CAMBRIDGE IGCSE BIOLOGY · 0610

BIOLOGY



EXAM QUESTION PACK

TOPIC 5: ENZYMES

SCORE	PERCENTAGE
/	%

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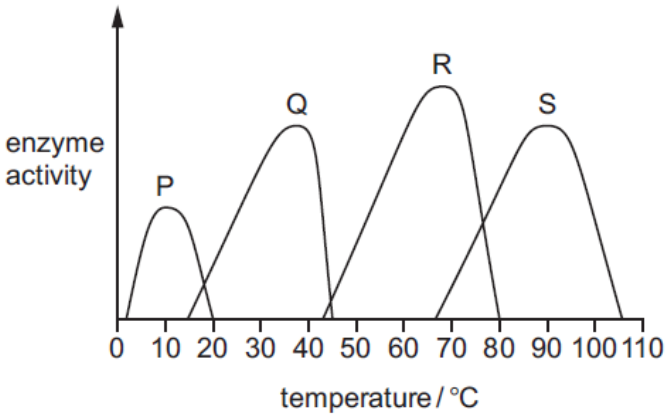
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Enzymes – 2023 November IGCSE 0610

1. Nov/2023 /Paper_ 0610/11/No.10

The graph shows the effect of temperature on the activity of four different enzymes.



Which conclusion about the data in the graph is correct?

A Enzyme P and enzyme Q are both active at 25 °C.

B Enzyme R and enzyme S are both active at 75 °C.

C Enzyme P has an optimum temperature of 0 °C.

D Enzyme S has an optimum temperature above 100 °C.

2. Nov/2023 /Paper_ 0610/11/No.12

Which colour does hydrogencarbonate indicator turn if the carbon dioxide concentration is increased?

A green

B red

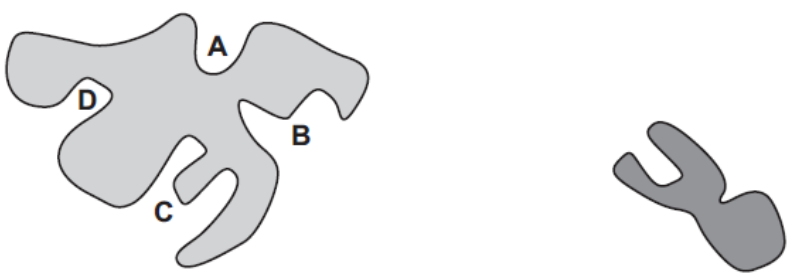
C violet

D yellow

3. Nov/2023 /Paper_ 0610/13/No.10

The diagrams represent an enzyme and its substrate.

Which part of the enzyme molecule is the active site for this substrate?



enzyme substrate

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4. Nov/2023 /Paper_ 0610/13/No.10

Which statement is correct?

A The active site of an enzyme has the same shape as the substrate.

B The active site is not affected by changes in temperature.

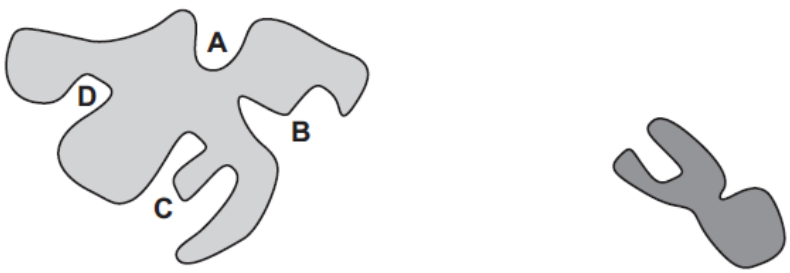
C The shape of the active site of an enzyme is complementary to its substrate.

D The substrate and product combine at the active site.

5. Nov/2023 /Paper_ 0610/21/No.10

The diagrams represent an enzyme and its substrate.

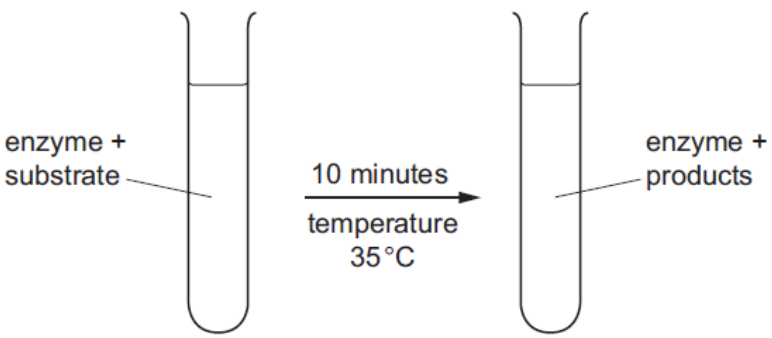
Which part of the enzyme molecule is the active site for this substrate?



enzyme substrate

6. Nov/2023 /Paper_ 0610/21/No.12

The diagram shows a test-tube at the start and at the end of an enzyme experiment.



At the end of the experiment, the mixture in the test-tube contains glycerol.

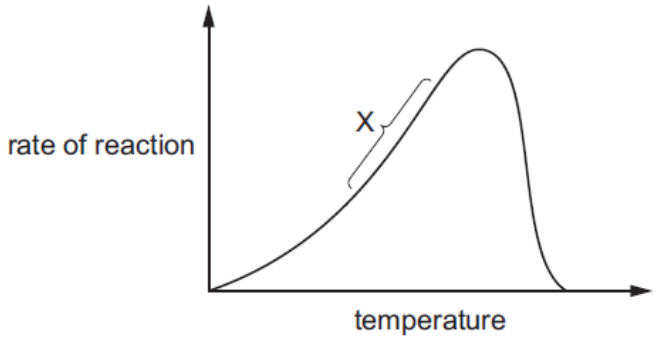
Which row correctly identifies the enzyme and the substrate it acts on?

	enzyme	substrate it acts on
A	amylase	fat
B	amylase	glucose
C	lipase	fat
D	lipase	glucose

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7. Nov/2023 /Paper_ 0610/23/No.10

The graph shows the effect of temperature on the rate of a reaction catalysed by an enzyme.



Which statement explains the shape of the graph at section X?

A The enzyme is **not** the correct one to act on this substrate.

B The enzyme is starting to denature.

C The number of active sites is increasing.

D The frequency of enzyme-substrate collisions is increasing.

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Enzymes – 2023 June IGCSE Biology 0610

1. June/2023/Paper_0610/11/No.10

What is true of **all** enzymes?

	they are sugars	they are most effective at pH 7
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

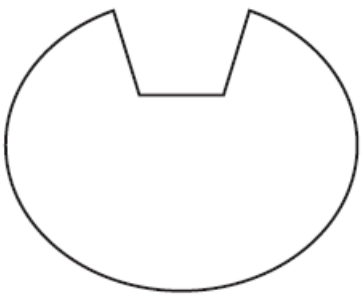
key

✓ = yes

✗ = no

2. June/2023/Paper_0610/11/No.11

What is the substrate for enzyme X?



enzyme X

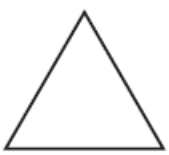
A



B



C



D



3. June/2023/Paper_0610/12/No.10

Which processes depend on the action of enzymes?

1 digestion

2 osmosis

3 respiration

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

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4. June/2023/Paper_0610/12/No.11

5. June/2023/Paper_0610/12/No.32

In a sperm cell, which structure contains enzymes that can digest the jelly coat of an egg cell?

A acrosome

B flagellum

C mitochondria

D nucleus

6. June/2023/Paper_0610/13/No.10

What is a characteristic of all catalysts?

A They are broken down in the reaction.

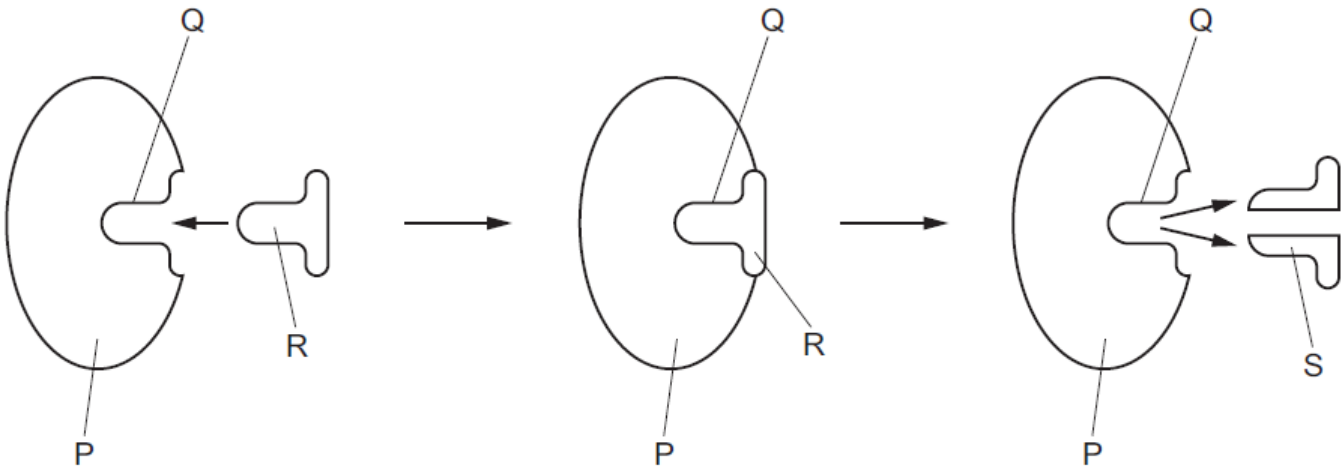
B They are made in the pancreas.

C They are **not** changed by the reaction.

D They do **not** change the rate of the reaction.

7. June/2023/Paper_0610/13/No.11

This sequence of diagrams shows how an enzyme works.



Which labelled part is the active site?

A P **B** Q **C** R **D** S

8. June/2023/Paper_0610/21/No.9

What is true of **all** enzymes?

	they are sugars	they are most effective at pH 7
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = yes

✗ = no

9. June/2023/Paper_0610/21/No.10

Which statement about human enzymes is correct when they are at temperatures above 80 °C?

A The enzyme molecules are denatured.

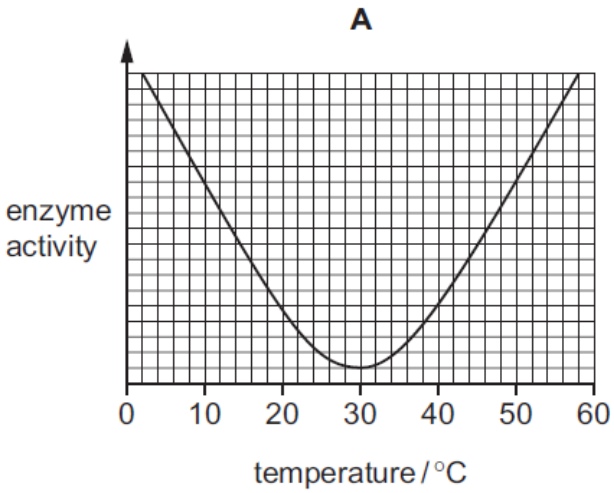
B The shape of the active site is stable.

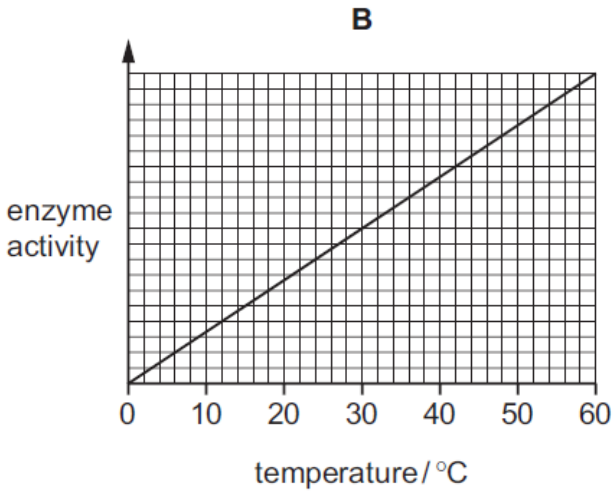
C More enzyme-substrate complexes form.

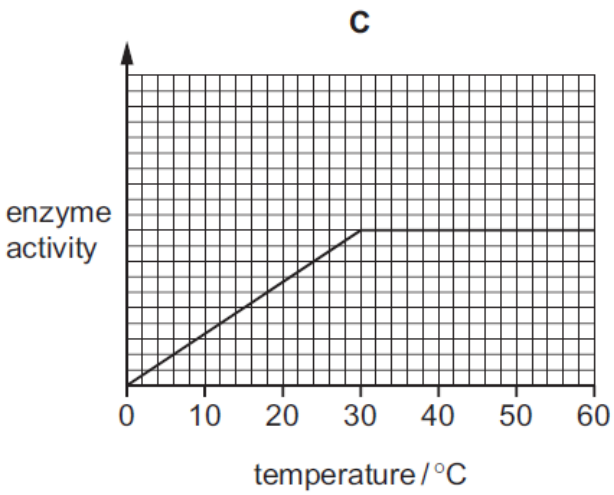
D More product is formed by the enzyme.

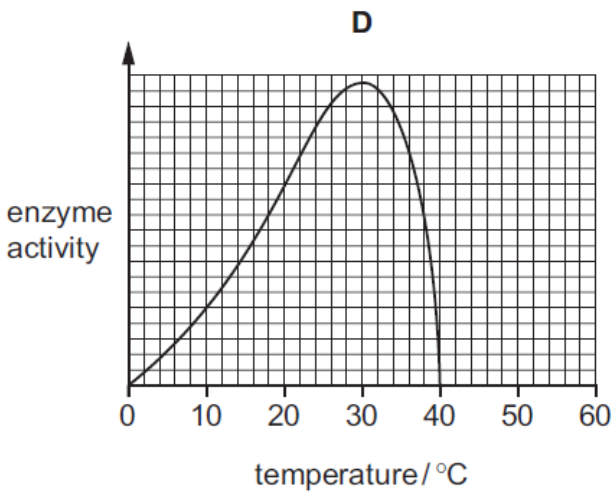
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10. June/2023/Paper_0610/22/No.10









11. June/2023/Paper_0610/23/No.9

The statements are about enzymes.

1 Enzymes are catalysts.

2 Enzymes are proteins.

3 Enzymes are used up during chemical reactions.

Which statements are correct?

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

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12. June/2023/Paper_0610/23/No.10

When the temperature increases, the rate of an enzyme-catalysed reaction increases until the optimum temperature is reached.

Which statement explains why the rate increases?

A The enzyme and substrate have more kinetic energy and collide less frequently.

B The enzyme and substrate have less kinetic energy and collide more frequently.

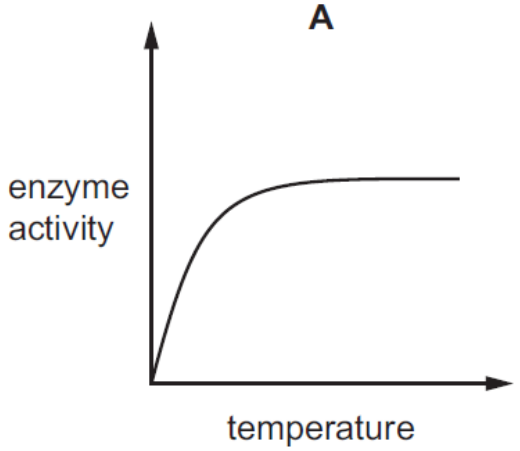
C The enzyme and substrate have more kinetic energy and collide more frequently.

D The enzyme and substrate have less kinetic energy and collide less frequently.

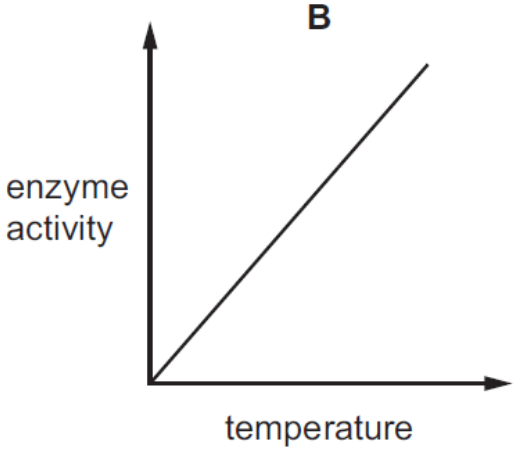
13. June/2023/Paper_0610/23/No.21

Which graph shows the effect of temperature on enzyme activity?

