Microorganisms and biotechnology

Question Paper

Level	O Level
Subject	Biology
Exam Board	Cambridge International Examinations
Topic	Microorganisms and biotechnology
Sub Topic	
Booklet	Question Paper

Time Allowed: **45 minutes**

Score: **/37**

Percentage: **/100**

1 During the production of alcohol, why must air be kept out of the fermenter?

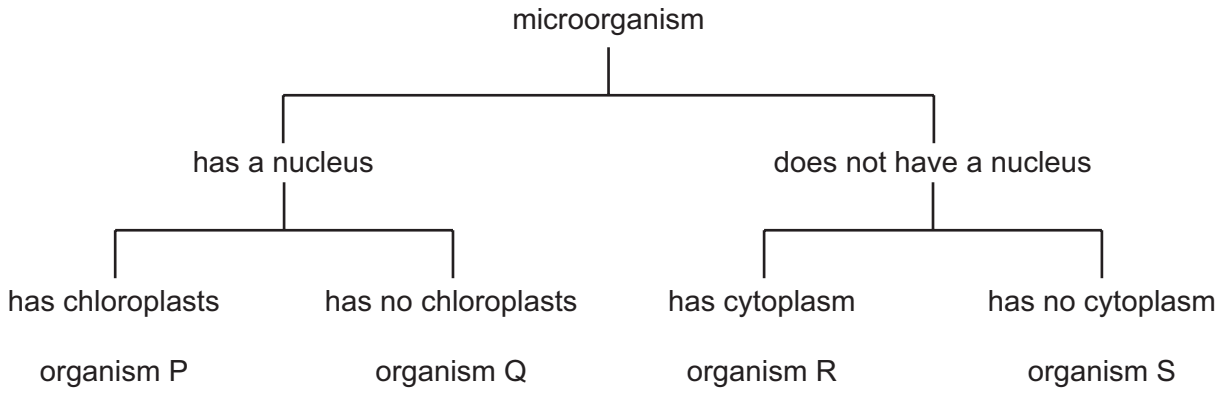
A to allow production of carbon dioxide

B to inhibit the growth of yeast

C to prevent aerobic respiration

D to prevent anaerobic respiration

2 A student examined four different microorganisms. She noted whether the microorganisms had a nucleus, chloroplasts and cytoplasm. She constructed the table below to identify the microorganisms.

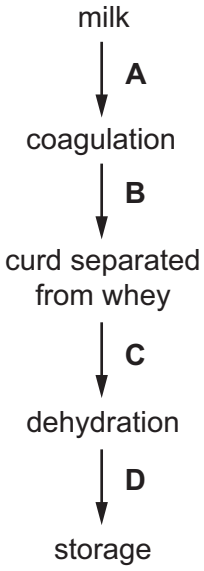


What are organisms Q, R and S?

	Q	R	S
A	bacterium	virus	fungus
B	bacterium	virus	plant
C	fungus	bacterium	virus
D	fungus	bacterium	plant

3 The diagram shows some of the stages in cheese production.

At which stage in the production of cheese are bacteria added?



4 Bacteria can be genetically engineered to produce human insulin.

Before this method was developed, the only insulin available was that from cattle or pigs. It was obtained from extracts of animal pancreas.

Which statements about the two methods are correct?

W Large numbers of bacteria can be cultured in a small space.

X Bacteria reproduce very quickly and make insulin quickly.

Y People sometimes develop diseases from insulin taken from cows or pigs.

Z The insulin produced in bacteria is not the same as that produced in the human pancreas.

A W, X and Y **B** W, X and Z **C** W, Y and Z **D** X, Y and Z

5 Foods can be made by treating milk in different ways.

1 Bacteria are added.

2 The milk is acidified.

3 The milk proteins are coagulated.

Which processes occur in both cheese and yoghurt production?

