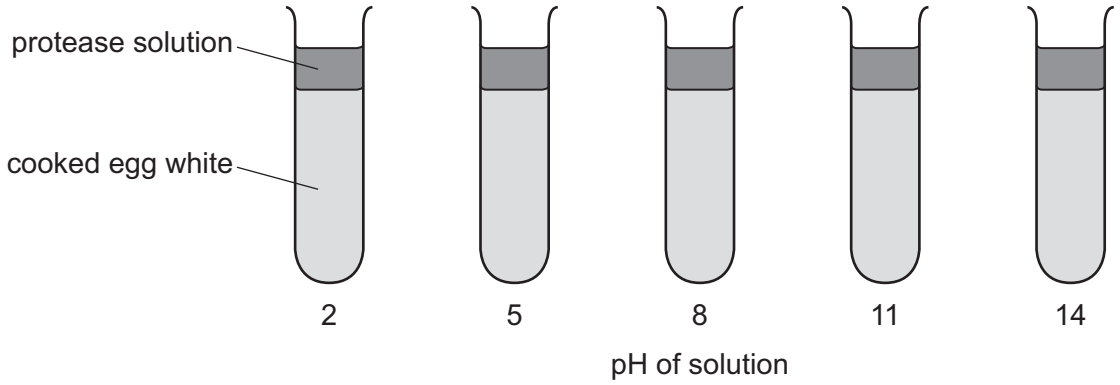
C



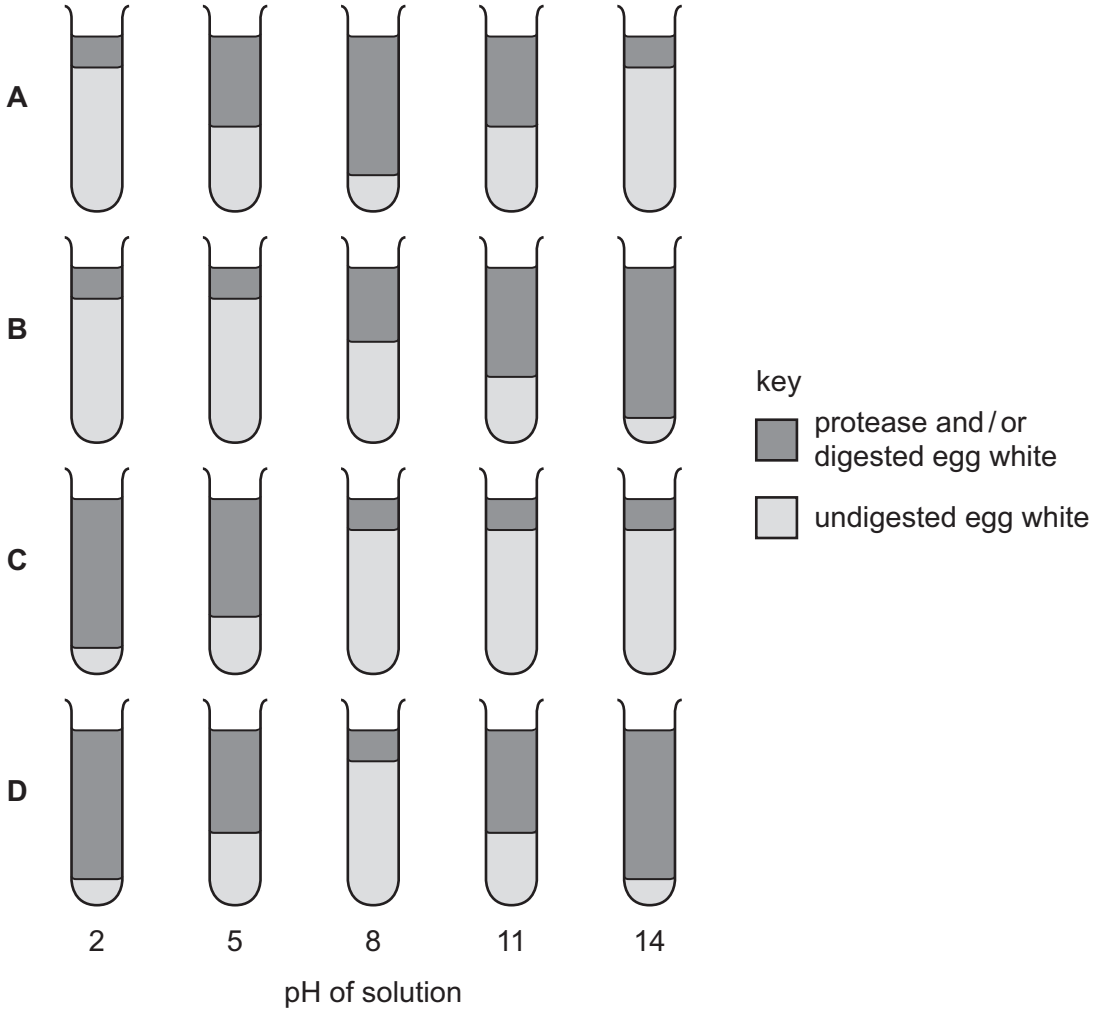
D



12 Five test-tubes containing cooked egg white are set up as shown. Cooked egg white contains a protein. Protease solutions of different pH are added to each tube.



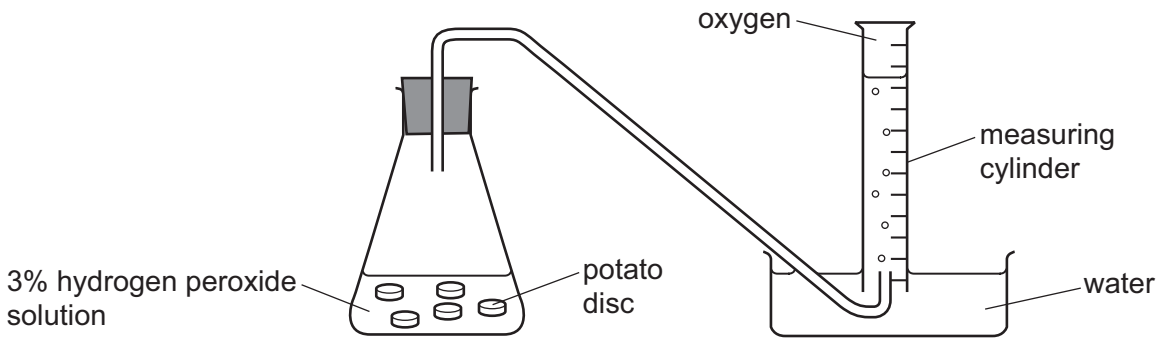
Which diagram shows the results of this experiment for a protease from the stomach?



6 Catalase is an enzyme found in potato tissue. It catalyses the breakdown of hydrogen peroxide into water and oxygen.