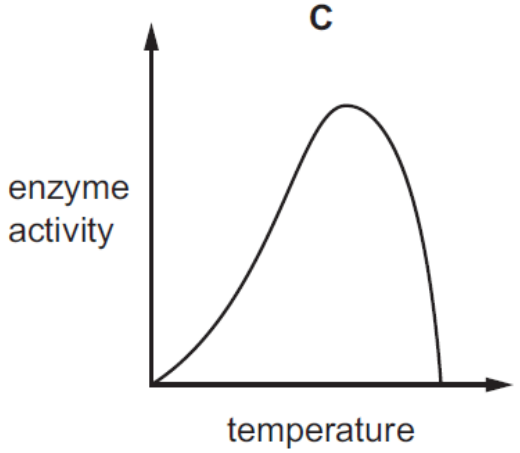
A



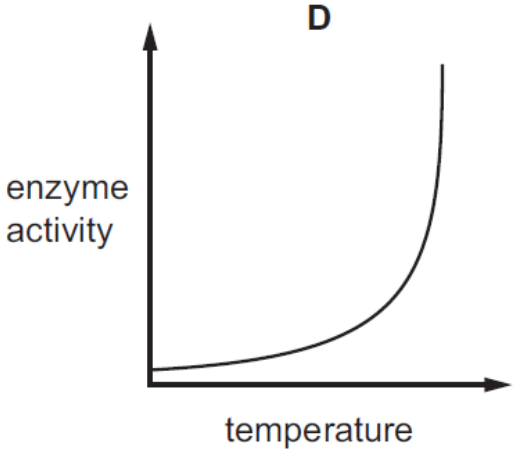
B



C



D



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14. June/2023/Paper_0610/32/No.3

(a) Fig. 3.1 shows the action of an enzyme.



Fig. 3.1

On Fig. 3.1 use label lines and labels to identify:

- an enzyme
- a product
- a substrate.

[3]

(b) Describe what is meant by the term enzyme.

.....

.....

..... [2]

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(c) The enzymes in biological washing powders speed up the removal of stains from clothing.

Some of these stains may contain fats.

(i) (Circle) the name of the enzyme that will remove fat stains.

amylase **lipase** **pectinase** **protease**

[1]

(ii) Explain why removing fat stains and protein stains from clothing requires a washing powder that contains more than one type of enzyme.

.....

.....

.....

.....

..... [2]

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(d) An investigation was carried out to compare how fast a biological washing powder removed stains at different temperatures.

Fig. 3.2 shows the results of the investigation.

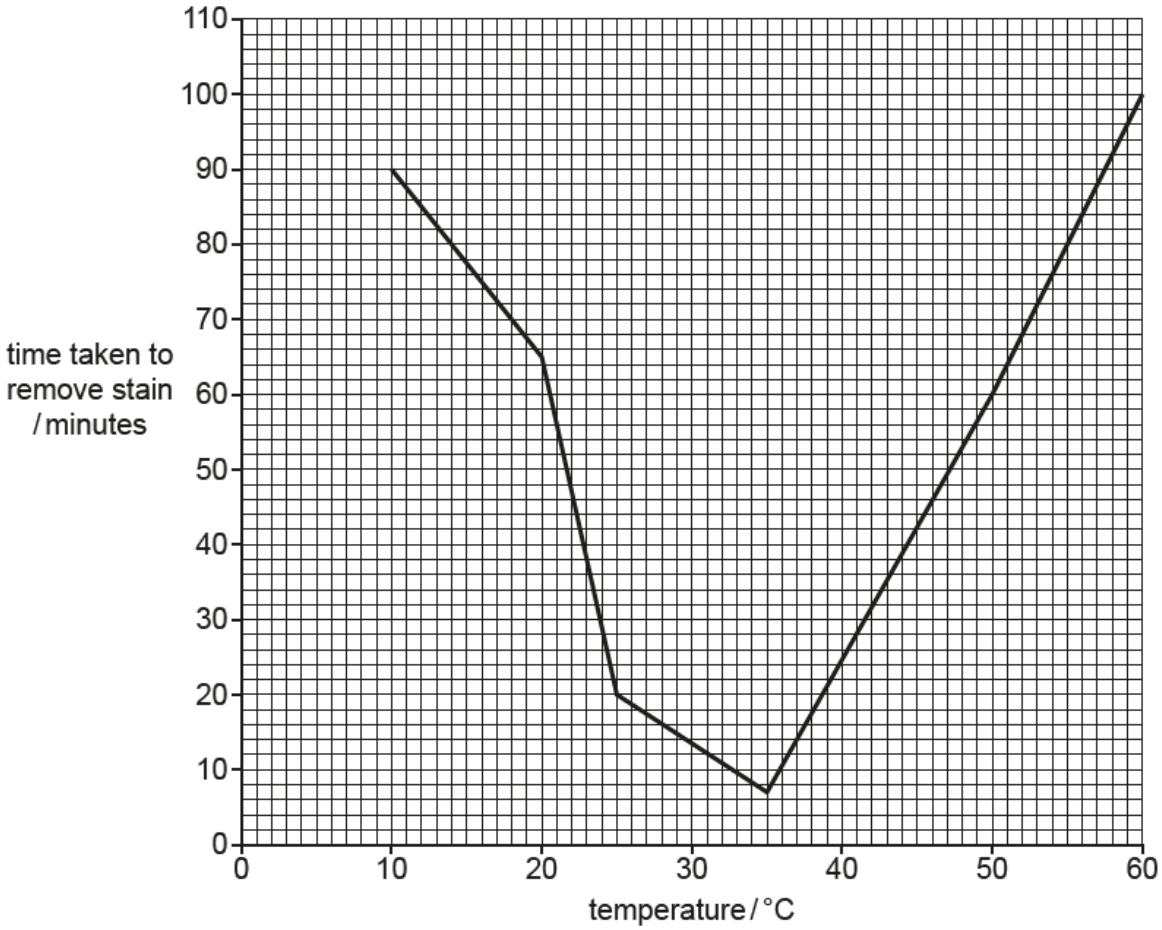


Fig. 3.2

Using the information in Fig. 3.2:

(i) State the optimum temperature for the washing powder.

..... °C [1]

(ii) State the time taken for the washing powder to remove the stain at 20 °C.

..... minutes [1]

(iii) Describe what happens to the enzymes in the biological washing powder between 40 °C and 60 °C.

.....

.....

.....

..... [2]

[Total: 12]

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15. March/2023/Paper_ 0610/12/No.10
What are enzymes made of?

A fatty acids

B glycogen

C protein

D starch

16. March/2023/Paper_ 0610/12/No.11
What remains at the end of an enzyme-controlled reaction?

A enzymes and products

B enzymes and substrates

C enzymes only

D products only

17. March/2023/Paper_ 0610/22/No.9
What remains at the end of an enzyme-controlled reaction?

A enzymes and products

B enzymes and substrates

C enzymes only

D products only

18. March/2023/Paper_ 0610/22/No.10
Which feature explains the specificity of an enzyme?

A complementary shape of active site and substrate

B denaturation at certain pH values

C temperature change leading to change in enzyme activity

D varying frequency of effective collisions between enzyme and substrate

Enzymes – 2022 November IGCSE 0610 Biology

1. Nov/2022/Paper_11/No.10

Which description of an enzyme-catalysed reaction is correct?

A The substrate binds to an enzyme with the same shape and a product is formed.

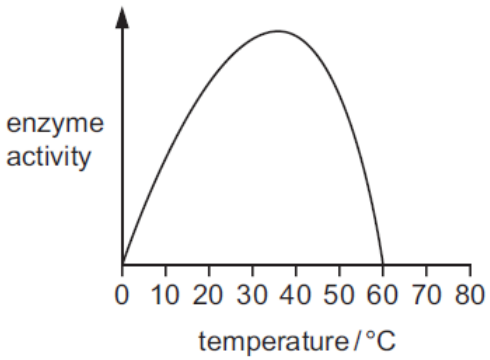
B The product binds to an enzyme with the same shape and a substrate is formed.

C The product binds to an enzyme with a complementary shape and a substrate is formed.

D The substrate binds to an enzyme with a complementary shape and a product is formed.

2. Nov/2022/Paper_11/No.11

The graph shows the effect of temperature on the activity of an enzyme.



At which temperature is the enzyme most active?

A 15 °C **B** 25 °C **C** 35 °C **D** 60 °C

3. Nov/2022/Paper_12/No.10

Which statement about enzymes is correct?

A They are made of carbohydrates.

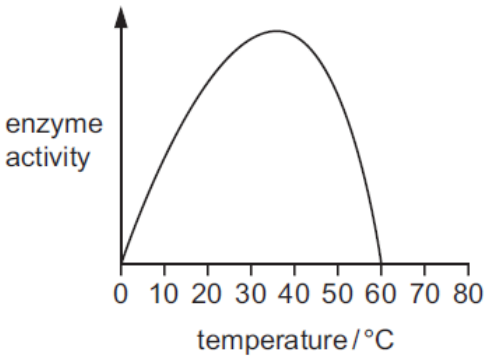
B Their activity is unaffected by pH.

C They are used up during the reaction.

D They have a complementary shape to their substrate.

4. Nov/2022/Paper_12/No.11

The graph shows the effect of temperature on the activity of an enzyme.



At which temperature is the enzyme most active?

A 15 °C **B** 25 °C **C** 35 °C **D** 60 °C

5. Nov/2022/Paper_12/No.15

Which statement is correct?

A Amylase breaks down glucose to starch.

B Amylase is secreted into the mouth and small intestine.

C Lipase breaks down glycerol to fatty acids.

D Protease is secreted into the oesophagus and stomach.

6. Nov/2022/Paper_13/No.10

The equation shows the digestion of protein to amino acids.

$$\text{protein} \xrightarrow{\text{protease}} \text{amino acids}$$

In the equation, what is protease?

A a catalyst

B a product

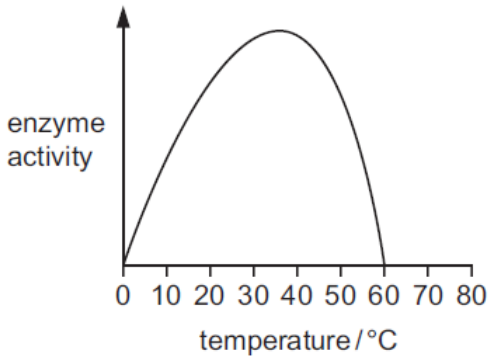
C a solvent

D a substrate

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7. Nov/2022/Paper_13/No.11

The graph shows the effect of temperature on the activity of an enzyme.



At which temperature is the enzyme most active?

A 15 °C **B** 25 °C **C** 35 °C **D** 60 °C

8. Nov/2022/Paper_21/No.8

Amylase and pepsin are digestive enzymes. The shapes of their active sites are different.

What causes the difference in the shapes of their active sites?

A They are produced by different parts of the digestive system.

B They have different pH ranges.

C They contain different sequences of amino acids.

D They are made of different proportions of the bases A, T, C and G.

9. Nov/2022/Paper_21/No.9

The rate of an enzyme-controlled reaction decreases when the temperature falls below the optimum.

Some possible reasons why it slows down are listed.

1 The enzyme molecules are denatured.

2 The molecules have less kinetic energy.

3 The shapes of the substrate molecules are changed.

4 There are less frequent collisions between molecules.

Which reasons cause the reaction to slow down?

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

10. Nov/2022/Paper_21/No.10

Which description of an enzyme-catalysed reaction is correct?

A The substrate binds to an enzyme with the same shape and a product is formed.

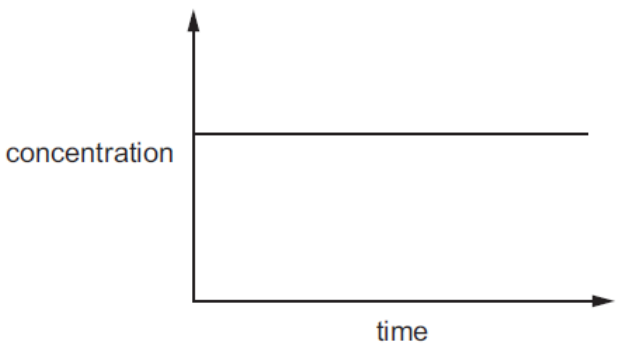
B The product binds to an enzyme with the same shape and a substrate is formed.

C The product binds to an enzyme with a complementary shape and a substrate is formed.

D The substrate binds to an enzyme with a complementary shape and a product is formed.

11. Nov/2022/Paper_22/No.8

The graph shows the concentration of a substance during the course of an enzyme-controlled reaction.



Which substance is this?

A enzyme

B enzyme-substrate complex

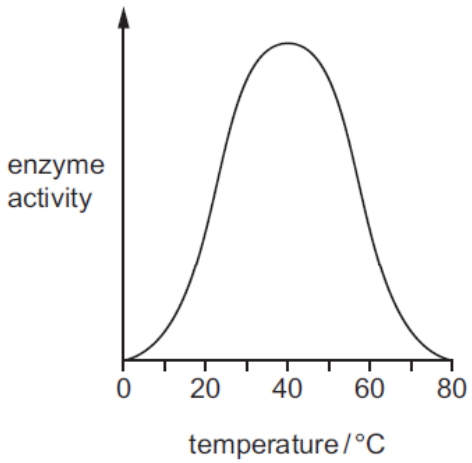
C product

D substrate

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12. Nov/2022/Paper_22/No.9

The graph shows the effect of temperature on the activity of an enzyme.



At which temperature do effective collisions happen most frequently?

A 15 °C **B** 40 °C **C** 60 °C **D** 80 °C

13. Nov/2022/Paper_22/No.10

Which statement about enzymes is correct?

A They are made of carbohydrates.

B Their activity is unaffected by pH.

C They are used up during the reaction.

D They have a complementary shape to their substrate.

14. Nov/2022/Paper_23/No.7

The list shows some statements about enzymes.

1 They all contain the element nitrogen.

2 They are proteins.

3 They can be denatured by cold temperatures.

4 Their specificity is due to the complementary shapes of the active site and the substrate.

Which statements are correct?

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

15. Nov/2022/Paper_42/No.2

Fig. 2.1 is a diagram of the human alimentary canal and associated organs.

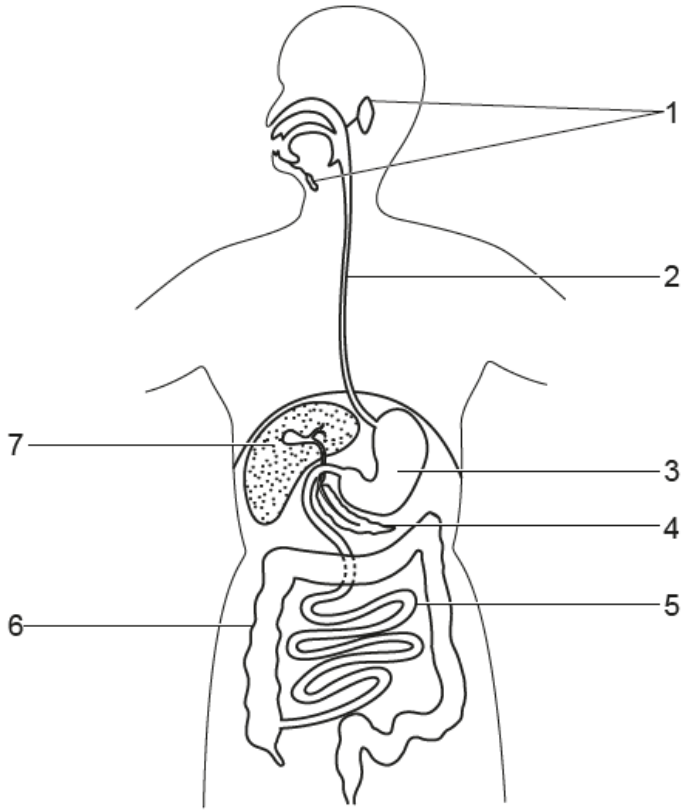


Fig. 2.1

(a) Table 2.1 shows enzymes, the organs that secrete these enzymes, their substrates and products.

Complete Table 2.1.

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Table 2.1

enzyme	organ that secretes the enzyme	number identifying the organ on Fig. 2.1	substrate	product or products
amylase		1		
		3	protein	
lipase		4		
maltase				

[4]

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(b) Explain the role of hydrochloric acid in the alimentary canal.

.....

.....

.....

.....

.....

.....

..... [3]

(c) State a function of the region of the alimentary canal labelled 6 in Fig. 2.1.

.....

.....

..... [1]

(d) Describe how food eaten by humans is reduced to smaller pieces **and** explain how this makes chemical digestion more efficient.

You may refer to Fig. 2.1 in your answer.

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.....

.....

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.....

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.....

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.....

.....

..... [6]

[Total: 14]

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Enzymes – 2022 June IGCSE 0610

1. June/2022/Paper_ 12/No.10

Which type of molecule are enzymes made of?

A carbohydrates

B fats

C proteins

D vitamins

2. June/2022/Paper_ 13/No.10

What is the correct definition of an enzyme?