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

6 Which substances are produced using bacteria?

A cheese and yoghurt

B cheese and penicillin

C penicillin and bread

D yoghurt and bread

7 Using the key, which organism is a virus?

1 has a cell wall ..... go to 2
does not have a cell wall ..... go to 3

2 cell wall is made of chitin ..... organism **A**
cell wall is made of cellulose ..... organism **B**

3 has a cell membrane ..... organism **C**
has a protein coat ..... organism **D**

8 Yeast is used in alcohol production.

Under which conditions will yeast produce most alcohol?

	glucose present	oxygen present
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

9 During the production of yoghurt and cheese, the pH of the mixture changes.

What causes this change in pH?

A anaerobic respiration of lactose

B coagulation of milk proteins

C production of ethanol

D release of bubbles of carbon dioxide

10 A new organism is discovered. It is found to be made of cells and contains DNA.

To which group of organisms could it belong to and to which group could it **not** belong?

	could be	could **not** be
A	bacteria	fungi
B	bacteria	viruses
C	fungi	bacteria
D	viruses	bacteria

11 The table shows the characteristics of four microorganisms.

Which one could be a virus?

	contains DNA	contains one or more cells	contains one or more cell nuclei	produces spores
A	✗	✗	✗	✗
B	✓	✓	✗	✗
C	✓	✓	✓	✗
D	✓	✓	✓	✓

key

✓ = true

✗ = false

12 When bacteria act on milk, which row describes the formation of yoghurt?

	substrate	product	pH
A	glucose	starch	lower
B	lactic acid	lactose	higher
C	lactose	lactic acid	lower
D	starch	glucose	higher

13 When cheese is being made, which organisms are used and what is their function?

	organisms	function
A	bacteria	to lower the pH
B	bacteria	to raise the pH
C	fungi	to break down milk sugar
D	fungi	to release carbon dioxide

14 Bacteria can be genetically engineered to produce human insulin by adding a human insulin gene to the bacterial DNA.

An advantage of this procedure is that

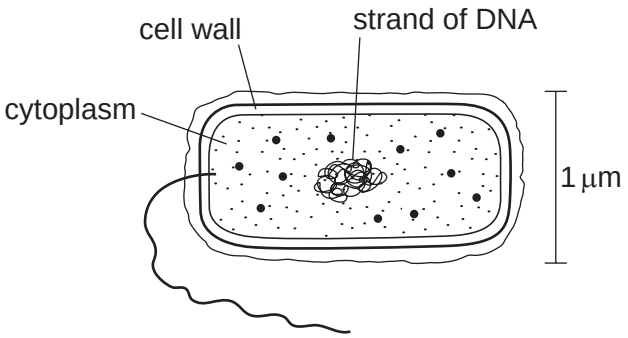
A the bacteria do not need a source of glucose.

B the bacteria grow faster than before being engineered.

C the insulin does not need to be purified before being injected into a patient.

D the insulin is unlikely to cause an immune response when injected into a patient.

15 The diagram shows a cell.



To which group of organisms does the cell belong?

