

BACTERIAL GROWTH LAB

Purpose: During this lab, you will collect prokaryotes and observe their properties and growth. You will also test the effects of various mouthwashes or various alcohol concentrations on bacterial growth.

Materials:

2 Sterile Petri Dishes
Tape

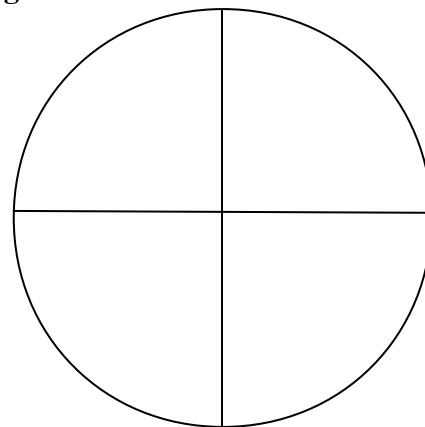
Ruler
Sharpie

Data Section:

Data Table 1: Location of the Samples (Dish I)

Quadrant	Location of Sample	Description of Growth
A		
B		
C		
D		

Diagram 1: Growth Patterns of Dish I



Data Table 2: Mouthwash (Dish II – Mouthwash Groups)

Quadrant	Mouthwash Brand/Name	% Alcohol	Zone of Inhibition (cm)	Class Average Zone of Inhibition (cm)
A				
B				
C				
D				

Data Table 3: Alcohol (Dish II – Alcohol Groups)

Quadrant	% Alcohol	Zone of Inhibition (cm)	Class Average Zone of Inhibition (cm)
A			
B			
C			
D			

Procedures:

DAY ONE

Part I: Collection of the Bacteria

1. Write your names and “Dish I” on the outer edge of the bottom of a dish. Divide the bottom of the dish into four quadrants (like in the drawing on the front of this sheet) and label them A,B,C & D.
2. With your partner, determine 4 locations around the school where you will collect samples.
3. Once you have determined your locations, come tell me to let me know where you are going (I will sign your paper which will act as your pass and I will make sure that your locations are appropriate).
4. To collect samples, take a small piece of tape and touch it to the surface then touch the tape to a quadrant on your dish (be careful not to touch the sticky side of the tape with your fingers). Throw the piece of tape away. Use a new piece of tape for each sample that you collect.
5. Record the locations and the quadrants in Data Table 1 in the Data Section.

Part II: Treatment of Bacteria with Mouthwash (Mouthwash Groups)

1. Write your names and “Dish II” on the outer edge of the bottom of your other dish. Divide the bottom of the dish into four quadrants and label them A,B,C & D.
2. Place 20 drops of diluted sputum onto the dish and swirl to cover.
3. Take one dot from each of the four mouthwashes and place one in each quadrant. Record the mouthwash and the quadrant in Data Table 2 in the Data Section.
4. When you have completed steps 1, 2 & 3, put your dishes **upside-down** in the incubator overnight; your bacteria can’t swim.

Part II: Treatment of Bacteria with Alcohol (Alcohol Groups)

1. Write your names and “Dish II” on the outer edge of the bottom of your other dish. Divide the bottom of the dish into four quadrants and label them A,B,C & D.
2. Place 20 drops of diluted sputum onto the dish and swirl to cover.
3. Take one dot from each of the four alcohol concentrations and place one in each quadrant. Record the alcohol concentration and the quadrant in Data Table 3 in the Data Section.
4. When you have completed steps 1, 2 & 3, put your dishes **upside-down** in the incubator overnight; your bacteria can’t swim.

Part III: Formulate your hypotheses

1. Create a hypothesis to explain which location will have the most growth and why. Record this in the space provided for Hypothesis #1.
2. Note the ingredients and record the percent alcohol of each mouthwash in the appropriate places in Data Table 2. Based in the ingredients in each mouthwash, create a hypothesis to describe the effects of the mouthwashes on bacterial growth. Record this in the space below provided for Hypothesis #2.
3. Create a hypothesis to describe the effects of the alcohol on bacterial growth. Record this in the space provided for Hypothesis #3.

DAY TWO

Part IV: Recording the Bacterial Growth and Measuring the Zones of Inhibition

1. Remove the cover from Dish I.
2. Describe the amount of growth and record in Data Table 1 in the Data Section. Draw what you see in Diagram 1 in the Data Section. Be as precise in your diagram as possible.
3. Turn Dish II over so that you are looking at the bottom. Using a ruler, measure (in centimeters) the diameters of the clear rings around each dot where there is no bacterial growth. These rings are called the Zones of Inhibition. Record your data on Data Table 2 (or Data Table 3) and on the white board.
4. Copy down the averages from the white board in the appropriate places in Data Tables 2 and 3.
5. When you have taken all your data, dispose of your dishes in the location specified by me.