$$\text{hydrogen peroxide} \xrightarrow{\text{catalase}} \text{water + oxygen}$$

The apparatus shown was used to investigate the activity of catalase.

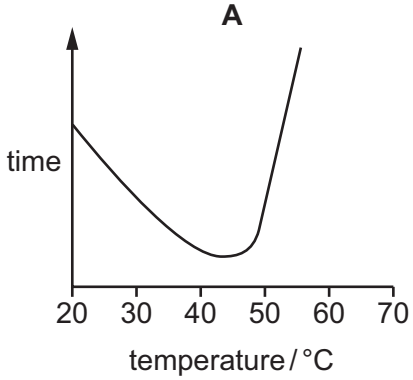


Five identical potato discs were dropped into 15 cm^3 of a 3% hydrogen peroxide solution at a temperature of 20 °C. The time taken for 5 cm^3 of oxygen to be produced was recorded.

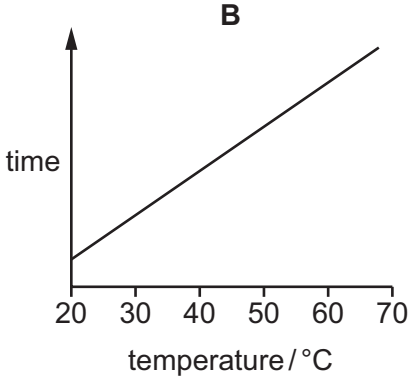
This procedure was repeated at each of the following temperatures: 30 °C, 40 °C, 50 °C, 60 °C and 70 °C.

Which graph shows the results of the investigation?