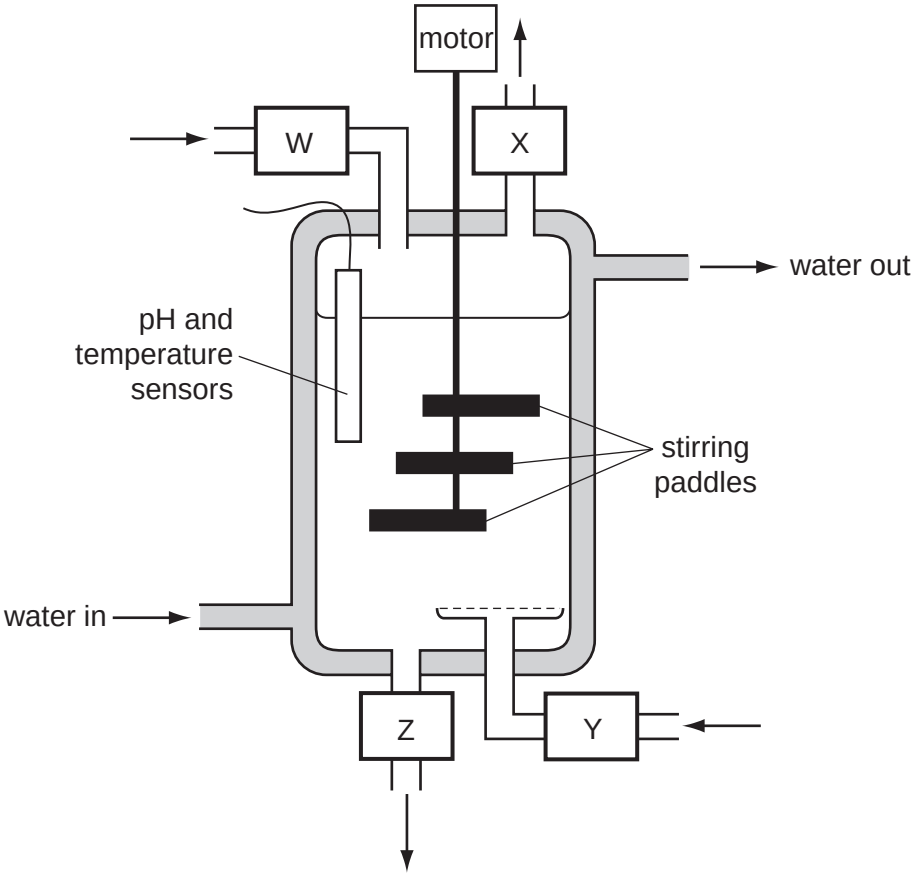
A bacteria

B fungi

C plants

D viruses

16 The diagram shows a fermenter used for the production of antibiotics.



Where do air and nutrients enter, and where do antibiotics and waste leave?

	air in	antibiotics out	nutrients in	wastes out
A	W	X	Y	Z
B	Y	Z	W	X
C	Y	X	W	Z
D	W	Z	Y	X

17 Which method could **not** be used to produce human insulin from genetically engineered bacteria?

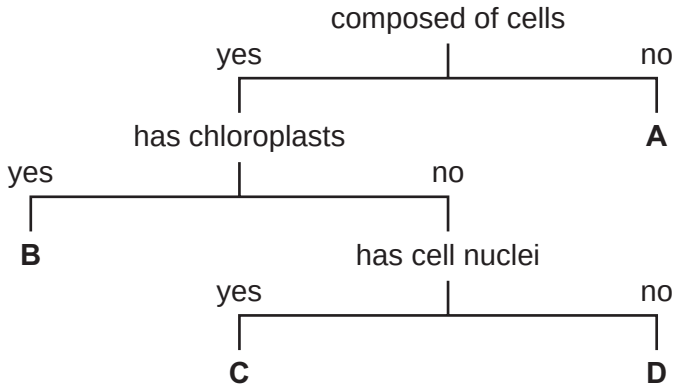
A Bacteria are ground up and used as a source of insulin.

B Insulin is extracted from gases given off from the fermenter in which bacteria are grown.

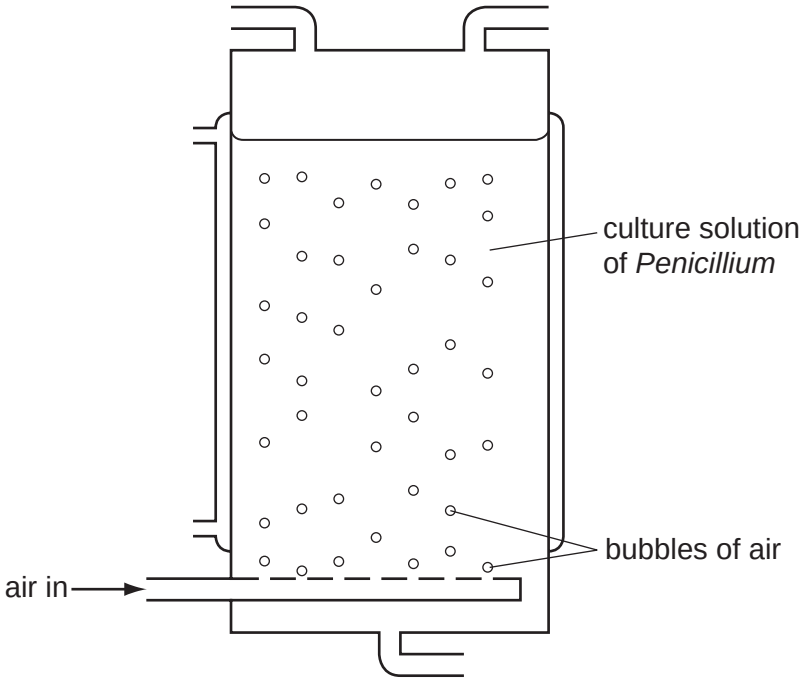
C Insulin is extracted from homogenised bacteria.