A a carbohydrate that functions as a biological catalyst

B a protein that functions as a biological catalyst

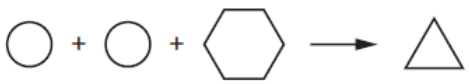
C a substance that is changed by the reaction

D a substance made of fats that changes the rate of a reaction

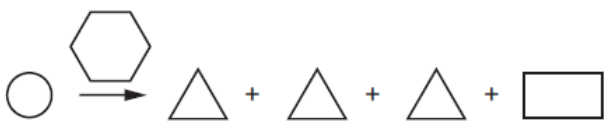
3. June/2022/Paper_ 13/No.15

Which diagram represents the action of lipase?

A



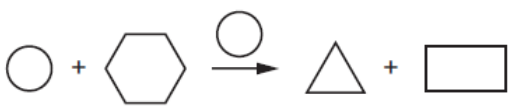
B

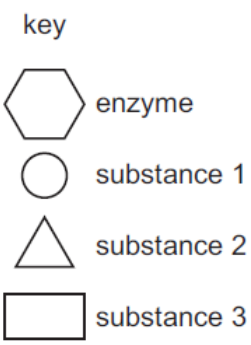


C



D





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4. June/2022/Paper_ 21/No.9

Some terms used to describe enzyme-controlled reactions are listed.

1 catalyst

2 product

3 protein

4 substrate

Which terms describe an enzyme?

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

5. June/2022/Paper_ 21/No.10

Which statement describes the effect of temperature on enzymes?

A High temperatures denature enzymes making it difficult for substrate molecules to fit into the active site.

B High temperatures denature enzymes making it easy for substrate molecules to fit into the active site.

C Low temperatures denature enzymes making it difficult for substrate molecules to fit into the active site.

D Low temperatures denature enzymes making it easy for substrate molecules to fit into the active site.

6. June/2022/Paper_ 23/No.9

What is the correct definition of an enzyme?

A a carbohydrate that functions as a biological catalyst

B a protein that functions as a biological catalyst

C a substance that is changed by the reaction

D a substance made of fats that changes the rate of a reaction

7. June/2022/Paper_ 23/No.10

Which statement describes the effect of temperature on enzymes?

A High temperatures denature enzymes making it difficult for substrate molecules to fit into the active site.

B High temperatures denature enzymes making it easy for substrate molecules to fit into the active site.

C Low temperatures denature enzymes making it difficult for substrate molecules to fit into the active site.

D Low temperatures denature enzymes making it easy for substrate molecules to fit into the active site.

8. June/2022/Paper_ 41/No.1(b_ c)

(b) Yeast cells make the enzyme sucrase. Sucrase catalyses the breakdown of sucrose to glucose and fructose.

Enzymes are made of protein.

Explain how the shape of a sucrase molecule is related to its function.

.....

.....

.....

.....

..... [2]

(c) The students made an extract of sucrase from yeast cells.

They investigated the activity of the sucrase extract at different pH values. They determined the rate of reaction at each pH.

They then calculated the rate of each reaction as a percentage of the fastest reaction, to give the percentage activity of sucrase.

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The results of this investigation are shown in Fig. 1.2.

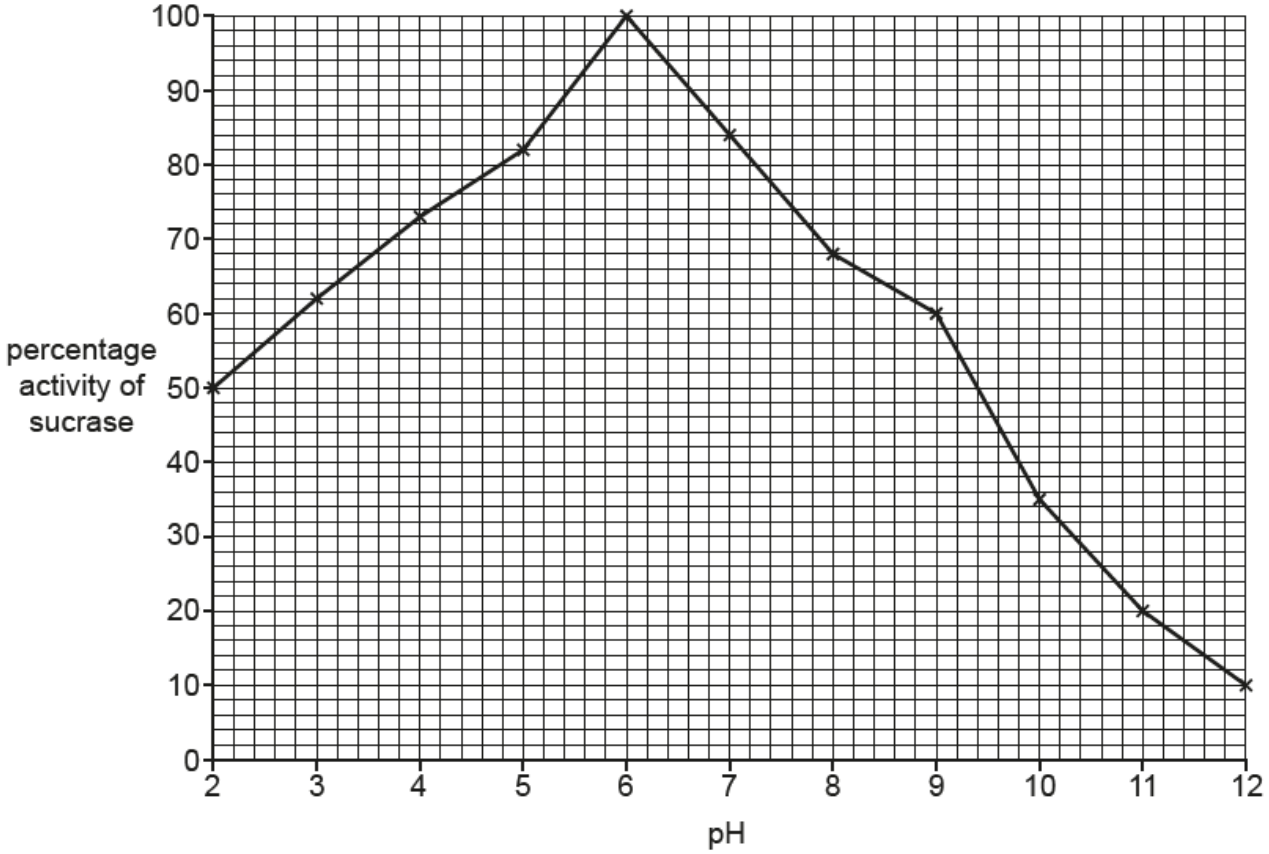


Fig. 1.2

Describe **and** explain the effect of pH on the activity of sucrase shown in Fig. 1.2.

.....

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.....

..... [6]

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9. June/2022/Paper_ 41/No.2(b)

(b) Fig. 2.2 is a diagram that shows the double circulation of a mammal. The arrows indicate the movement of oxygen and carbon dioxide in and out of the blood.

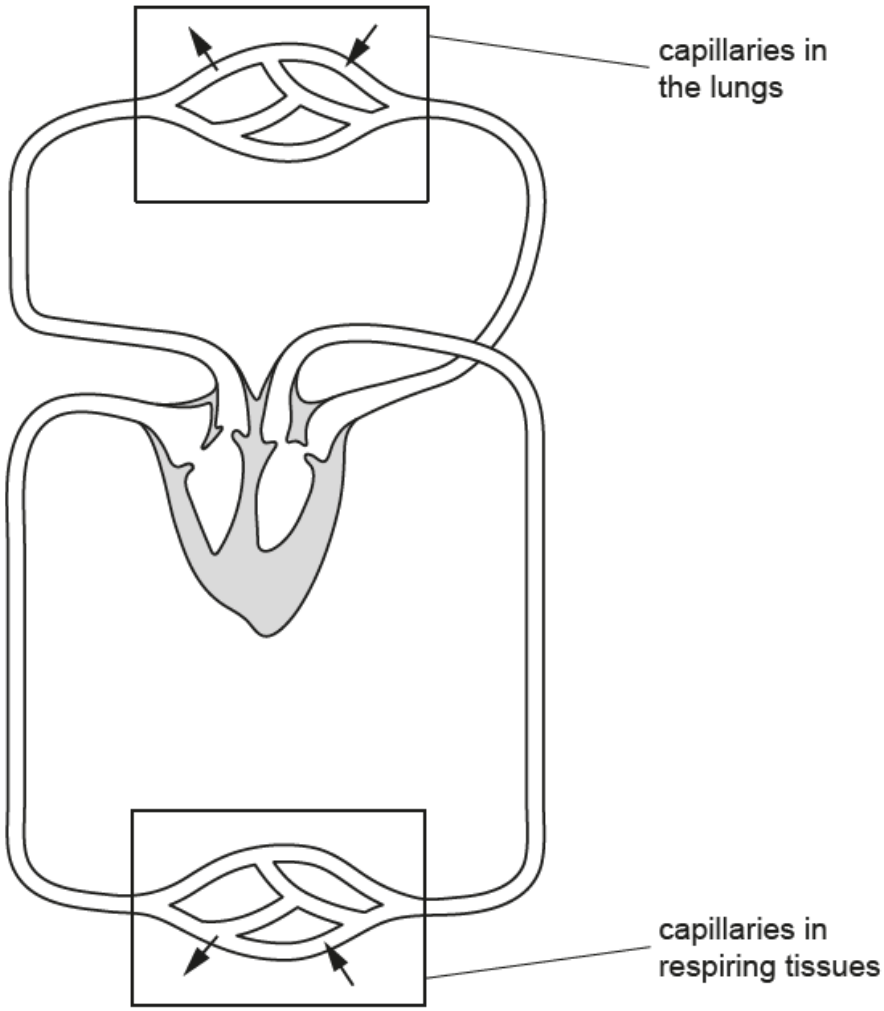


Fig. 2.2

(i) Shade the blood vessel in Fig. 2.2 that transports blood with the highest oxygen concentration. [1]

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(ii) Describe the evidence shown in Fig. 2.2 that the mammal has a double circulatory system.

.....

.....

.....

.....

..... [2]

(iii) Explain the advantages of a double circulation.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

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10. June/2022/Paper_ 43/No.2(b _ c)

(b) Biotechnologists use enzymes to extract juice from fruit such as oranges.

Define the term enzyme.

.....

.....

.....

.....

..... [2]

(c) Fig. 6.2 shows the results of leaving pieces of orange fruit in an enzyme solution for different lengths of time.

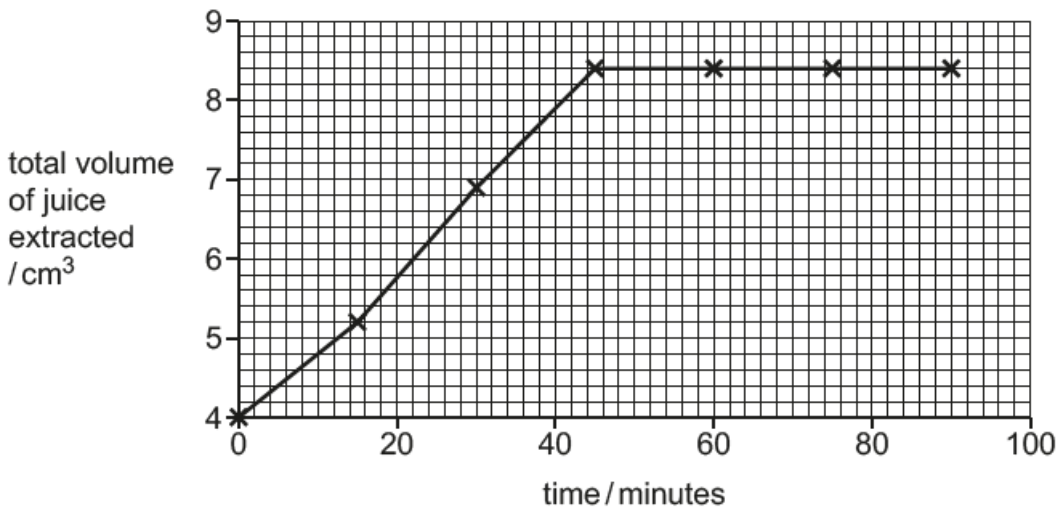


Fig. 6.2

(i) State the name of the enzyme used to extract juice from fruit.

..... [1]

(ii) Using the information in Fig. 6.2, state the optimum length of time for efficient extraction of juice from oranges.

..... [1]

(iii) State the name of the vitamin found in high concentrations in citrus fruit such as oranges.

..... [1]

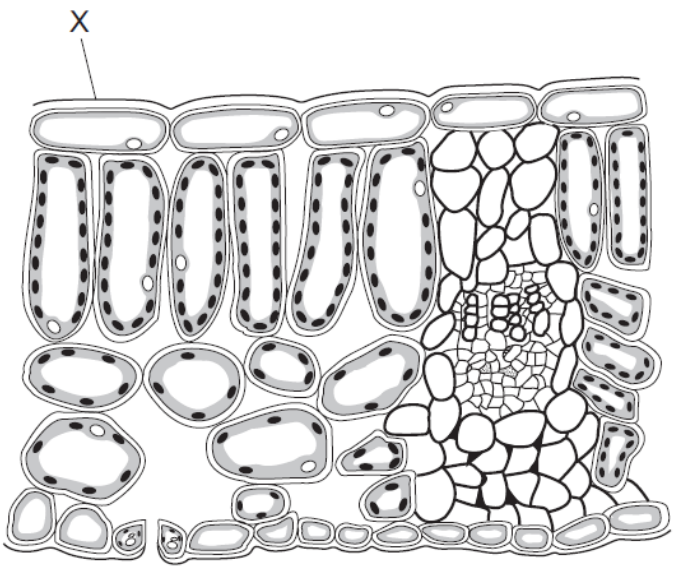
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Enzymes – 2021 IGCSE 0610

1. Nov/2021/Paper_11/No.10

2. Nov/2021/Paper_12/No.10

The diagram shows a cross-section through a leaf.



What is the structure labelled X?

A cuticle

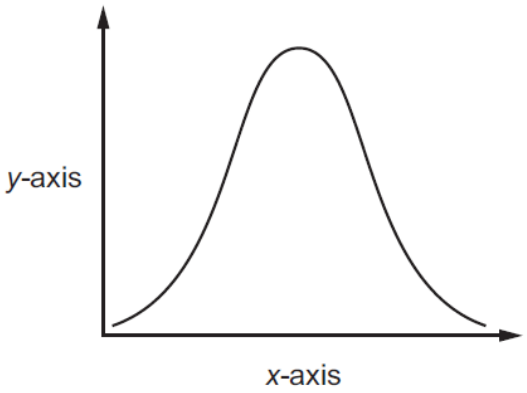
B palisade mesophyll

C spongy mesophyll

D stomata

3. Nov/2021/Paper_13/No.10

An experiment was carried out to investigate the effect of pH on enzyme action. The graph shows the results.

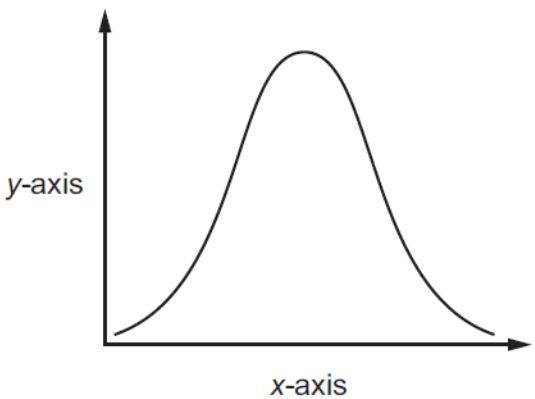


What are the labels for the *x*-axis and the *y*-axis?

	x-axis	*y*-axis
A	pH	rate of reaction
B	pH	time
C	rate of reaction	pH
D	time	pH

4. Nov/2021/Paper_21/No.10

An experiment was carried out to investigate the effect of pH on enzyme action. The graph shows the results.



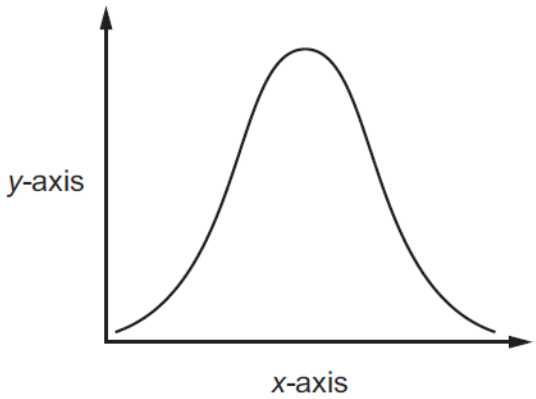
What are the labels for the *x*-axis and the *y*-axis?

	x-axis	*y*-axis
A	pH	rate of reaction
B	pH	time
C	rate of reaction	pH
D	time	pH

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5. Nov/2021/Paper_22/No.10

An experiment was carried out to investigate the effect of pH on enzyme action. The graph shows the results.