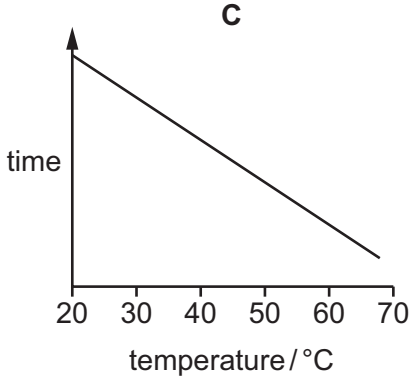
A



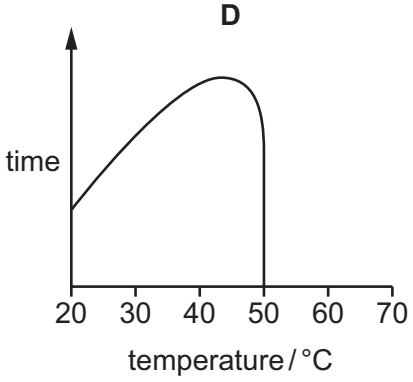
B



C



D



13. Question | 5090 Oct-Nov 2024 P1 V2 Q11

11 Cubes of boiled egg white are placed in test-tubes containing 5 cm^3 of water. Boiled egg white contains protein. Other substances are added to each test-tube as shown in the table. The test-tubes are left for eight hours and then tested for amino acids.

test-tube	solution added	results of test for amino acids
1	pepsin	absent
2	pepsin + alkali	absent
3	none	absent
4	pepsin + acid	large amounts
5	boiled pepsin + acid	traces
6	acid	traces
7	alkali	absent

Which test-tubes show that pepsin is an enzyme?

A 1 and 4 **B** 2 and 7 **C** 4 and 5 **D** 5 and 6

14. Question | 5090 May-June 2025 P1 V1 Q8

8 The diagram shows an enzyme molecule.



Which diagram shows the substrate molecule for this enzyme?

A



B



C



D



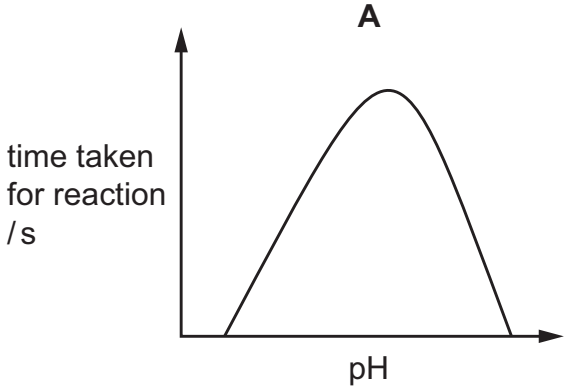
15. Question | 5090 May-June 2025 P1 V1 Q9

9 The enzyme amylase catalyses the breakdown of starch into maltose.

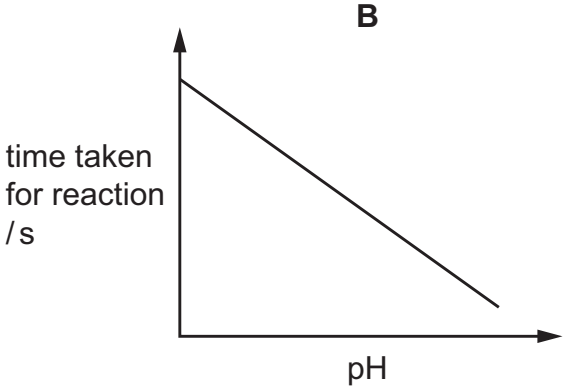
The effect of different pHs on the time it took for this breakdown to occur when all other variables were controlled was investigated.

Which graph shows the results of this investigation?

A



B



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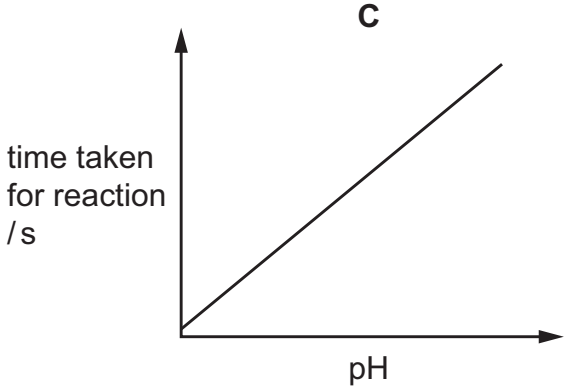
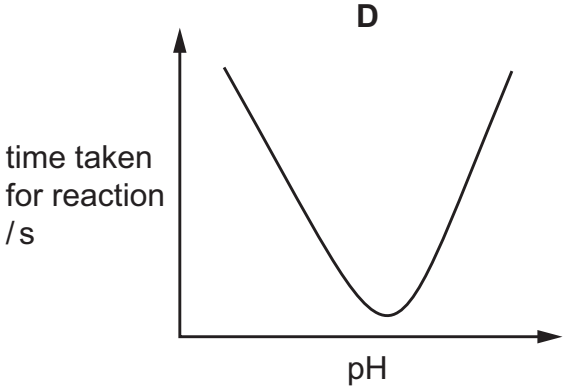