D Insulin is extracted from the nutrient medium from a fermenter in which bacteria have been grown.

18 Using the flow diagram, which organism is a fungus?



19 The diagram shows a fermenter used to produce penicillin.



Why is air pumped into the fermenter?

	to mix culture	to provide oxygen
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key
✓ = yes
✗ = no

20 On decomposition, which substance in decaying plants is the major source of carbon for carbon dioxide production by the micro-organisms involved?

A cellulose

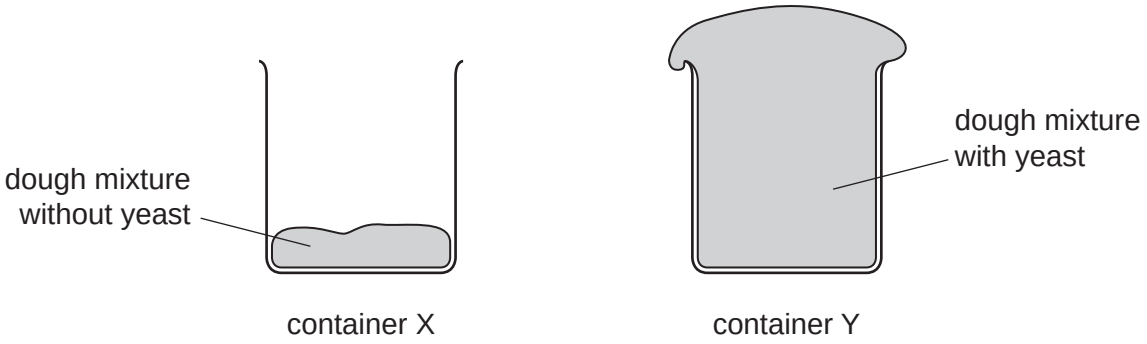
B glucose

C starch

D sucrose

21 Two containers, X and Y, were filled with equal amounts of dough mixture for making bread. The mixture in Y had yeast in it.

The containers were then left in a warm place for two hours. The diagram shows their appearance after this time.



Which substance produced by the yeast causes the difference between containers X and Y?

A alcohol

B carbon dioxide

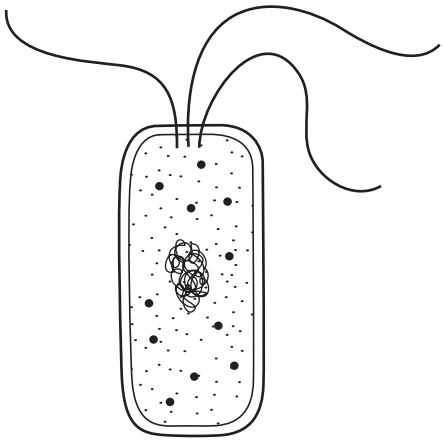
C lactic acid

D oxygen

22 Which row shows a disease and the organism that causes it?

	disease	organism that causes it
A	AIDS	bacterium
B	AIDS	insect
C	malaria	insect
D	syphilis	bacterium

23 The diagram shows the structure of a bacterium.



In what way does this differ from a cell of a fungus?

A The bacterium has a cell membrane.