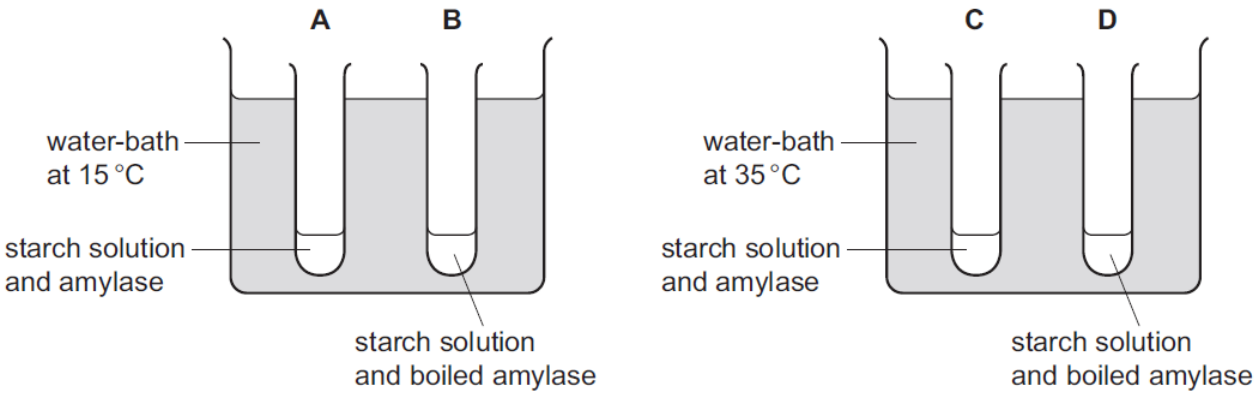
What are the labels for the *x*-axis and the *y*-axis?

	x-axis	*y*-axis
A	pH	rate of reaction
B	pH	time
C	rate of reaction	pH
D	time	pH

6. Nov/2021/Paper_22/No.11

Four test-tubes were set up as shown in the diagram.

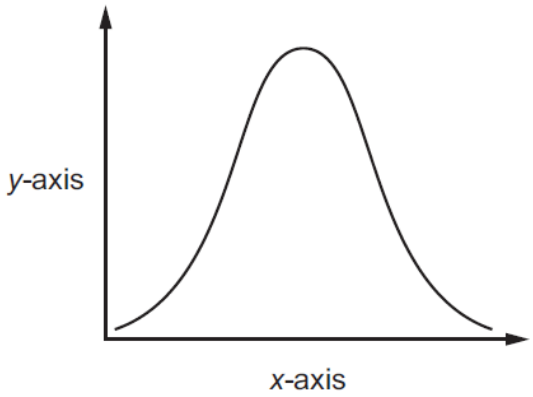
In which test-tube is the starch digested most quickly?



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7. Nov/2021/Paper_23/No.10

An experiment was carried out to investigate the effect of pH on enzyme action. The graph shows the results.



What are the labels for the *x*-axis and the *y*-axis?

	x-axis	*y*-axis
A	pH	rate of reaction
B	pH	time
C	rate of reaction	pH
D	time	pH

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8. Nov/2021/Paper_32/No.7

(a) A student investigated the effect of different concentrations of pectinase on the volume of apple juice produced.

1 cm^3 of pectinase solution was added to 5 g of mashed apples and the volume of apple juice produced was recorded. Six different concentrations of pectinase solution were tested.

The results are shown in Table 7.1.

Table 7.1

percentage concentration of pectinase solution	volume of apple juice produced / cm^3
0	4.4
5	5.0
10	5.4
15	5.8
20	
25	7.4

(i) Predict the volume of apple juice produced using pectinase solution with a concentration of 20%.

..... cm^3 [1]

(ii) Calculate the percentage increase in the volume of apple juice produced when the concentration of pectinase solution increased from 0% to 10%.

Space for working.

.....%
[2]

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(b) Crops such as apples can be selectively bred.

The box on the left contains a sentence beginning.

The boxes on the right contain some sentence endings.

Draw **two** lines to make two correct sentences about selective breeding.

Selective breeding	involves one parent only.
	is carried out over many generations.
	is caused by mutation.
	is caused by the environment.
	requires human involvement.

[2]

(c) Some of the statements shown correctly describe events that happen during the process of natural selection.

Two of the statements are incorrect.

1	There is no variation within populations.
2	Many offspring are produced so there is more competition for resources.
3	Individuals that are not suited to the environment die.
4	Individuals that are better suited to the environment survive and breed.
5	Offspring pass their alleles to their parents.

State the numbers of the **two** incorrect statements.

..... and .....

[2]

(d) State the term that is defined as an inherited feature that helps an organism to survive and reproduce in its environment.

..... [1]

[Total: 8]

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9. Nov/2021/Paper_41/No.3

Some washing powders contain enzymes.

(a) Fig. 3.1 shows a box of biological washing powder containing enzymes.

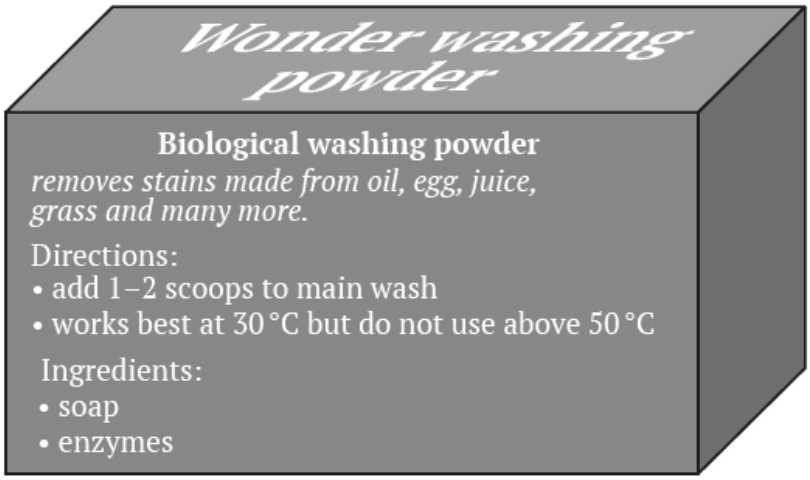


Fig. 3.1

(i) Eggs contain protein.

Describe how the biological washing powder removes egg stains.

.....

.....

.....

.....

.....

.....

..... [3]

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(ii) Explain why the manufacturer states that the washing powder works best at 30 °C and should **not** be used above 50 °C.

.....

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..... [4]

(b) Scientists used enzymes and bile in the early development of biological washing powders.

Outline the roles of bile in the body.

.....

.....

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.....

.....

.....

.....

..... [4]

[Total: 11]

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10. Nov/2021/Paper_42/No.6

Enzymes are catalysts.

(a) Define the term catalyst.

.....

.....

..... [2]

(b) Fig. 6.1 shows diagrams of three enzymes and eight different substrates.

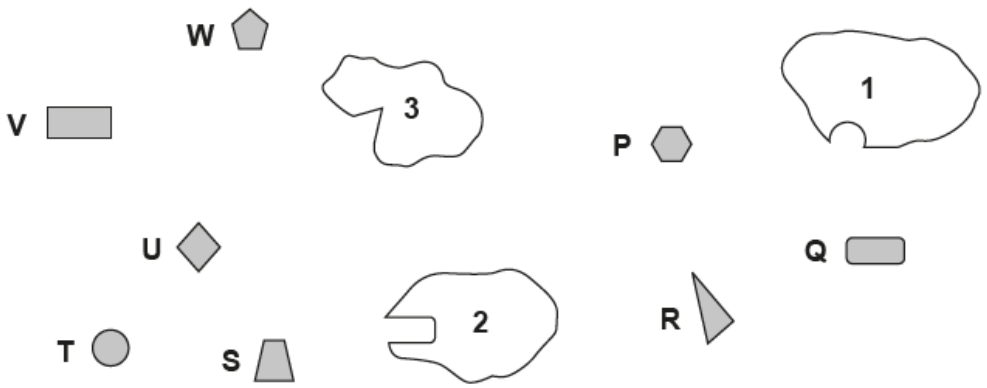


Fig. 6.1

(i) State the letter of the substrate that will be broken down by enzyme 1.

..... [1]

(ii) Explain, in terms of enzyme structure, the reason for your choice in **6(b)(i)**.

.....

.....

.....

.....

..... [2]

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(c) Table 6.1 lists some enzymes and the reactions that they catalyse.

Complete Table 6.1.

Table 6.1

enzyme	reaction
maltase	breakdown of maltose to .....
.....	breakdown of proteins to amino acids
lipase	breakdown of fats to ..... and .....
.....	breakdown of lactose to simpler sugars
.....	insertion of a short length of DNA into a plasmid
restriction enzyme	.....

[6]

[Total: 11]

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Enzymes – 2021 IGCSE 0610

1. March/2021/Paper_12/No.10

A human enzyme was used in an experiment. All factors were kept constant, apart from temperature.

What happened to the rate of reaction when the temperature was reduced steadily from 35 °C to 5 °C?

A It decreased steadily.

B It increased and then decreased.

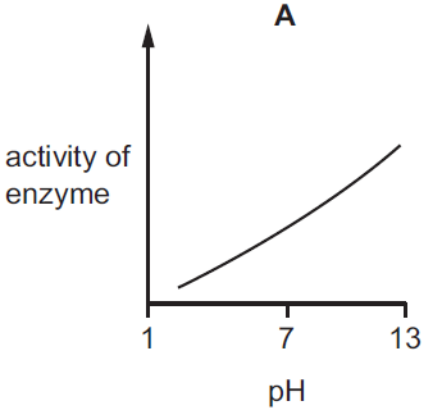
C It increased steadily.

D It remained the same.

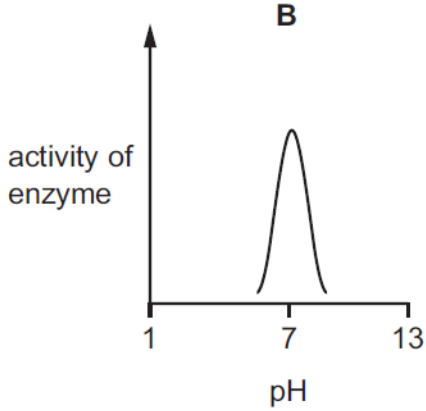
2. March/2021/Paper_12/No.11

Which graph represents the effect of pH on the activity of a digestive enzyme?

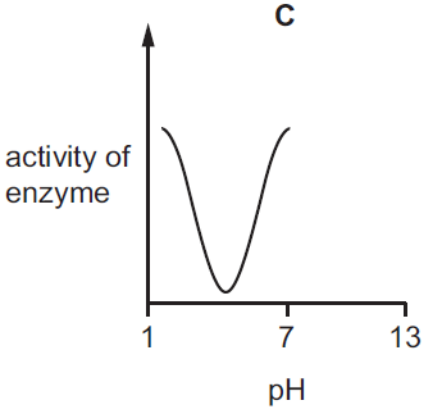
A



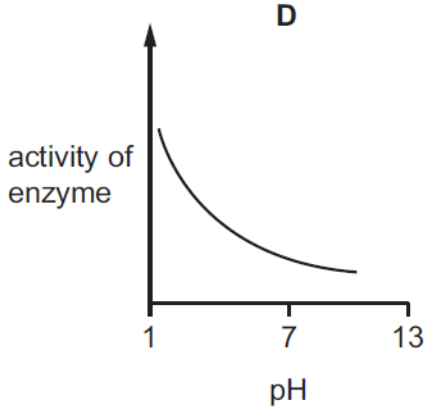
B



C



D



3. June/2021/Paper_11/No.11

Which statement describes a catalyst?

A a substance that decreases the rate of a chemical reaction and is not changed by the reaction

B a substance that decreases the rate of a chemical reaction and is changed by the reaction

C a substance that increases the rate of a chemical reaction and is changed by the reaction

D a substance that increases the rate of a chemical reaction and is not changed by the reaction

4. June/2021/Paper_11/No.39

What is a use of pectinase in the food industry?

A to extract juice from fruit

B to make biofuels

C to make biological washing powders

D to make bread rise

5. June/2021/Paper_12/No.11

Which statement about an enzyme-controlled reaction is correct?

A During the reaction, the substrate changes into products.

B The enzyme is gradually used up during the reaction.

C The enzyme is slowly broken down during the reaction.

D The higher the temperature, the slower the reaction.

6. June/2021/Paper_13/No.10

Starch is digested by amylase in the mouth, but it is not digested in the stomach.

What is the reason for this?

A All starch digestion is completed in the mouth.

B The pH in the stomach is not suitable for the amylase to work.

C The starch does not stay in the stomach long enough to be digested.

D The temperature in the stomach is not suitable for the amylase to work.

7. June/2021/Paper_21/No.11

Starch is digested by amylase in the mouth, but it is not digested in the stomach.

What is the reason for this?

A All starch digestion is completed in the mouth.

B The pH in the stomach is not suitable for the amylase to work.

C The starch does not stay in the stomach long enough to be digested.

D The temperature in the stomach is not suitable for the amylase to work.

8. June/2021/Paper_21/No.12

Which statement describes a catalyst?

A a substance that decreases the rate of a chemical reaction and is not changed by the reaction

B a substance that decreases the rate of a chemical reaction and is changed by the reaction

C a substance that increases the rate of a chemical reaction and is changed by the reaction

D a substance that increases the rate of a chemical reaction and is not changed by the reaction

9. June/2021/Paper_21/No.16

What are the products when proteins are broken down?

A amino acids

B fatty acids

C glycerol

D simple sugars

10. June/2021/Paper_22/No.12

Which statement about an enzyme-controlled reaction is correct?

A During the reaction, the substrate changes into products.

B The enzyme is gradually used up during the reaction.

C The enzyme is slowly broken down during the reaction.

D The higher the temperature, the slower the reaction.

11. June/2021/Paper_23/No.12

Which type of molecule are enzymes made of?

A carbohydrate

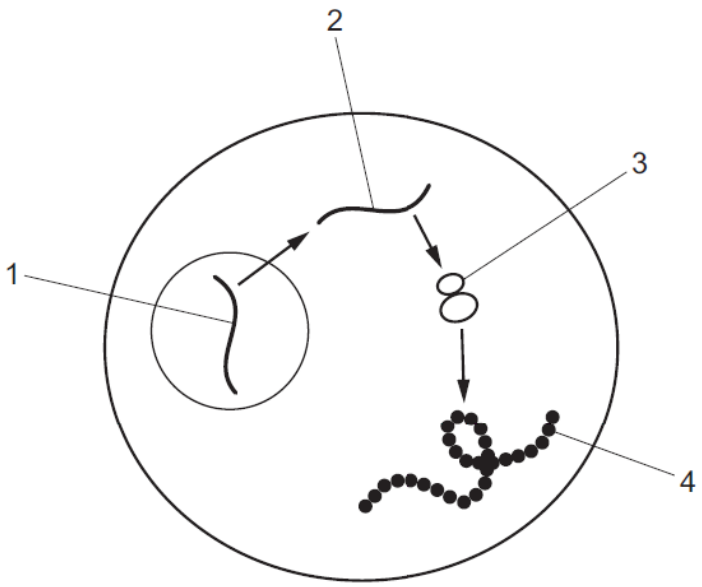
B fat

C protein

D vitamin

12. June/2021/Paper_23/No.32

The diagram shows structures involved in the synthesis of an enzyme in a cell.



What is structure 2?

A amino acids

B DNA

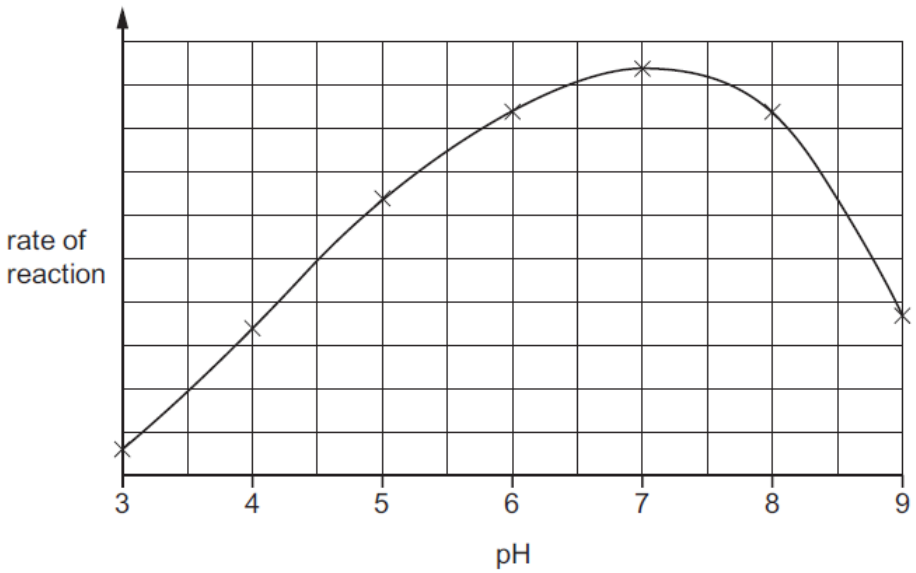
C mRNA

D protein

Enzymes – 2020 IGCSE 0610

1. Nov/2020/Paper_11/No.10

The graph shows the effect of pH on the rate of reaction of an enzyme.