D



5090 Biology Paper 1 - Enzymes

Topical questions | 23 questions

16. Question | 5090 May-June 2025 P1 V1 Q10

10 What are features of enzymes?

1 They act on specific substrates.

2 They are carbohydrates.

3 They are catalysts.

4 They are involved in some, but **not** all, metabolic reactions.

A 1, 2 and 3 **B** 1 and 3 only **C** 1 and 4 **D** 2, 3 and 4

17. Question | 5090 May-June 2025 P1 V2 Q6

6 What is an example of a biological catalyst?

A bile

B DNA

C insulin

D maltase

18. Question | 5090 May-June 2025 P1 V2 Q7

7 What will be the result if the active site of an enzyme is damaged?

A A different product is produced from the substrate.

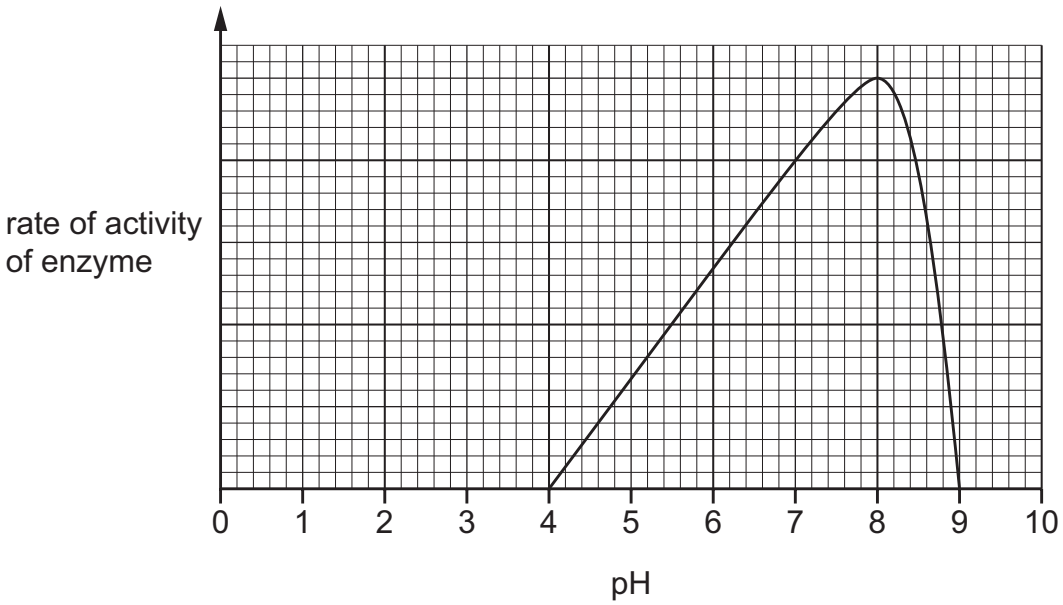
B The enzyme **cannot** carry out its specific reaction.

C The enzyme can no longer collide with a substrate molecule.

D Enzyme–substrate complexes will form faster.

19. Question | 5090 May-June 2025 P1 V2 Q8

8 The graph shows the rate of activity of enzyme X at different pH values. All other conditions are kept constant.



Using the data shown in the graph, which statement is correct?

A Enzyme X is denatured in weak acid and alkali conditions.

B The kinetic energy of the substrate increases between pH 6 and 8.

C The kinetic energy of enzyme X is lowest at pH 4.

D The frequency of effective collisions between the enzyme and substrate is greatest at pH 8.

20. Question | 5090 Oct-Nov 2025 P1 V1 Q6

6 Many reactions in cells are dependent on enzyme activity.

Which statement about enzymes is **not** correct?

A They are protein molecules.

B They catalyse biological reactions.

C They remain unchanged at the end of a reaction.

D They have active sites which are the same shape as their substrate molecules.

