

SI Microbiology - Full Discipline Demo

Aseptic Technique and Culturing Microbes

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

Identify each statement as true or false.

⚡ All equipment, work surfaces, and hands must be thoroughly cleaned after working with cultures.	
⚡ Streak plating is the primary medium for increasing microbial numbers in the laboratory.	
⚡ Open tubes and vials should be tilted away from the mouth and nose.	
⚡ Culture plates should be incubated agar side down.	
⚡ Inoculating loops must be sterilized after use in each quadrant of a streak plate.	
⚡ The caps and lids of media containers should be placed on the bench when working with cultures.	
True	False
1	2

Correct answers:

1

All equipment, work surfaces, and hands must be thoroughly cleaned after working with cultures.

Open tubes and vials should be tilted away from the mouth and nose.

Inoculating loops must be sterilized after use in each quadrant of a streak plate.

2 Culture plates should be incubated agar side down.

The caps and lids of media containers should be placed on the bench when working with cultures.

Streak plating is the primary medium for increasing microbial numbers in the laboratory.

Match each term to the best description.

⚡ Slant	Rod-shaped bacteria commonly found in the lower intestine of warm-blooded organisms	1
⚡ Plate	Agar-filled Petri dish used for growing, isolating, and observing microbial colonies	2
⚡ <i>Escherichia coli</i>	Model organism for study of osmotic pressure regulation, antibiotic resistance, and biofilms that is found on the skin of humans	3
⚡ <i>Saccharomyces cerevisiae</i>	Agar-filled tube used for the storage and transport of microorganisms	4
⚡ <i>Staphylococcus epidermidis</i>	Ovoid single-celled fungi found on ripe fruits in nature	5

Correct answers:

- 1 *Escherichia coli* 2 Plate 3 *Staphylococcus epidermidis* 4 Slant
5 *Saccharomyces cerevisiae*

Exploration

Agar plates should be labeled on the ____.

- ☐ lid
- ☒ bottom
- ☐ side
- ☐ All of the above

✓

Aseptic techniques are necessary to ____.

- ☐ maintain safety
- ☐ isolate pure cultures
- ☐ prevent the spread of unwanted microbes
- ☒ All of the above

✓

Agar is a gel (solid) media used in both slants and plates.

- ☒ True
- ☐ False

✓

The inoculation loop must be sterilized ____ when creating a streak plate.

- ☐ before use
- ☐ between use in each quadrant
- ☐ after completing all quadrants
- ☒ All of the above

✓

____ is a rod-shaped bacteria important to the study of genetics and evolution.

- ☒ *Escherichia coli*
- ☐ *Saccharomyces cerevisiae*
- ☐ *Staphylococcus epidermidis*
- ☐ *Bacillus subtilis*

✓

Exercise 1

What is the purpose of aseptic techniques when performing microbiology laboratories? Which specific aseptic techniques were employed in this exercise?

Aseptic techniques prevent the spread of microorganisms beyond the intended working environment and are vital for both isolating and maintaining pure cultures of microorganisms. In addition, aseptic techniques provide a safe working environment by preventing the spread of pathogens. Disinfecting the work surface before and after conducting the procedures, proper hand washing, using sterilized equipment, working efficiently, keeping opened broth tubes tilted away from the mouth, avoiding aerosol production, not placing lids on the work surface, and storage of liquid cultures away from pets and children were all examples of aseptic techniques used in this exercise.

What type of media was used in this exercise? What is the general purpose of this media type in microbiology laboratories?

Liquid media in the form of nutrient broth was used in this exercise. Liquid media is primarily used to multiply microbes in microbiology laboratories.

Did each of your cultures develop at the same rate? Why might your incubation environment favor one microbe over another? Reference your results recorded in Data Table 1 and Photo 1 in your explanation.

Note to instructors: Student answers may vary but should reflect the incubation conditions to the biology of the microbe and be supported by the results recorded in Data Table 1 and Photo 1. *S. cerevisiae* and *B. subtilis* liquid cultures produced turbidity and sediments more quickly than *E. coli* and *S. epidermidis* when incubated at 25°C when tested at Science Interactive. *S. cerevisiae* is found in the environment on ripening fruit and *B. subtilis* lives within the soil. Both these environments tend to be at lower temperatures than the human body where both *E. coli* and *S. epidermidis* reside.

Photo 1: Active Culture Broths
(SAMPLE ANSWER BELOW)



Data Table 1: Broth Culture Results
(SAMPLE ANSWER BELOW)

Microbe	Description
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<i>Bacillus subtilis</i>	White turbidity with some sediments
<i>Escherichia coli</i>	Cream-colored turbidity
<i>Staphylococcus epidermidis</i>	White-colored sediments with minimal turbidity
<i>Saccharomyces cerevisiae</i>	Beige-colored turbidity and sediments

Exercise 2

Which aseptic techniques were used in this exercise to culture microbes on solid media?

Disinfecting the work surface before and after conducting the procedures, proper hand washing, using sterilized equipment, working efficiently, keeping opened broth tubes tilted away from the mouth, avoiding aerosol production, not placing lids on the work surface, labeling the bottom of agar plates, sterilizing the inoculation loop after streaking each quadrant, and incubating plated cultures agar side up and away from pets and children were all examples of aseptic techniques used in this exercise.

Were you successful in performing streak plating to isolate individual colonies for each of the four cultures in this exercise? Refer to the results recorded in Photo 2 in your explanation.