What does the graph show?

A The enzyme is destroyed at pH 9.

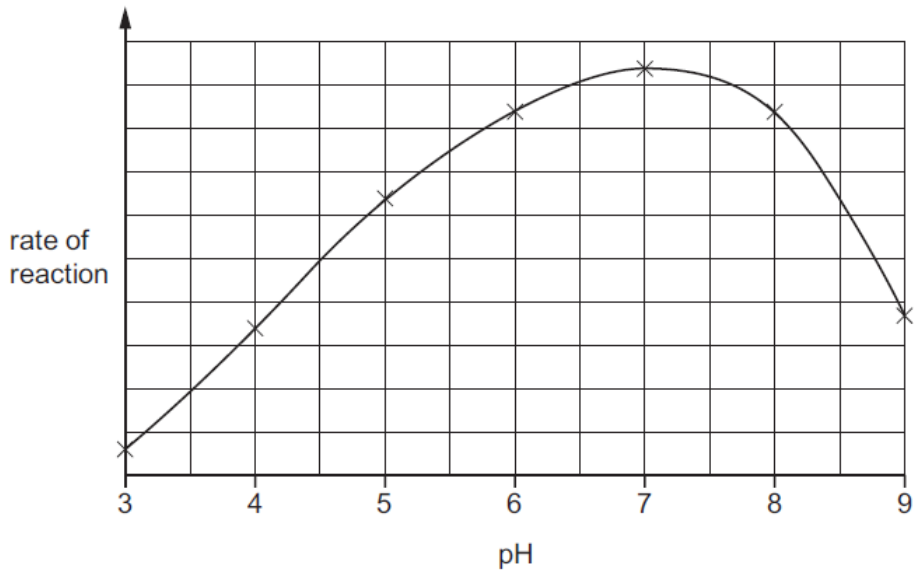
B The enzyme works best at pH 6.

C The rate of reaction halves as the pH changes from pH 5 to pH 7.

D The rate of reaction is the same at pH 5 and pH 8.5.

2. Nov/2020/Paper_12/No.10

The graph shows the effect of pH on the rate of reaction of an enzyme.



What does the graph show?

A The enzyme is destroyed at pH 9.

B The enzyme works best at pH 6.

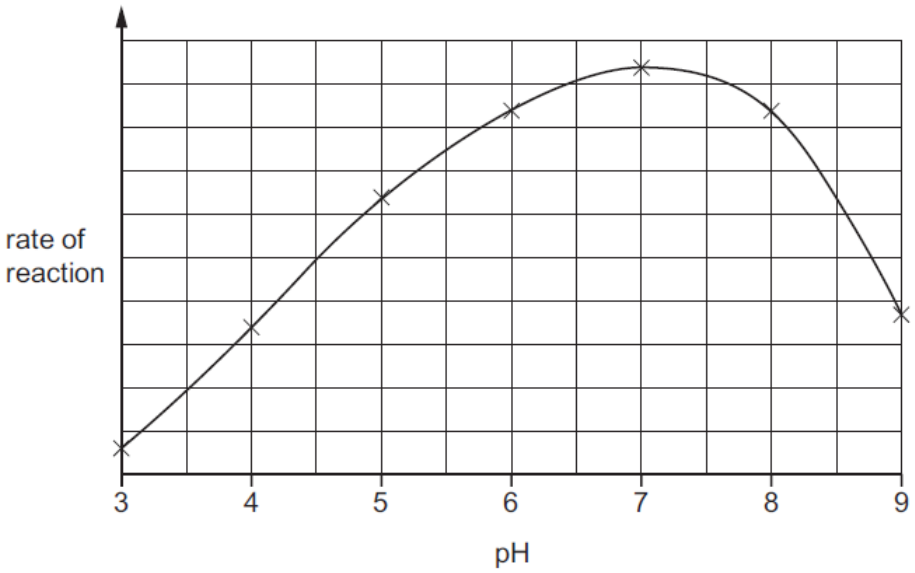
C The rate of reaction halves as the pH changes from pH 5 to pH 7.

D The rate of reaction is the same at pH 5 and pH 8.5.

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3. Nov/2020/Paper_13/No.10

The graph shows the effect of pH on the rate of reaction of an enzyme.



What does the graph show?

A The enzyme is destroyed at pH 9.

B The enzyme works best at pH 6.

C The rate of reaction halves as the pH changes from pH 5 to pH 7.

D The rate of reaction is the same at pH 5 and pH 8.5.

4. Nov/2020/Paper_13/No.11

What kind of molecule is an enzyme?

A fat

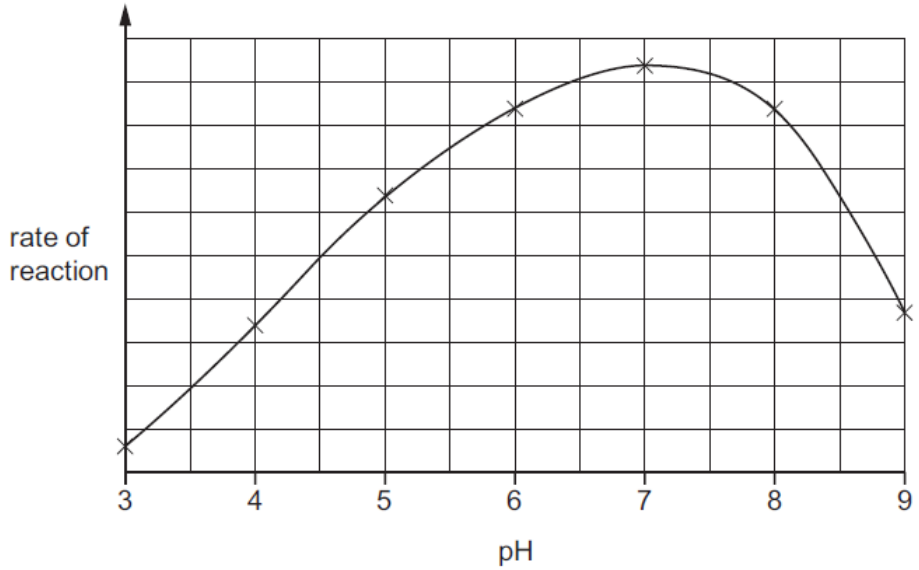
B glucose

C protein

D starch

5. Nov/2020/Paper_21/No.9

The graph shows the effect of pH on the rate of reaction of an enzyme.



What does the graph show?

A The enzyme is destroyed at pH 9.

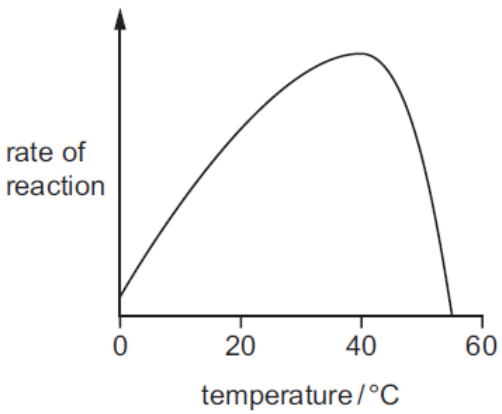
B The enzyme works best at pH 6.

C The rate of reaction halves as the pH changes from pH 5 to pH 7.

D The rate of reaction is the same at pH 5 and pH 8.5.

6. Nov/2020/Paper_21/No.10

The graph shows how enzyme activity is affected by temperature.



How can the change in activity between 40 °C and 55 °C be explained?

A Heat has killed the enzyme.

B The enzyme has been used up.

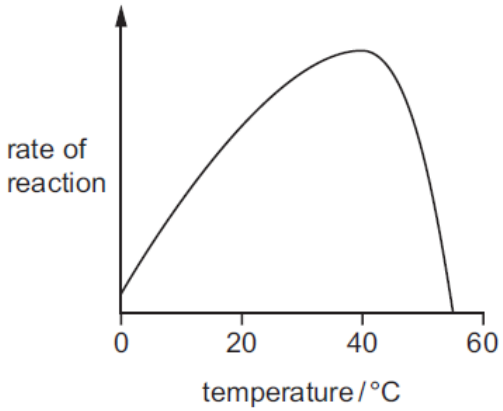
C The reactants are moving faster.

D The substrate is less likely to fit into the active site.

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7. Nov/2020/Paper_22/No.9

The graph shows how enzyme activity is affected by temperature.



How can the change in activity between 40 °C and 55 °C be explained?

A Heat has killed the enzyme.

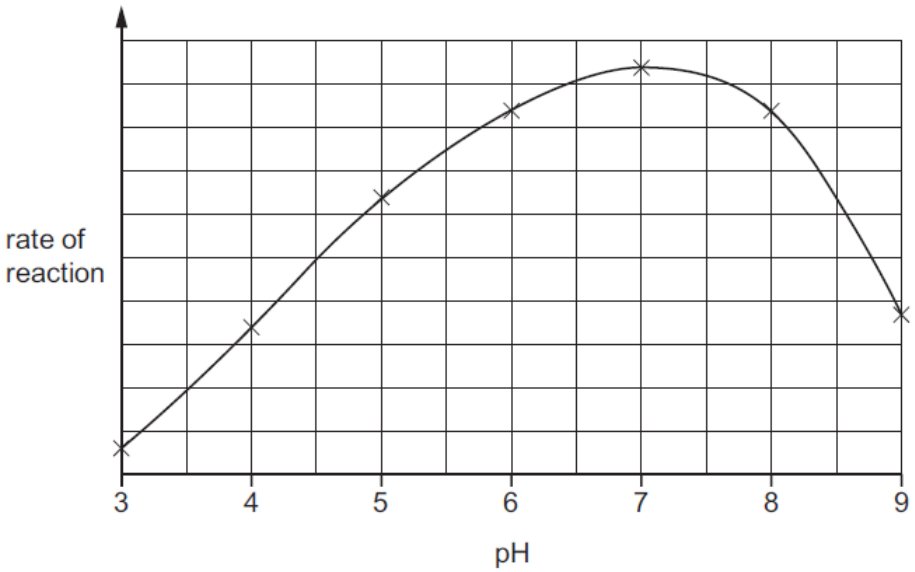
B The enzyme has been used up.

C The reactants are moving faster.

D The substrate is less likely to fit into the active site.

8. Nov/2020/Paper_22/No.9

The graph shows the effect of pH on the rate of reaction of an enzyme.



What does the graph show?

A The enzyme is destroyed at pH 9.

B The enzyme works best at pH 6.

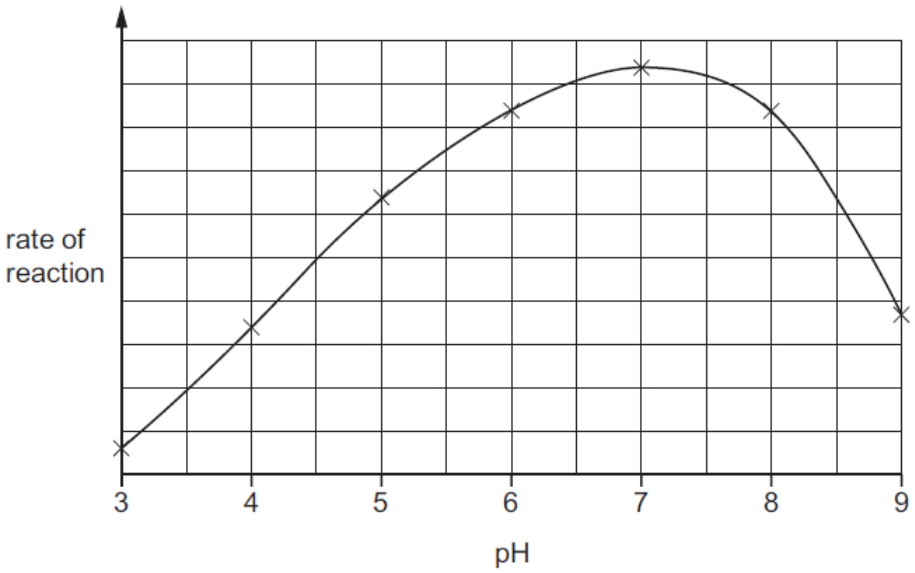
C The rate of reaction halves as the pH changes from pH 5 to pH 7.

D The rate of reaction is the same at pH 5 and pH 8.5.

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9. Nov/2020/Paper_23/No.9

The graph shows the effect of pH on the rate of reaction of an enzyme.



What does the graph show?

A The enzyme is destroyed at pH 9.

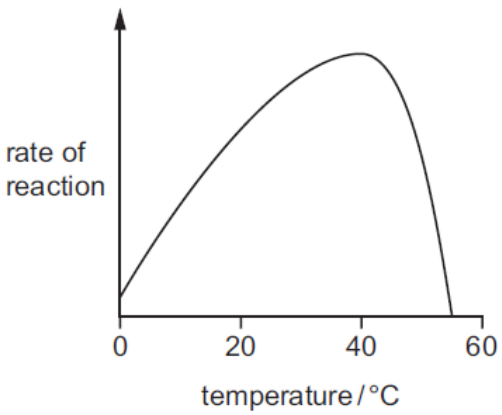
B The enzyme works best at pH 6.

C The rate of reaction halves as the pH changes from pH 5 to pH 7.

D The rate of reaction is the same at pH 5 and pH 8.5.

10. Nov/2020/Paper_23/No.10

The graph shows how enzyme activity is affected by temperature.



How can the change in activity between 40 °C and 55 °C be explained?

A Heat has killed the enzyme.

B The enzyme has been used up.

C The reactants are moving faster.

D The substrate is less likely to fit into the active site.

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11. Nov/2020/Paper_31/No.6

(a) Pectinase is an enzyme that is used in the production of apple juice.

A student investigated how pH affected the volume of apple juice produced when using pectinase.

The student chopped an apple into small pieces.

The pieces of apple were put into solutions with different pH values.

Pectinase was added to each solution.

After two hours the mixture was filtered and the volume of apple juice obtained was recorded.

Table 6.1 shows the results.

Table 6.1

pH	volume of apple juice obtained / cm^3
1.0	23.2
2.0	24.2
3.0	23.5
4.0	25.7
5.0	27.6
6.0	27.4
7.0	24.0
8.0	22.0

(i) State the pH at which pectinase is most active.

Give a reason for your answer.

pH .....

reason .....

.....

.....

[2]

(ii) State **one** factor, other than pH, that would affect the activity of pectinase.

..... [1]

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(b) Pectinase is an enzyme.

The box on the left shows the beginning of a sentence.

The boxes on the right show some endings of sentences.

Draw **three** lines from the word 'Enzymes' to make three correct sentences.

Enzymes	are living organisms.
	are proteins.
	can only be used once.
	have a complementary shape to their substrate.
	increase the rate of chemical reactions.
	in the stomach are most active at pH 8.

[3]

(c) State **one** use of enzymes in biotechnology other than fruit juice production.

..... [1]

(d) Many types of enzymes are involved in digestion.

State the names of **two** digestive enzymes in the human alimentary canal.

1 .....

2 .....

[2]

[Total: 9]

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12. Nov/2020/Paper_41/No.5

Milk is a source of some of the nutrients that are part of a balanced diet.

(a) Calcium and protein are two nutrients found in milk.

Describe the importance of calcium and protein in the diet.

calcium .....

.....

.....

protein .....

.....

.....

[4]

(b) Lactose is found in cows' milk. Some people do not have the enzyme to digest lactose.

State the names of **two** organs, associated with the alimentary canal, that produce enzymes.

1 .....

2 .....

[2]

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(c) Fig. 5.1 shows a flow diagram for the production of lactose-free milk.

