

SI Microbiology - Full Discipline Demo

Starch Hydrolysis Testing

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Microbiology - Full Discipline Demo
Course	SI Microbiology - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Match each term to the best description.

⌘ Starch

⌘ α -Amylase

⌘ Iodine reagent

⌘ Oligo-1,6- glucosidase

Enzyme that hydrolyzes α -1,4-glycosidic linkages into individual glucose subunits

1

Forms a dark blue-black complex with starch molecules

2

Polysaccharide produced by green plants for energy storage

3

Enzyme that hydrolyzes α -1,4-glycosidic linkages to produce dextrans and maltose

4

Correct answers:

1 α -Amylase 2 Iodine reagent 3 Starch 4 Oligo-1,6- glucosidase

Classify each statement as true or false.

⚡ 1,4- α -Glycosidic linkages connect the linear portions of a starch molecule.	
⚡ A starch molecule consists of between 10-20 repeating α -D-glucose subunits.	
⚡ Both the colonies and immediate surrounding agar of amylase-positive bacteria appear unstained at the conclusion of the starch agar protocol.	
⚡ The starch agar protocol uses starch agar and a pH indicator.	
True	False
1	2

Correct answers:

1 1,4- α -Glycosidic linkages connect the linear portions of a starch molecule.

Both the colonies and immediate surrounding agar of amylase-positive bacteria appear unstained at the conclusion of the starch agar protocol.

2

A starch molecule consists of between 10-20 repeating α -D-glucose subunits.

The starch agar protocol uses starch agar and a pH indicator.

Exploration

Starch molecules are too large to be transported through the plasma membrane of bacterial cells.

- ☒ True
☐ False



The starch agar protocol is a biochemical test to determine if a microbe secretes α -amylase and ____ for hydrolyzing starch.

- ☒ oligo-1,6-glucosidase ✓
- ☐ glucose
- ☐ maltose
- ☐ glycosidic linkages

Exercise 1

Why are well-developed colonies required on starch agar plates before adding iodine reagent?

Well-developed colonies are required before adding iodine reagent to ensure significant starch hydrolysis of the surrounding agar has occurred. Less-developed colonies could produce negative results even though the microbes secreted α -amylase and oligo-1,6-glucosidase.

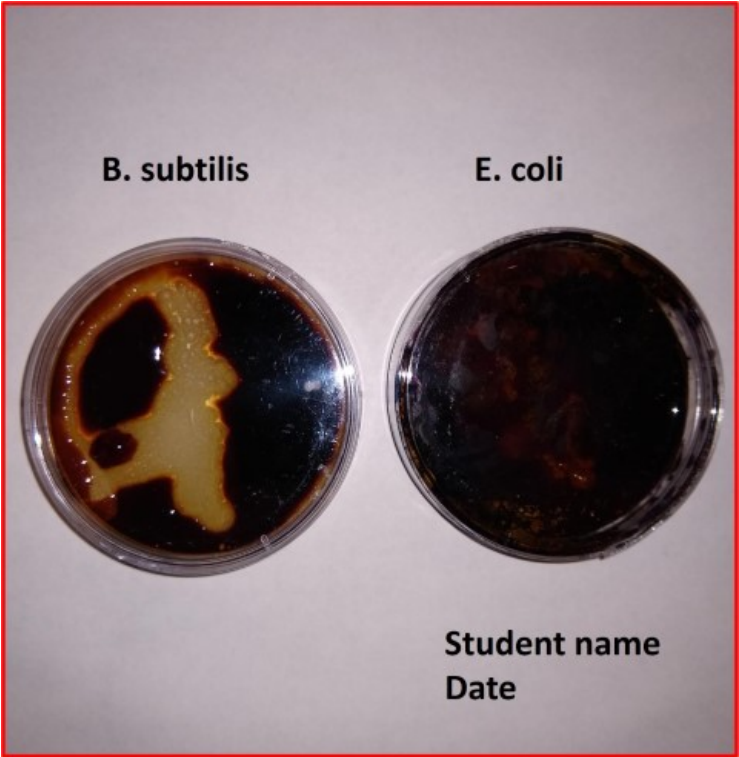
How does IKI solution indicate the presence of starch hydrolysis when added to starch agar plates?

IKI solution is an iodine reagent that reacts with starch molecules to form a dark blue-black color. In the absence of starch, no color change occurs. When added to a starch agar plate, only agar with remaining starch molecules turns black.

Which of the microbes cultured in this exercise secrete α -amylase and oligo-1,6-glucosidase? Reference Data Table 1 and Photo 1 in your explanation.

0 Word(s)

Photo 1: Starch Cultures with IKI Solution
(SAMPLE ANSWER BELOW)



Data Table 1: Starch Hydrolysis Testing Results
(SAMPLE ANSWER BELOW)

Microbe	Observation	Conclusion
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<i>B. subtilis</i>	Unstained colonies with unstained agar zone	Positive
<i>E. coli</i>	Stained colonies with stained agar surrounding colonies	Negative

Competency Review

The α -D-glucose subunits that make up starch molecules are bonded by 1,4- α -glycosidic linkages and 1,6- α -glycosidic linkages.

- ☒ True ✓
- ☐ False

The enzyme ____ hydrolyzes the α -1,4-glycosidic linkages of starch into individual glucose subunits.

- ☐ oligo-1,6- glucosidase
- ☒ α -amylase ✓
- ☐ dextrin
- ☐ iodine

Amylase-negative bacteria colonies and the surrounding agar appear unstained at the conclusion of the starch agar protocol.

- ☐ True
- ☒ False ✓

Starch agar contains ____.

- ☐ beef extract
- ☐ starch
- ☐ water
- ☒ All of the above ✓

A ____ is used to inoculate starch agar plates with bacteria.

- ☐ pipet
- ☐ spreader
- ☐ needle
- ☒ loop

✓

Inoculated starch agar plates should be incubated until colonies are well-developed.

- ☒ True
- ☐ False

✓

Only one or two drops of IKI solution should be added to incubated starch agar plates when performing starch agar protocol.

- ☐ True
- ☒ False

✓

____ excretes α -amylase and oligo-1,6-glucosidase when cultured on starch agar plates.

- ☒ *B. subtilis*
- ☐ *E. coli*
- ☐ Both *B. subtilis* and *E. coli*
- ☐ Neither *B. subtilis* nor *E. coli*

✓

Extension Questions

Both *B. subtilis* and *E. coli* can be found living in the guts of different animal species. Apply your knowledge of starch agar testing for each microbe to predict the types of animals, based on diet, where each might reside. (SAMPLE ANSWER BELOW)

B. subtilis has the ability to hydrolyze starch and would be predicted to live in the guts of animals that feed on starchy plants. *E. coli* does not hydrolyze starch and would be predicted to reside in the guts of animals that eat a more varied diet.