Hypothesis #1: Which location will have the most growth? This does not have to be in “If...then” form. Why do you think this? This hypothesis should be predictive and testable by this experiment.

Hypothesis #2: Which mouthwash do you think will be the most effective? Why? This hypothesis should be testable by this experiment.

Hypothesis #3: Which alcohol concentration do you think will be the most effective? Why? This hypothesis should be predictive and testable by this experiment.

Conclusions:

Note: You will not turn this sheet in. You will address these questions in your lab report.

1. Based on your results, do you support or reject your hypothesis regarding bacterial growth around the school? Why?
2. Which location showed the most growth? What about this location do you think made it so inviting to bacterial growth?
3. Based on the class results, do you support or reject your hypothesis regarding the effects of mouthwash? Why?
4. Which mouthwash was most effective? Least effective?
5. Based on the class results, do you support or reject your hypothesis regarding the effects of the alcohol? Why?
6. Which concentration of alcohol was most effective? Least effective?
7. On graph paper, create a bar graph that shows the class averages for the mouthwash results.
8. On a different graph from #7, create a line graph that shows the relationship between Alcohol Content (in percent) of mouthwashes and the size of the Zones of Inhibition (class averages). Include a line of best fit, if there is one. On the same graph, show the relationship between Alcohol Content (in percent) and the size of the Zones of Inhibition (class averages); include a line of best fit, if there is one. Be sure to include a Key that indicates each of the lines (Alcohol and Mouthwashes).
9. Using the line graph from #8 above, what can you conclude about the importance of alcohol on the effectiveness of the mouthwashes? Can the effectiveness of the mouthwashes be explained based solely on the alcohol content or must there be some other factor(s) that is responsible for the effectiveness of the mouthwashes? Why do you think this?
10. What were three possible sources of errors during this lab?
11. What changes would you make to this experiment to improve the reliability of the results?

BACTERIAL GROWTH LAB REPORT

Title Page

Lab title should be in the center of the page with your name, period and lab partner(s) name(s) in the lower right-hand corner. Be sure to write “Lab Partner(s):” before their name(s) and that they are distinct from your name.

Purpose: You will state what the purposes of this lab were: why did we do what we did?

Introduction

Here you will give some background about what bacteria are, what roles they play (either as something positive or something negative), and why they should be investigated. Explain, in general, bacterial growth and research the different methods that humans (and other organisms) use to kill bacteria. Finally, why should be care about where bacteria grow and how we can kill them?

Experimental Hypothesis

These hypotheses do not need to be phrased as “If <this is done>, then <this will happen>,” but they do need to be testable and/or predictable (as indicated on the lab sheet). You should have already written these and had me look at them. There will be three hypotheses: one about where bacteria grows in the environment, one about the effectiveness of the mouthwashes and one about the effect of the different alcohol concentrations.

Materials

Unnumbered list of materials needed in the experiment; should not include the obvious (pencils, graph paper, desk, et cetera).

Methods

This portion of the lab report will discuss everything that you did: from collecting the bacteria and plating the mouthwash to reading the results of the growth. Be sure you clearly describe how you measured the zones of inhibition. Leave out nothing. You may want to split it up into the three different things that you did (if you plated the bacteria with alcohol, describe that; if you plated the bacteria with mouthwash, describe that). Be sure that it is written in paragraph form.

Data

Here you will reproduce the tables that were filled out during the lab. Do not merely cut them out of the lab sheet and glue them down; they will not be counted. They should be presented neatly and clearly either by hand or done on the computer. Be sure to include labels and units and to title and number each of your tables (e.g., Table 1: Whatever The Title of This Table Might Be).

Graphs and Analysis

Here you will present your two graphs. You will also include the diagram of growth of bacteria you collected from around the school. There should be a verbal explanation of each of the graphical representations. For the line graph, talk about any trend or relationship between the amount of alcohol and the size of the zones of inhibition for both the mouthwashes and the alcohol alone. For the diagram of growth you will talk about how much the bacteria covered each of the quadrants, and the quality of the growth (the color, thickness and shininess, for example).

Conclusion

Include a statement of whether data analysis supports or does not support your hypotheses. Include your answers to the questions in the “Conclusions” section of the lab sheet. Do not list and number the answers; you will take the information and make a coherent paragraph or two.