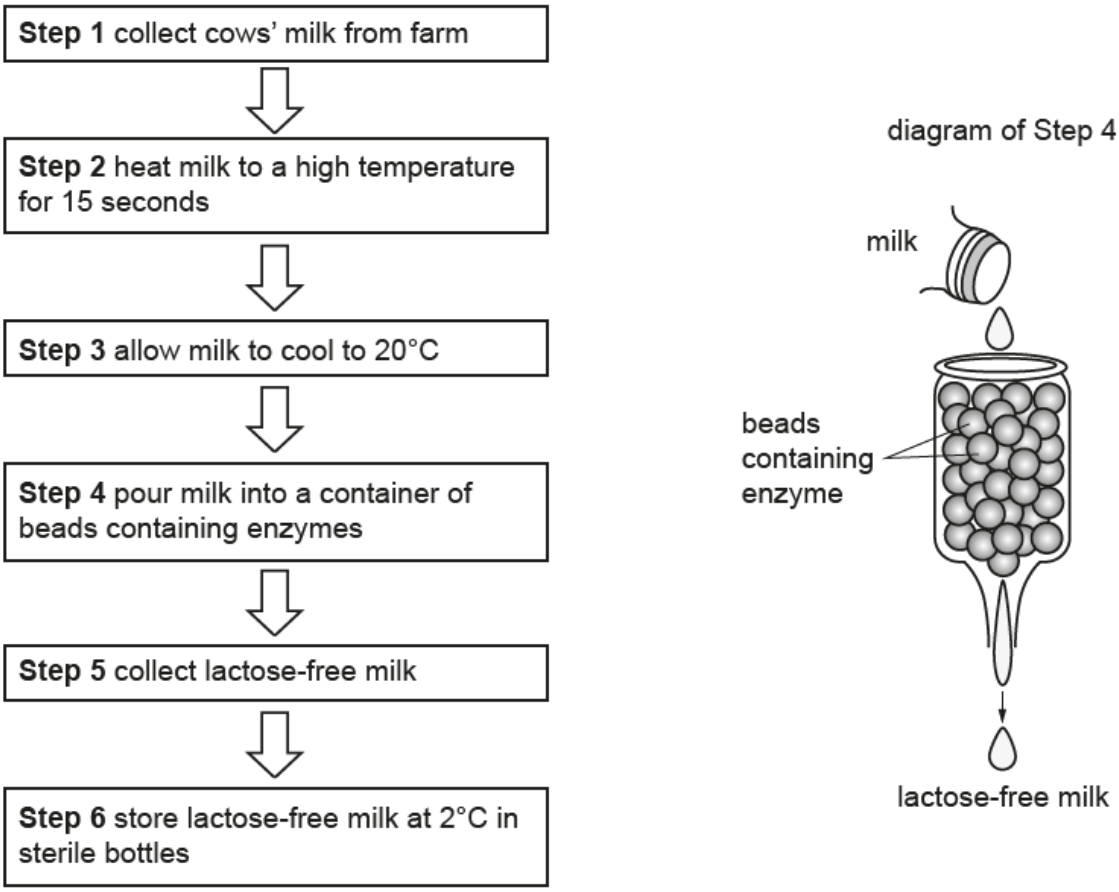


Fig. 5.1

(i) Explain how heating the milk in **step 2** in Fig. 5.1 ensures the hygienic preparation of lactose-free milk.

.....

.....

..... [1]

(ii) Explain why the milk must be cooled in **step 3** before it makes contact with the enzymes.

.....

.....

.....

.....

..... [2]

(iii) State the name of the enzyme used to make lactose-free milk in **step 4**.

..... [1]

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(iv) Suggest why the enzymes are kept in the beads in **step 4** rather than mixed as an enzyme solution with the milk.

.....

.....

..... [1]

(d) Milk is produced by mammals.

(i) Explain the advantages to newborn mammals of breast milk.

.....

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.....

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.....

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.....

.....

..... [4]

(ii) Explain why breast-feeding mothers are advised to drink plenty of water and avoid excessive alcohol consumption.

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..... [2]

[Total: 17]

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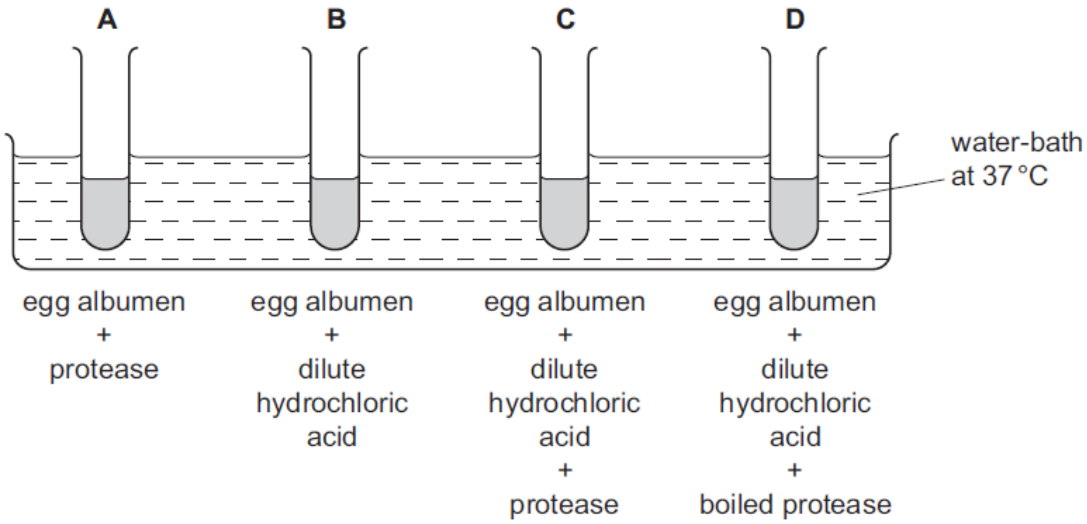
Enzymes – 2020 IGCSE 0610

1. March/2020/Paper_12/No.10

The diagram shows an experiment on the digestion of the protein in egg albumen by protease.

The protease was taken from a human stomach.

In which test-tube will the protein be digested most quickly?



2. March/2020/Paper_12/No.11

What is left at the end of an enzyme-controlled reaction?

A enzymes and products

B enzymes and substrates

C enzymes only

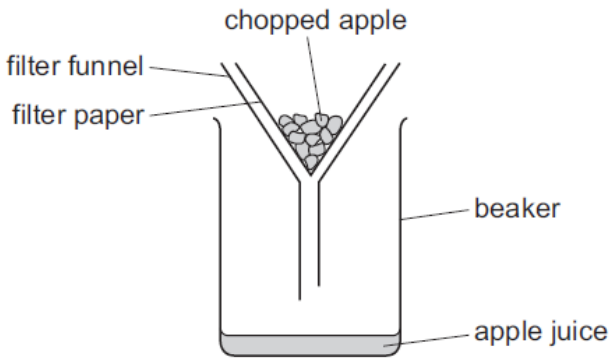
D products only

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3. March/2020/Paper_12/No.38

Chopped apple is placed into filter paper and a funnel as shown in the diagram.

Enzymes are added to increase the volume of apple juice released.



Which enzyme would release the highest volume of juice?

A amylase

B lipase

C pectinase

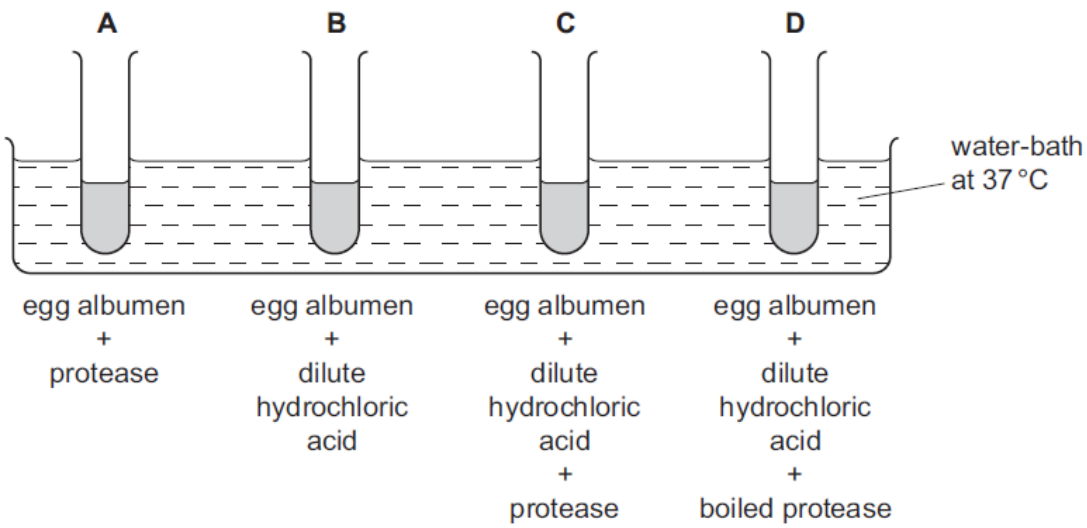
D protease

4. March/2020/Paper_22/No.10

The diagram shows an experiment on the digestion of the protein in egg albumen by protease.

The protease was taken from a human stomach.

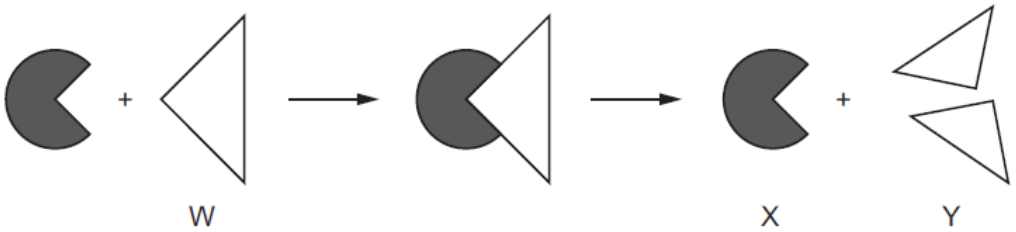
In which test-tube will the protein be digested most quickly?



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5. March/2020/Paper_22/No.11

The diagram represents enzyme action.



What are parts W, X and Y in this chemical reaction?

	enzyme	product	substrate
A	W	X	Y
B	X	W	Y
C	X	Y	W
D	Y	W	X

6. June/2020/Paper_11/No.9

What is the definition of an enzyme?

A a carbohydrate that acts as a catalyst

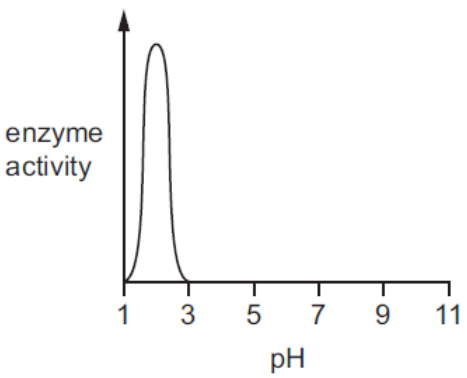
B a DNA molecule that acts as a catalyst

C a fat that acts as a catalyst

D a protein that acts as a catalyst

7. June/2020/Paper_12/No.12

The graph shows the effect of pH on the activity of an enzyme.



In which part of the alimentary canal would this enzyme be **most** active?

A large intestine

B mouth

C small intestine

D stomach

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8. June/2020/Paper_13/No.9

Which statement about enzyme-controlled reactions is correct?

A During the reaction, a substrate changes into a product.

B The enzyme is slowly broken down during the reaction.

C The higher the pH the faster the reaction.

D The product is gradually used up during the reaction.

9. June/2020/Paper_21/No.9

What is the definition of an enzyme?

A a carbohydrate that acts as a catalyst

B a DNA molecule that acts as a catalyst

C a fat that acts as a catalyst

D a protein that acts as a catalyst

10. June/2020/Paper_21/No.13

The activity of amylase is measured in four parts of the alimentary canal.

Which two parts have the most amylase activity?

A colon and duodenum

B colon and stomach

C mouth and duodenum

D stomach and mouth

11. June/2020/Paper_21/No.14

Biological washing powder can be used to remove stains on clothing.

Which enzymes will remove stains caused by starch, fat and protein?

	amylase	lipase	trypsin
A	✓	✗	✗
B	✓	✓	✓
C	✗	✗	✓
D	✗	✓	✓

key

✓ = removes stain

✗ = does not remove stain

12. June/2020/Paper_22/No.10

Enzymes function best at their optimum temperature.

Which statement describes the effect on an enzyme of increasing the temperature to the enzyme's optimum temperature?

A There are more frequent successful collisions.

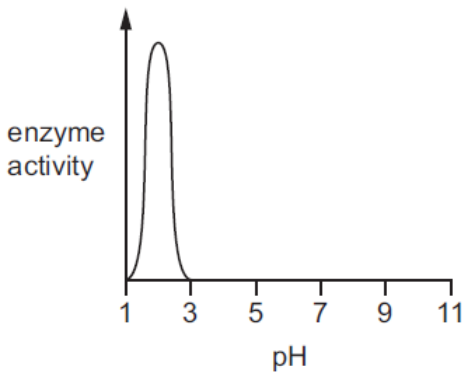
B The kinetic energy of the enzymes decreases.

C The enzymes begin to lose their complementary shape.

D The rate at which enzyme-substrate complexes form is reduced.

13. June/2020/Paper_22/No.13

The graph shows the effect of pH on the activity of an enzyme.



In which part of the alimentary canal would this enzyme be **most** active?

A large intestine

B mouth

C small intestine

D stomach

14. June/2020/Paper_23/No.9

Which statement about enzyme-controlled reactions is correct?

A During the reaction, a substrate changes into a product.

B The enzyme is slowly broken down during the reaction.

C The higher the pH the faster the reaction.

D The product is gradually used up during the reaction.

15. June/2020/Paper_23/No.10

Increasing temperature above the optimum for the enzyme results in loss of enzyme activity.

How is this explained?

A less frequent collisions between the enzyme and the substrate

B reduced kinetic energy of the enzyme molecule

C substrate molecules move faster and effective collisions are less likely

D the shape of the active site is changed and the substrate will no longer fit into it

16. June/2020/Paper_41/No.2

Biological washing powders contain enzymes that break down food stains.

(a) Complete Table 2.1 by naming the enzymes that break down three substances in food stains and by stating the product or products.

Table 2.1

substance	enzyme	product(s)
starch		
fat		
protein		

[3]

Some students compared how effective biological and non-biological washing powders are at removing stains at temperatures between 10 °C and 60 °C.

- Pieces of stained cloth were washed using two different washing powders.
- The degree of stain removal was measured by using a light meter to record the percentage of light reflected from the cloth.
- A light meter gave a value of 100% when the cloth was completely clean.
- Any stain left on the cloth reduced the percentage of light reflected.

The results of the students' investigation are shown in Fig. 2.1.

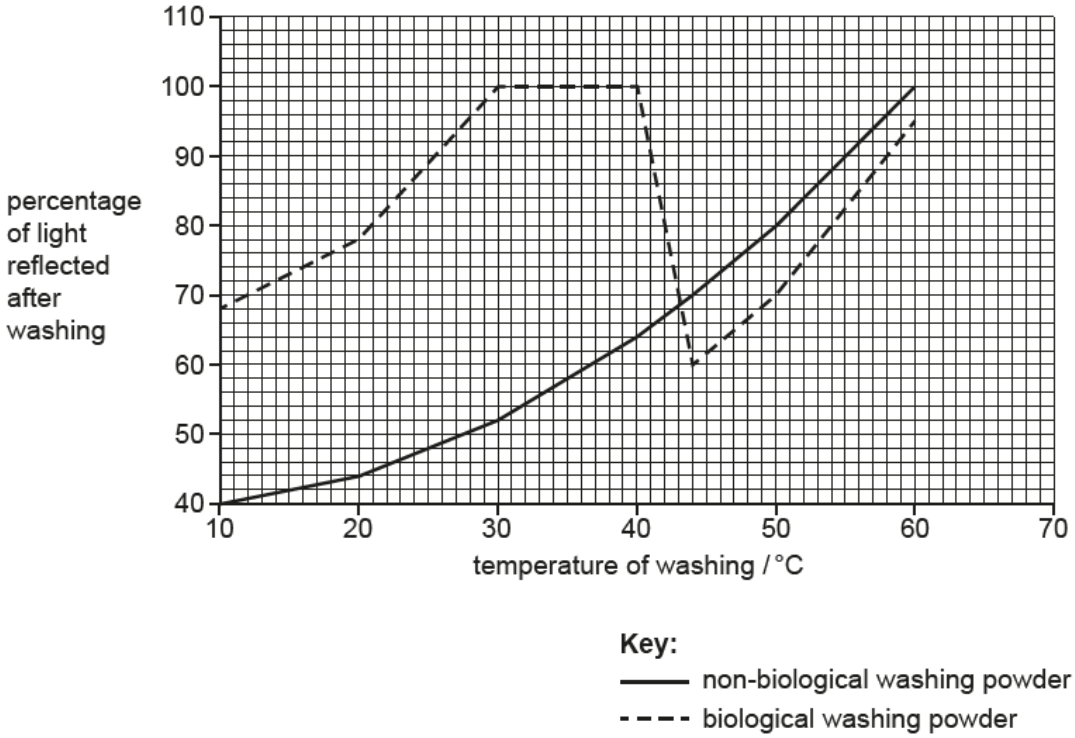


Fig. 2.1

(b) Compare the effectiveness of the two washing powders at removing stains.

Use the information in Fig. 2.1 in your answer.

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..... [4]

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(c) The students suggested that the enzymes in the biological washing powder were denatured at high temperatures.

Explain why enzyme molecules do not function when they are denatured.

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..... [2]

(d) Forensic scientists often try to find DNA on items of stained clothing. The DNA can be used to identify individual people.

Suggest why DNA can be used to identify individual people.