21. Question | 5090 Oct-Nov 2025 P1 V2 Q6

6 Four test-tubes contain starch solution and amylase. They are placed in water-baths at different temperatures and provided with different pHs, as shown in the table. All other conditions are kept the same.

After 30 minutes, iodine solution is added to each test-tube. The contents of three of the test-tubes turns blue-black.

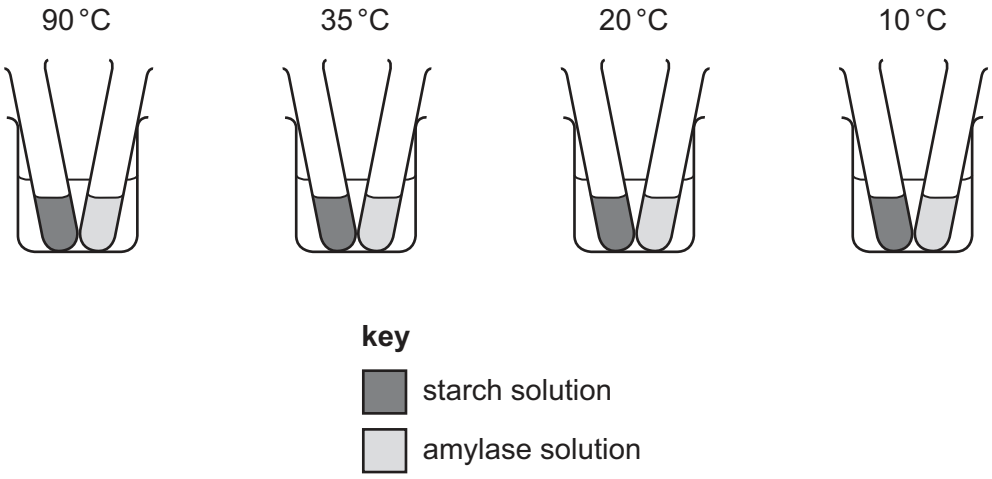
In which test-tube are the contents yellow-brown?

	temperature / °C	pH
A	35	2.5
B	35	6.9
C	75	2.5
D	75	6.9

22. Question | 5090 May-June 2026 P1 V2 Q7

7 The diagram shows an experiment on amylase.

Each beaker contains water maintained at the temperature shown.



Each test-tube of amylase is poured into the test-tube of starch solution in the same beaker, and then samples of each mixture are tested with iodine solution.

Samples of the mixture are then tested with iodine solution again at five minute intervals.

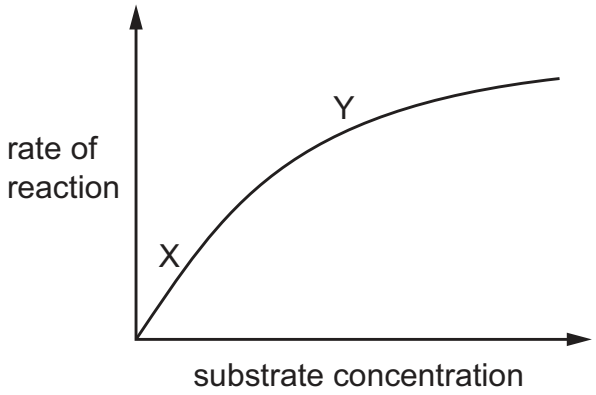
Which results will be obtained?

	90 °C	**35 °C**	**20 °C**	**10 °C**
A	blue-black after 30 minutes	goes yellow-brown immediately	goes yellow-brown after five minutes	blue-black after 30 minutes
B	blue-black after 30 minutes	goes yellow-brown after five minutes	goes yellow-brown immediately	blue-black after 30 minutes
C	goes yellow-brown immediately	goes yellow-brown after five minutes	goes yellow-brown after five minutes	blue-black after 30 minutes
D	goes yellow-brown after five minutes	blue-black after 30 minutes	blue-black after 30 minutes	goes yellow-brown after five minutes

23. Question | 5090 May-June 2026 P1 V2 Q8

8 The graph shows the effect of substrate concentration on the rate of an enzyme-controlled reaction.

The results were obtained using a constant enzyme concentration, a temperature of 30 °C and a pH of 7.0.



Which statement explains the shape of the graph from X to Y?

A Denaturation of the enzyme molecules is increasing.

B The enzyme active sites are **not** all occupied.

C The concentration of substrate molecules is decreasing.

D The frequency of effective collisions between enzyme active sites and substrate molecules is decreasing.