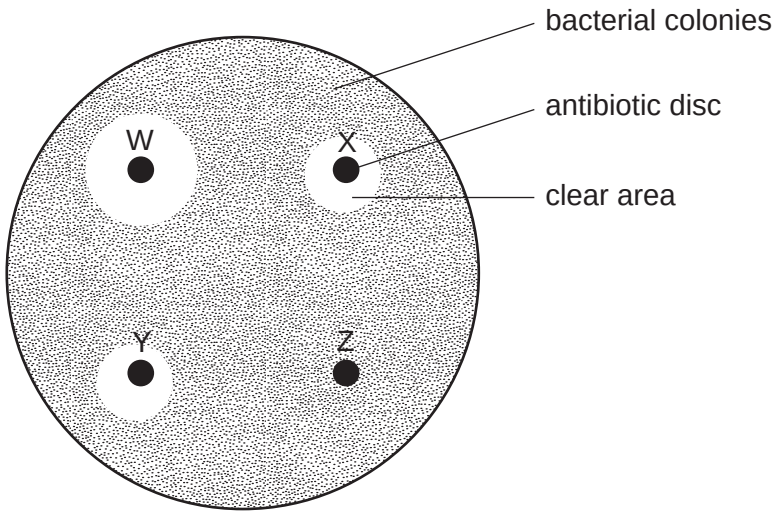
B The bacterium has a cell wall.

C The bacterium has cytoplasm.

D The bacterium has no true nucleus.

24 Bacteria were grown on an agar plate, until the plate was covered with visible yellow bacterial colonies.

Four discs containing equal amounts of different antibiotics were then placed on the agar plate. After two days, clear areas had formed around some of the discs, as shown in the diagram.



Which conclusion about this experiment is correct?

A Antibiotic W is more effective against these bacteria than antibiotic X.

B Antibiotic Y is more effective against these bacteria than antibiotic W.

C Disc W has a higher concentration of antibiotic than disc Y.

D Disc Z contains no antibiotic.

25 Which organisms are used, and what is their role, in the manufacture of cheese?

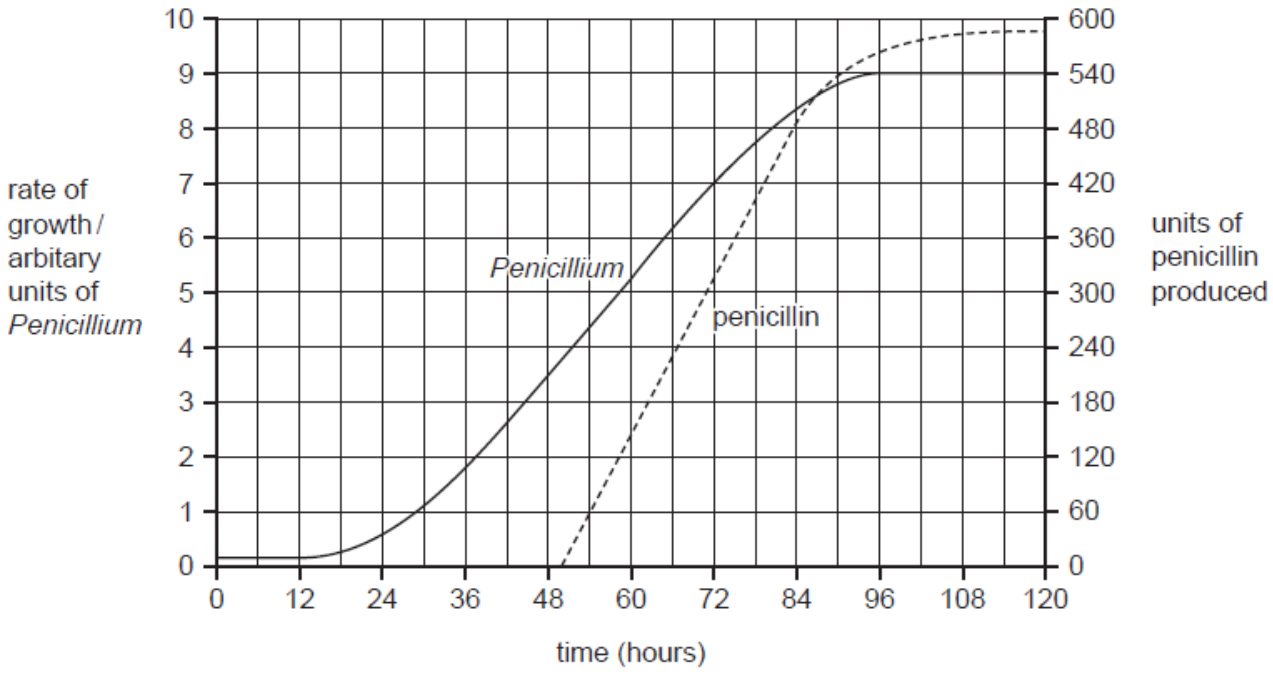
	organism	role
A	bacteria	to lower the pH
B	fungi	to break down milk sugar
C	viruses	to curdle milk
D	yeast	to release carbon dioxide