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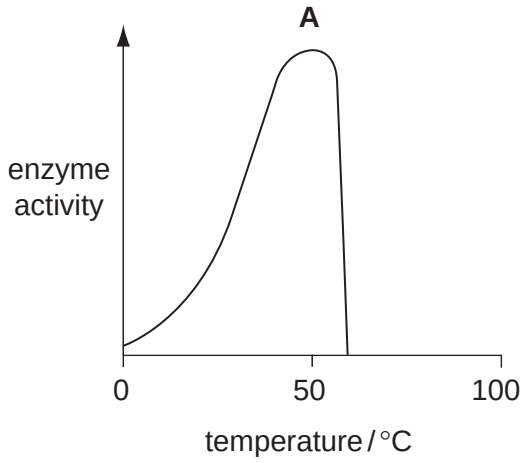
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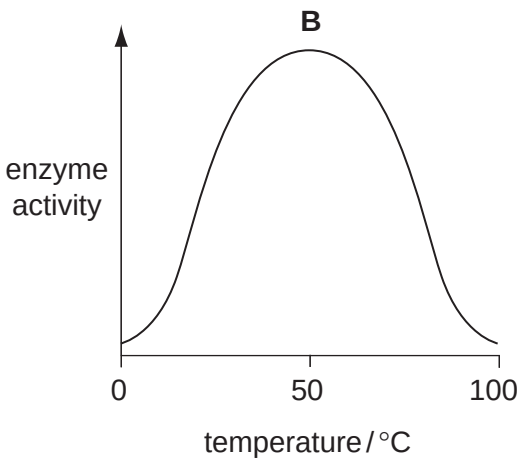
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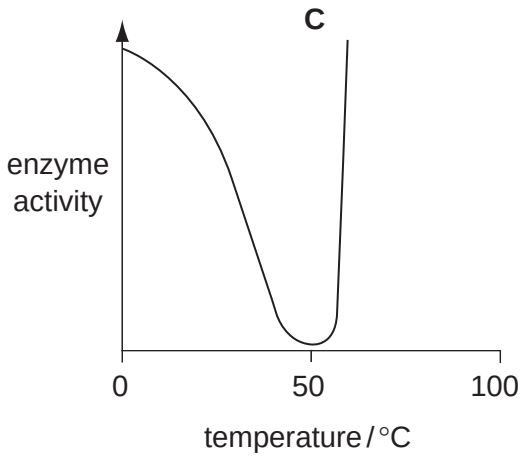
[Total: 11]

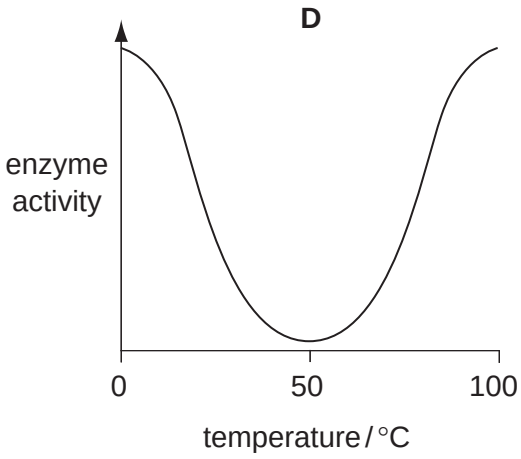
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1. Which graph shows the effect of temperature on the activity of an enzyme?

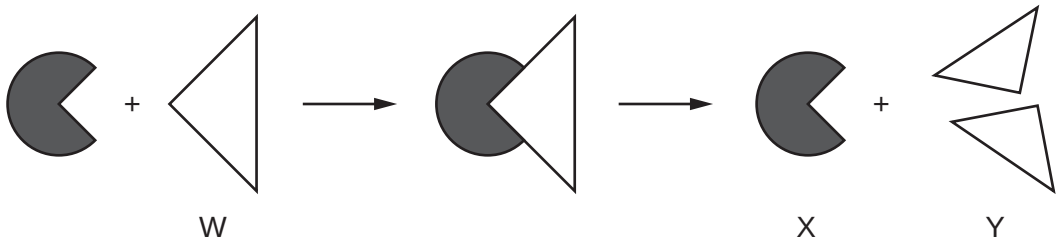








2. The diagram represents enzyme action.



What are parts W, X and Y in this chemical reaction?

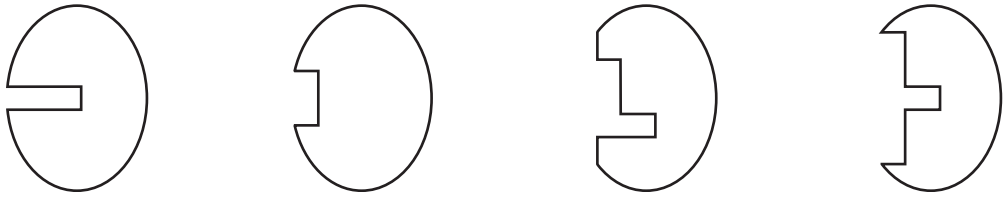
	enzyme	product	substrate
A	W	X	Y
B	X	W	Y
C	X	Y	W
D	Y	W	X

3. The diagram represents a chemical reaction.



Which diagram represents the enzyme for this reaction?

A **B** **C**



4. A food stain on a table cloth is where meat cooked in oil has been spilt.

It is washed in a biological washing powder.

Which combination of enzymes should be in the washing powder to remove the stain?

A amylase and lipase

B lipase and protease

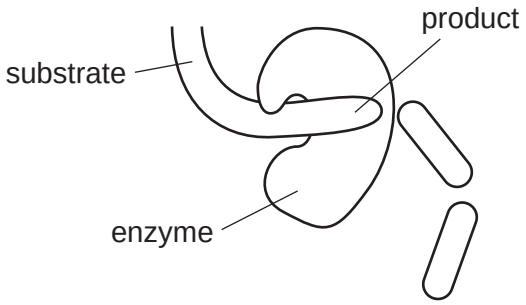
C pectinase and amylase

D protease and pectinase

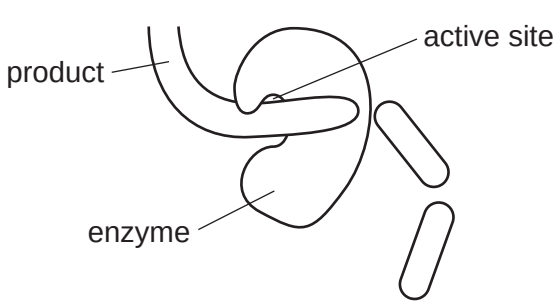
5. The diagrams show a protease enzyme catalysing the breaking of part of a protein molecule into smaller pieces.

Which diagram has three correct labels?

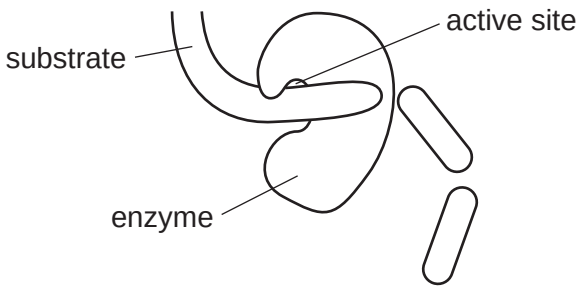
A



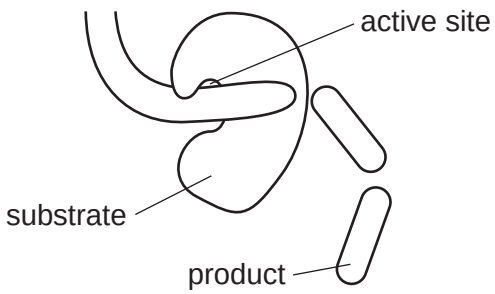
B



C



D

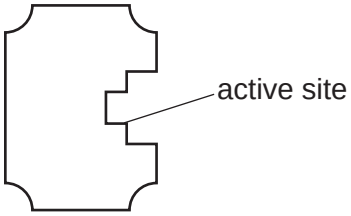


6. The table shows the conditions in four test-tubes containing equal amounts of starch and salivary amylase.

In which test-tube is the starch broken down fastest?

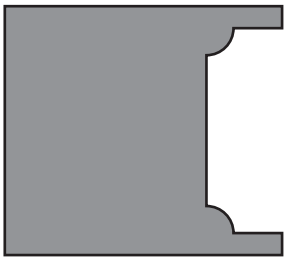
	pH	temperature /°C
A	2	27
B	2	37
C	7	27
D	7	37

7. The diagram represents the shape of an enzyme molecule.

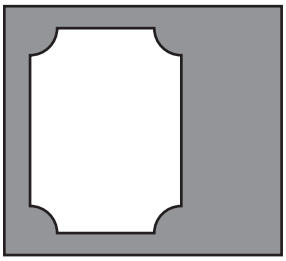


With which substrate would this enzyme most easily form an enzyme-substrate complex?

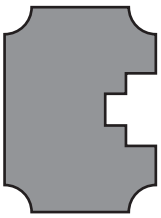
A



B



C



D

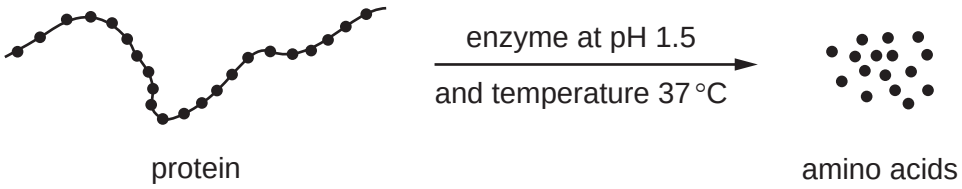


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8. What is true of **all** enzymes?

	they are sugars	they are most effective at pH7
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

9. The diagram shows the effect of an enzyme working in the human digestive system.



What would **reduce** the rate of production of amino acids?

A removing the amino acids as they are formed

B increasing the amount of protein

C raising the temperature to 40 °C

D raising the pH to 7.5

10. Which group of compounds ensures that metabolic reactions take place effectively?

A carbohydrates

B enzymes

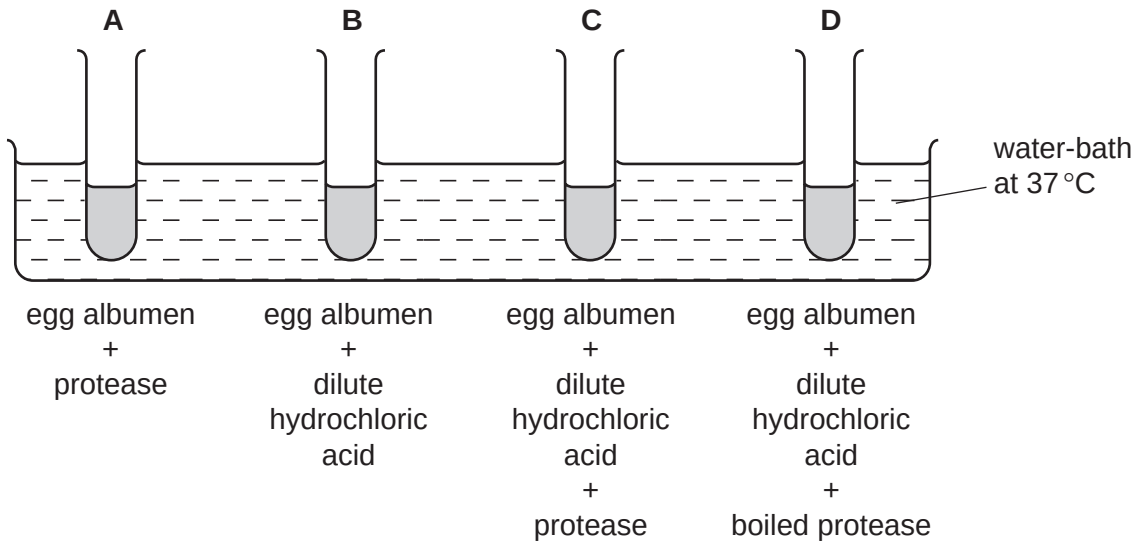
C fatty acids

D hormones

11. The diagram shows an experiment on the digestion of the protein in egg albumen by protease.

The protease was taken from a human stomach.

In which test-tube will the protein be digested most quickly?



12. Which effect does a gradual decrease in pH from 13 to 1 have on the action of amylase?

A slows it down only

B slows it down then speeds it up

C speeds it up only

D speeds it up then slows it down

13. An enzyme in potato cells causes oxygen to be produced from hydrogen peroxide.

Cubes of potato were incubated with hydrogen peroxide at different temperatures.

The numbers of bubbles of oxygen released per minute were counted at each temperature.

The table shows the results.

temperature / °C	15	25	35	45	55
number of bubbles / bubbles per minute	96	98	82	36	1

The results suggest the optimum temperature for the enzyme is between which two values?

A 15 °C and 35 °C

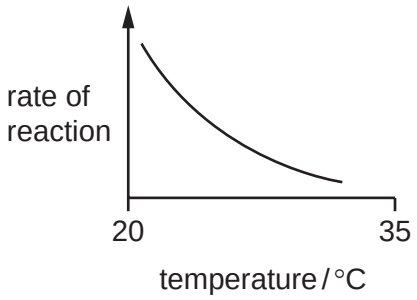
B 35 °C and 45 °C

C 35 °C and 55 °C

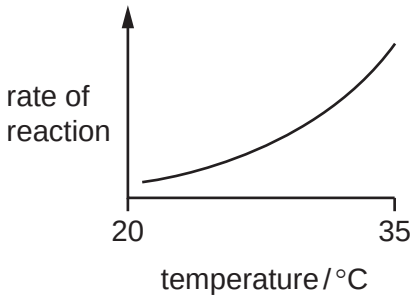
D 45 °C and 55 °C

14. Which graph shows the effect of temperature between 20 °C and 35 °C on the activity of a human digestive enzyme?

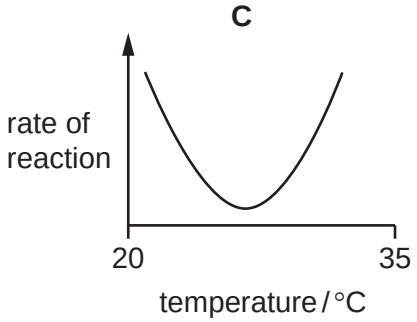
A



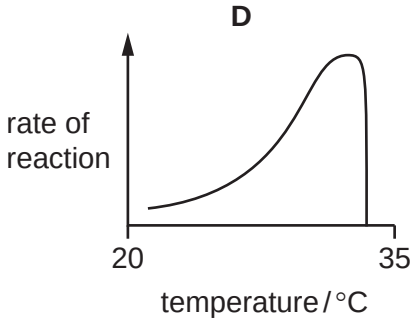
B



C



D



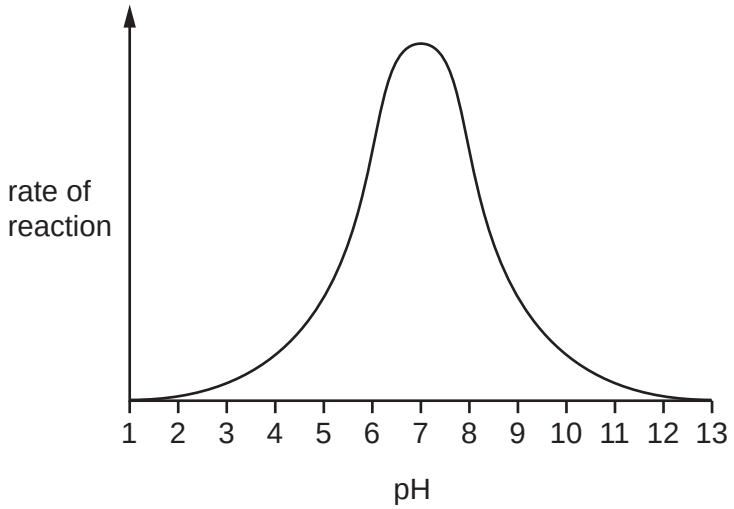
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15. Lactase is a human enzyme that catalyses the breakdown of lactose in milk.

At which temperature does lactase work fastest?

A 0 °C **B** 18 °C **C** 37 °C **D** 100 °C

16. The graph shows the effect of pH on a particular enzyme-controlled reaction.



When is the enzyme **not** active?

A at pH 1 and pH 13

B at pH 3 and pH 11

C at pH 5 and pH 9

D at pH 7

17. What happens to most enzymes above 60 °C?

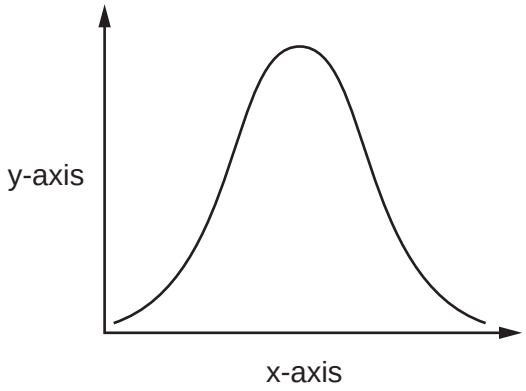
A They are denatured.

B They are destroyed by white blood cells.

C They are digested.

D They are made more active.