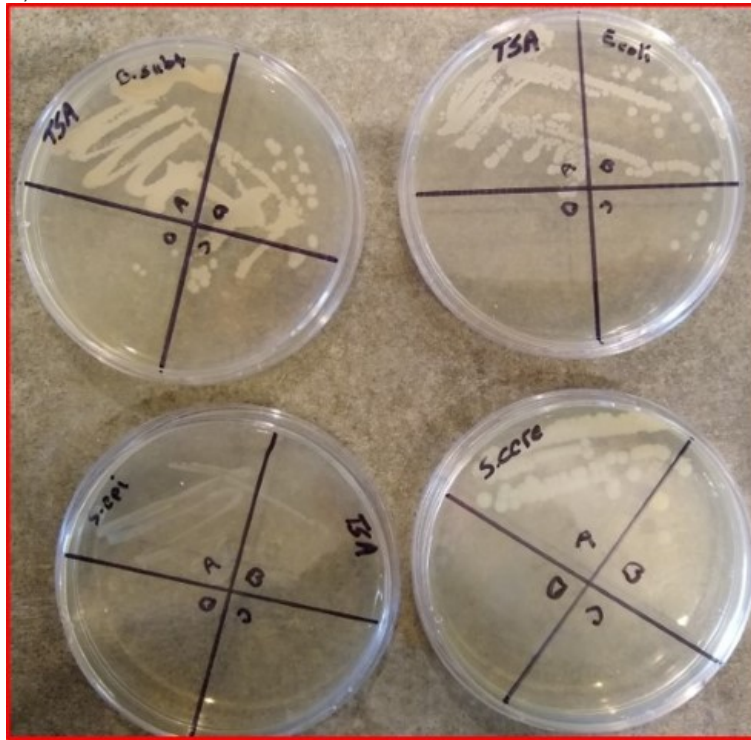
Students results may vary, but students should answer affirmatively after performing the procedures as written and should be supported by their photo. Science Interactive results produced individual colonies in quadrants B or C of each agar plate as recorded in Photo 2 of the instructor answer key.

How did the observable colonies on each agar plate differ in size, color, and morphology for each of the microbes? Would you be able to distinguish the species on an unlabeled plate? Reference the results recorded in Data Table 2 in your explanation.

Students descriptions of colony morphology may differ based on observation skills but should conclude that the relative sizes of *S. epidermidis* colonies are significantly smaller than the other species and that *S. cerevisiae* colonies are larger than others. Furthermore, students should commonly observe that *S. epidermidis* colonies are white in color while *S. cerevisiae* are beige or

cream colored, *E. coli* opaque or pearlescent, and *B. subtilis* yellow or beige colored. Terms students use to describe morphology should be consistent with those provided in both Data Table 2 and Figure 12 of this exercise.

Photo 2: Developed Streak Plates
(SAMPLE ANSWER BELOW)



Data Table 2: Agar Plate Results
(SAMPLE ANSWER BELOW)

Microbe	Relative size	Colony Color and Morphology
<i>Escherichia coli</i>	medium	Opaque, circular, raised, entire
<i>Staphylococcus epidermidis</i>	small	White, circular, raised, entire
<i>Saccharomyces cerevisiae</i>	large	Cream, circular, entire, raised
<i>Bacillus subtilis</i>	medium	Yellow, irregular, flat, erose

Competency Review

Aseptic technique includes ____ .

- ☐ working quickly and efficiently around open media containers
- ☐ not talking or breathing over open media containers
- ☐ washing hands before and after working with media
- ☒ All of the above



All laboratory equipment that will contact microbe cultures must be sterilized before use.

- ☒ True
- ☐ False



____ are used to isolate and observe the morphology of microorganisms in the laboratory.

- ☐ Broths
- ☐ Slants
- ☒ Agar plates
- ☐ Autoclaves



Streak plating technique systematically increases bacterial numbers in each streaked plate section.

- ☐ True
- ☒ False

✓

_____ is a soil bacteria utilized by biotechnology companies to produce both drug compounds and drought resistance in crops.

- ☐ *Escherichia coli*
- ☐ *Saccharomyces cerevisiae*
- ☐ *Staphylococcus epidermidis*
- ☒ *Bacillus subtilis*

✓

Lyophilized bacteria pellets should be hydrated with _____ before being transferred to a culture tube.

- ☐ undiluted bleach
- ☐ 70% isopropyl alcohol
- ☐ warm tap water
- ☒ sterile nutrient broth

✓

Turbidity and sediments are indicators of microbial growth in liquid media.

- ☒ True
- ☐ False

✓

Isolated colonies of *Saccharomyces cerevisiae* and *Staphylococcus epidermidis* differ in _____.

- ☐ size
- ☐ color
- ☐ morphology
- ☒ All of the above

✓

Extension Questions

A microbiology student accidentally used the same pipet when creating *E. coli* and *S. epidermidis* liquid cultures from the lyophilized pellets in their lab kit. How would this mistake be recognized when the liquid culture is streak plated? How could the student create pure liquid and plated cultures from the mixed culture streak plate? (SAMPLE ANSWER BELOW)

The resulting streak plate would include both *E. coli* and *S. epidermidis* colonies. The student would notice two colony types on the developed streak plate. To create a pure liquid cultures, the student should collect a loop of each colony type and use it to inoculate two sterile broth tubes (one tube per colony) and incubate until turbidity or sediments are formed. A loop of the broth could then be streak plated on a new agar plate to isolate colonies of the pure culture.