26 Two species of bacteria work together and make yoghurt.

What do they produce?

	ethanol	lactic acid	protease
A	✓	✓	✓
B	✗	✓	✓
C	✓	✗	✓
D	✓	✓	✗

27 The graph shows the rate of growth of the fungus *Penicillium* and the amount of penicillin produced when grown in a fermenter.



After how long should the penicillin be removed from the fermenter to obtain the most yield in the shortest time?

A 54 hours **B** 80 hours **C** 96 hours **D** 120 hours

28 What is the role of the bacteria used in cheese and yoghurt production?

A to coagulate casein to form 'curds'

B to convert lactose to lactic acid

C to prevent the growth of pathogens

D to produce enzymes

29 Which group of waste materials are likely to be decomposed most quickly by the action of micro-organisms?

A glass and building bricks

B shredded paper

C mouldy food

D toxic chemicals

30 What do microorganisms release during the production of bread and cheese?

	bread	cheese
A	alcohol	acid
B	alcohol	alcohol
C	water	acid
D	water	alcohol

31 New yoghurt can be made by adding a small amount of old yoghurt to some fresh, sterile milk.

What does the old yoghurt provide that is essential for this process?

A bacteria

B protein

C sugar

D vitamins

32 'This group of organisms have long thread like bodies. Their cells contain nuclei. Some of them produce antibiotics.'

Which group of organisms is being described?

A bacteria

B fungi

C plants

D viruses

33 Fermenters that are used to produce single cell protein may be closed (batch) or open (continuous).

Which set of fermenter properties is correct?

	closed	open
A	growth rate of culture remains at optimum	fermenting microorganisms must be added all the time
B	growth rate of culture remains at optimum	product can be removed all the time
C	vessel must be sterilised after each separate cycle	fermenting microorganisms must be added all the time
D	vessel must be sterilised after each separate cycle	product can be removed all the time

34 Why must the milk used in the production of yoghurt be free from all traces of antibiotics

A Antibiotics cause artificial selection of the bacteria in the yoghurt.

B Antibiotics cause the yoghurt to decompose.

C Antibiotics kill the starter culture bacteria.

D Antibiotics support the growth of yeasts in the culture.

35 In cheese production, which micro organism is involved, what is a product of respiration and what effect does it have?

	micro organism	product	effect
A	bacteria	acids	solidifies
B	bacteria	alcohols	digests
C	yeast	acids	digests
D	yeast	alcohols	solidifies

36 The table shows some structures found in four different cells.

Which cell is from a fungus?

cell	cell wall	cell membrane	nucleus membrane	chloroplasts
A	✓	✓	✓	✓
B	✗	✓	✓	✓
C	✓	✓	✗	✗
D	✓	✓	✓	✗

key
✓ = present
✗ = absent

37 What is a feature of bacteria?

A They are always parasitic.

B They have a nucleus.

C They are made of hyphae.

D They reproduce by binary fission.