18. An experiment was carried out to investigate the effect of pH on enzyme action. The graph shows the results.

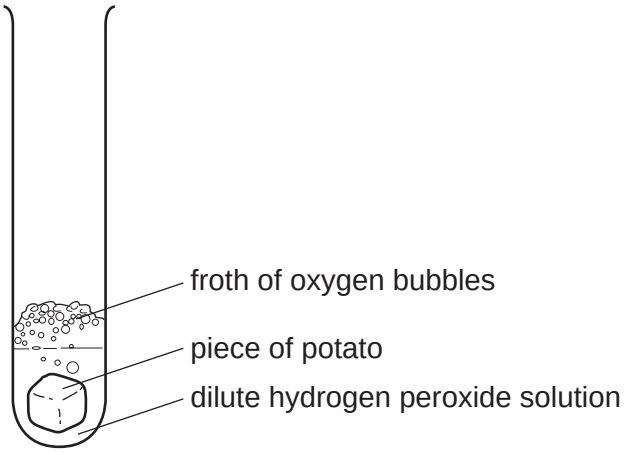


What are the labels for the x-axis and the y-axis?

	x-axis	y-axis
A	pH	rate of reaction
B	pH	time
C	rate of reaction	pH
D	time	pH

19. The enzyme catalase, found in potato, speeds up the breakdown of hydrogen peroxide. The reaction releases a froth of oxygen bubbles.

The diagram shows an experiment to find the effect of changes in pH on the rate of this reaction.



The table shows the time taken for the froth of bubbles to reach the top of the test-tube at different pH values.

pH	minutes
4	4
5	3
6	1
7	2

Which pH is nearest to the optimum (best) for this enzyme?

A pH 4 **B** pH 5 **C** pH 6 **D** pH 7

20. What is a characteristic of all catalysts?

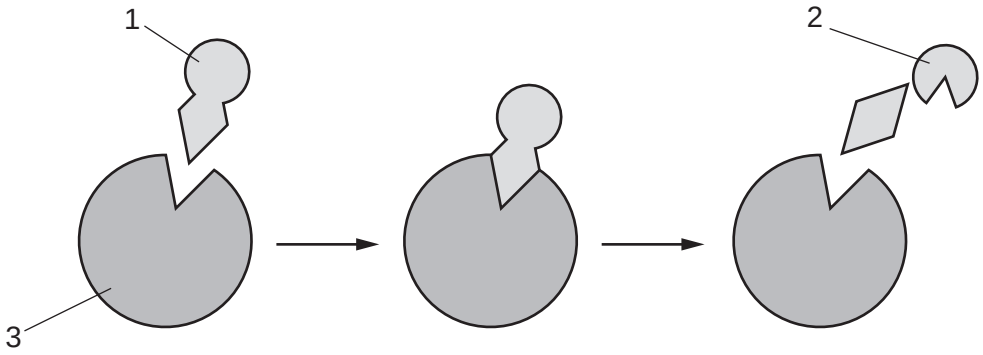
A They are broken down in the reaction.

B They are made of protein.

C They are not changed by the reaction.

D They do not change the rate of the reaction.

21. The diagram shows the lock and key model of enzyme action.



Which is the enzyme and which is the substrate?

	enzyme	substrate
A	1	2
B	1	3
C	3	1
D	3	2

22. The table shows the temperature and pH at which four different enzymes are most active.

Which enzyme is a protease from the stomach?

	optimum temperature / °C	optimum pH
A	25	10
B	37	7
C	40	2
D	50	5

23. Which statement is correct for **all** catalysts?

A They are enzymes.

B They are proteins.

C They speed up chemical reactions.

D They work in living organisms.

24. Two enzyme-controlled reactions are shown.

amino acids $\xrightarrow{\text{enzyme 1}}$ proteins

proteins $\xrightarrow{\text{enzyme 2}}$ amino acids

From these reactions, what deduction can be made about enzymes?

A Enzyme 1 has been changed to enzyme 2.

B Enzyme 2 slows down the production of amino acids.

C Enzymes can build up large molecules.

D Enzymes only break down large molecules.

25. The temperature of an enzyme-controlled reaction is increased by 10 °C.

How does this affect the rate of reaction?

A It always increases the rate.

B It always decreases the rate.

C It may increase or decrease the rate.

D It has no effect on the rate.

26. In an experiment, the effect of temperature on the action of amylase is investigated.

Six different test-tubes are set up, each containing a mixture of amylase and starch solution.

Which condition should **not** be kept the same in each of the six test-tubes?

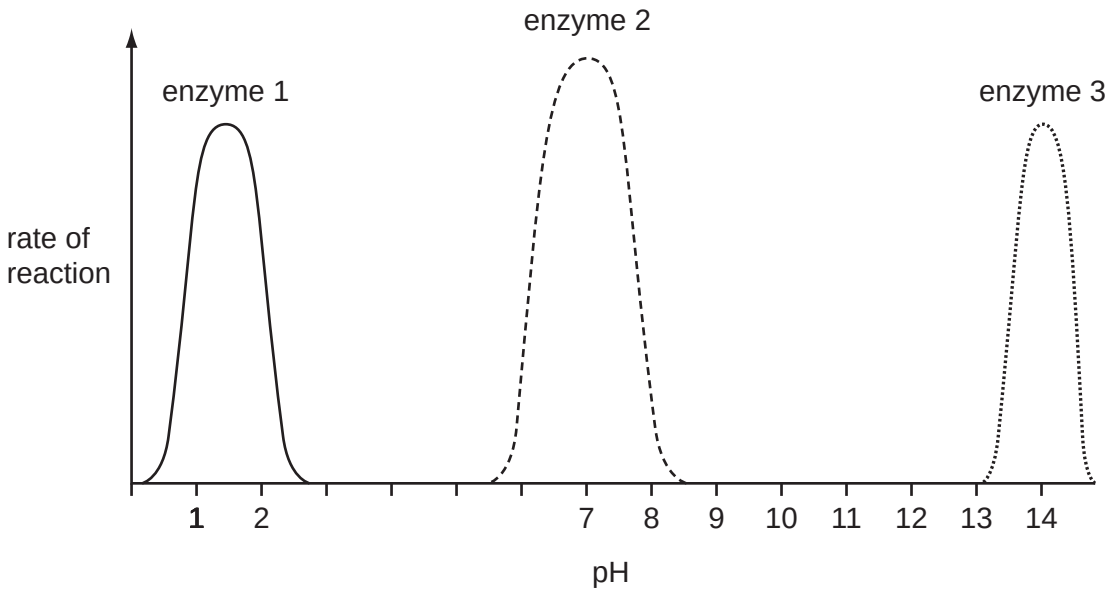
A concentration of amylase

B pH

C temperature

D volume of starch solution

27. The graph shows the effect of pH on the rate of reaction of three different enzymes.



What does the graph show?

A Each enzyme works best at a different pH.

B Each enzyme works best over a narrow temperature range.

C Enzymes work best in acid conditions.

D Enzymes work best in alkaline conditions.

28. Some plants digest insects and use the nutrients for growth.

What must these plants produce to digest the insects?

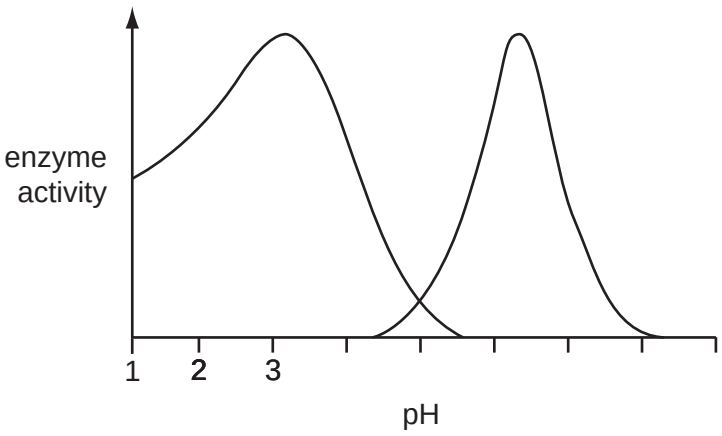
A acids

B alkalis

C enzymes

D hormones

29. The graph shows the effect of pH on the activity of two enzymes.



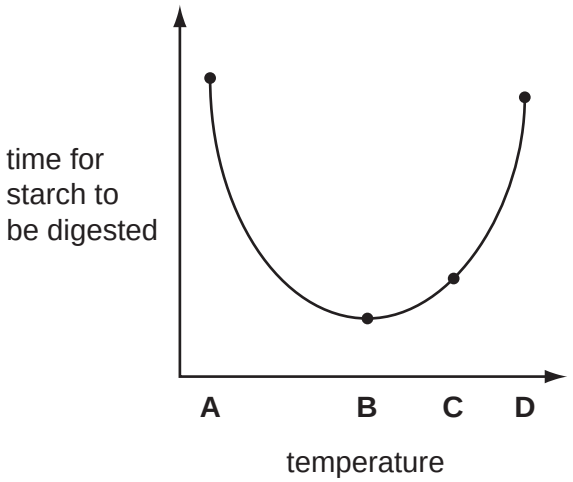
At which pH is the activity of both enzymes the same?

A 1 **B** 3 **C** 5 **D** 8

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30. Four identical mixtures of starch and amylase were kept at different temperatures. The graph shows the time taken for the starch to be completely digested at each temperature.

At which temperature is the rate of reaction quickest?



31. Equal quantities of a protein-digesting enzyme were added to 5 cm^3 of protein solutions of different pH. Each tube was kept at 37 °C.
The amount of amino acid in each tube was measured after 3 minutes. The results are shown in the table.

pH	amount of amino acid / arbitrary units
1	10
2	9
3	7
4	2
5	1
6	1
7	1
8	0

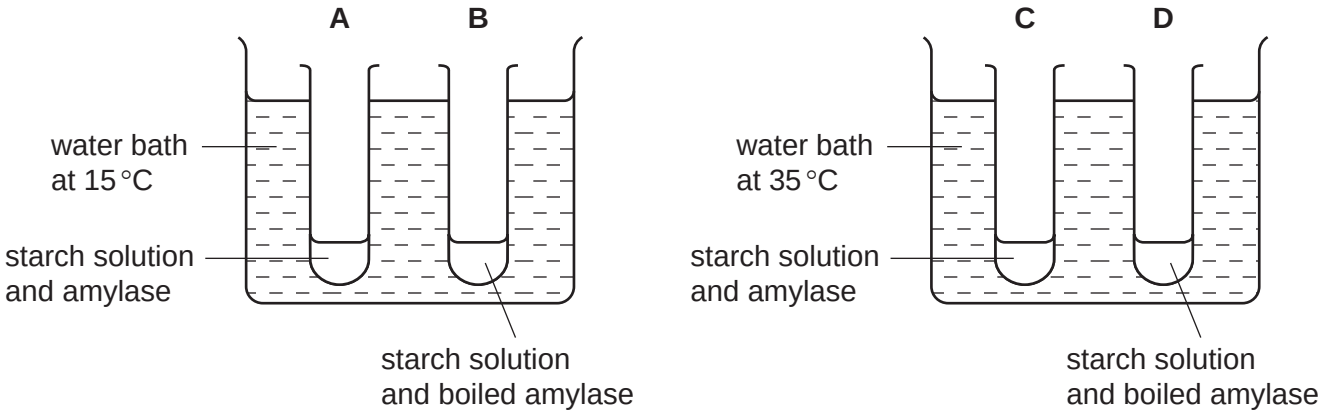
At which pH was the enzyme most active?

A 1 **B** 7 **C** 8 **D** 10

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32. Four test-tubes were set up as shown in the diagram.

In which tube is the starch digested most quickly?



33. A human digestive enzyme breaks down its substrate at a fast rate at 35 °C.
What would occur if the enzyme and substrate were kept at 75 °C?

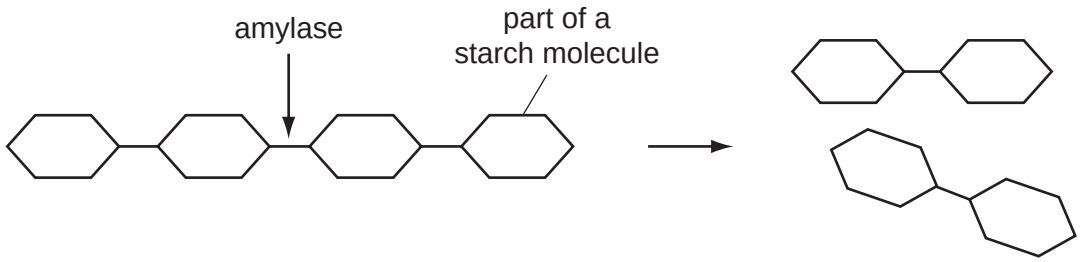
A The enzyme would stop working and be denatured.

B The reaction would continue at the same rate.

C The reaction would take place more quickly.

D The reaction would take place more slowly.

34. The diagram shows the action of amylase.



What is the function of the enzyme amylase?

A breaks down the substrate into amino acids

B changes the product into the substrate

C increases the rate of starch breaking down into glucose

D increases the rate of starch breaking down into maltose

35. What are enzymes made of?

A carbohydrates

B DNA

C fats

D proteins

36. At which temperature do most enzymes from the human body become completely denatured?

A 0 °C **B** 27 °C **C** 40 °C **D** 65 °C

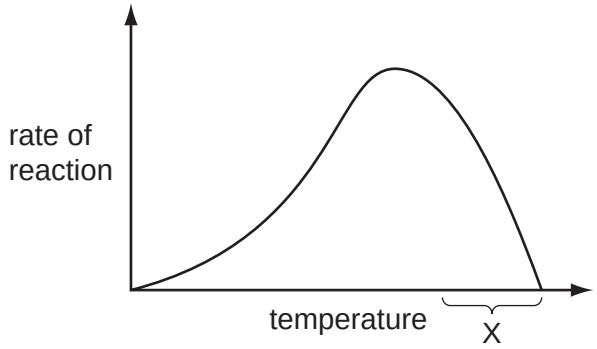
37. Six test-tubes were set up at different temperatures. Each contained identical solutions containing starch and amylase mixtures. The table shows the time taken for the reactions to finish in each test-tube.

temperature / °C	15	25	35	45	55	65
time / seconds	35	22	13	5	35	66

At which temperature does the amylase work best?

A 15 °C **B** 35 °C **C** 45 °C **D** 65 °C

38. The graph shows how the rate of an enzyme-controlled reaction changes with temperature.



What is happening within the temperature range marked X?

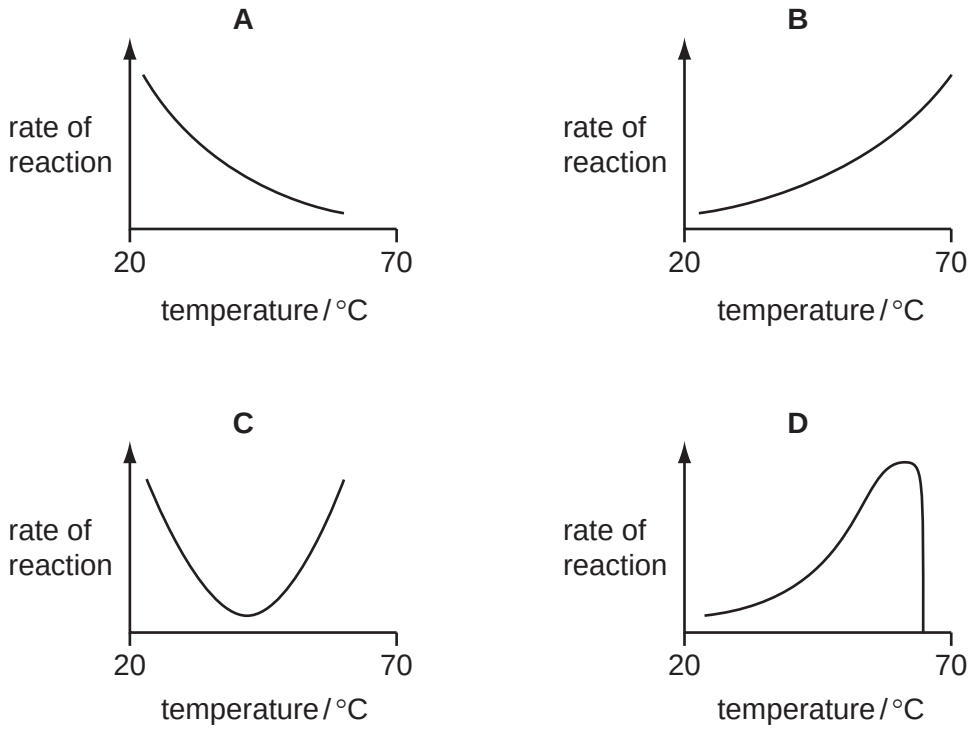
A The enzyme is becoming denatured.

B The enzyme is being used up.

C The reaction is occurring at body temperature.

D The reaction is occurring at the optimum temperature.

39. Which graph shows the effect of temperature on the activity of a human digestive enzyme?



40. Which substance is an enzyme?

A bile

B fibrinogen

C lipase

D maltose