

EDVOTEK® MyLab™ #1301

How Clean Is Our Home Environment?

STORE AT ROOM TEMP.

Designed for the Classroom
SINCE 1987



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OBJECTIVE

Students will learn:

- How to pour nutrient agar plates for microbial growth
- How effective are home cleansers and soaps

COMPONENTS

This experiment contains components to test several different variable of cleanliness.

- Petri plates
- Sterile Bacterial Nutrient Agar
- Filter paper strips
- Micro-tipped pipets

REQUIREMENTS

- Bleach to disinfect bacterial plates
- Various home-use detergents, soaps, and cleansers (e.g., rubbing alcohol, bleach, anti-bacterial soap, Lysol, hydrogen peroxide)
- Antibacterial or disinfectant soap for washing hands
- Microwave
- Large beaker or jar
- Hot glove
- Scotch tape
- Permanent marker
- Small disposable cups
- Gloves
- Goggles

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BACKGROUND INFORMATION

Microbes are small, unicellular, organisms that live all around us. Bacteria are unicellular organisms that directly affect our everyday lives. Certain bacteria help us in the production of various food products such as cheeses and yogurt. Yeast, which is a unicellular plant, is involved in the production of breads, beer, and various wines. Microbes also provide us with various small molecules used in medicine like antibiotics and various products used in biotechnology. Certain bacteria are present in our intestines where they both help metabolize foods and produce certain building blocks such as amino acids and vitamins that are often not readily available from our diets. Microbes are also involved in various activities which are disturbing to humans and animals. Certain microbes cause infections, spoil foods, and produce toxins that can make us very ill.

To protect ourselves against bad effects from microbes, we routinely take many precautions. We quickly clean our cuts and wounds to avoid infection. We wash our hands prior to meals to avoid the introduction of undesirable bacteria in our mouths. We use soap when we bathe to remove and kill bacteria that may grow on our skin and in our hair. We pasteurize milk and other liquids we drink by filtration to remove bacteria from an environment that could be ideal food for their growth. Finally, we refrigerate our foods to minimize bacterial growth that can result in food spoilage.



Microbes can grow all over our homes in various places. They can be present in the air we breathe, in our bathrooms, kitchens, and the food we eat. Our immune system will fight off bacterial infections and most of the time they will not cause diseases. We clean our homes with various soaps, detergents, and other cleaning solutions to control the presence of bacteria. This experiment will allow young scientists to test various household liquid detergents, soaps, and cleansers and to categorize them in terms of their effectivity as antibacterial agents.



EXPERIMENTAL PROCEDURES

Preparation of Plates

(One or two days before the experiment)

1. **UNCAP** the bottle of Bacterial Nutrient Agar (also called medium), but **LEAVE** the loosened cap on the bottle. Loosening the cap will allow steam to vent during heating.
2. **SQUEEZE** the bottle of medium to break up the solid agar.
3. **SET** the bottle into a beaker or glass jar and **PLACE** it in a microwave oven to melt the medium.

***IMPORTANT:** Use consecutive short periods of heating in the microwave to melt the medium. Rapid heating can cause the medium to boil over and out of the bottle, resulting in medium loss.*

4. **SET** the microwave to medium heat. **HEAT** for 15 seconds. Carefully **SWIRL** the bottle in the beaker. **CAUTION: Wear hot gloves or oven mitts!** **HEAT** for another 5 sec.

***CAUTION:** Make sure the bottle is loosely capped at all times to allow steam to vent during heating!*

5. **REPEAT** heating in 5 second intervals and swirling the medium until it has completely melted. The medium should be a clear, yellowish liquid. Use an oven mitt or towel to **REMOVE** the medium from the microwave. **CAUTION: Bottle will be hot to the touch!**
6. **ALLOW** the medium to cool at room temperature until the bottle is very warm to the touch, but not burning hot.
7. **LAY** the petri plates on a flat, clean surface with the lid on top.
8. **LIFT** the lid and **POUR** melted medium (5 mL each or approximately equally) in the five petri plates provided so the bottom plate is covered with a layer of medium at least 1/3 full.
9. Quickly **COVER** the plates and let the medium solidify for one hour. You may **STORE** plates inverted at room temperature until the day of the experiment.
***NOTE:** If the plates will not be used in 2-3 days, they should be wrapped in plastic wrap and kept in a cool, dry place.*

EXPERIMENTAL PROCEDURES, CONTINUED

Setting Up the Plates

A good experiment consists of positive and negative controls. These controls have predicted results, such as “growth” or “no growth”. When tested at the same time as other samples, the experimental results are considered to be valid or reliable, because it shows that the experiment was performed correctly.

1. **LABEL** one media plate “control”. **TAPE** it shut and leave it closed.
2. Wearing gloves, quickly **DIP** one of the filter paper test strips into a cleaning agent you wish to test OR **USE** one of the micro-tipped transfer pipets to **ADD** one drop to the strip.
3. Carefully, **ALLOW** any excess liquid to drip off and then **APPLY** the strip to a section of one of the other media plates.
4. **LABEL** the bottom of the plate near the location of the strip.
5. **REPEAT** steps 2-4 with other cleaning agents you wish to test. These are the experimental plates.
6. **INDICATE** on the cover of the experimental plate(s) the location you select (e.g., floor, near doorway, desk, near an air vent, window).
7. **SET** your plate at the designated area and **REMOVE** the lid.
8. **ALLOW** plate to remain open overnight. **REPLACE** the lid the next morning.
9. **INCUBATE** all covered plates upside down at room temp. for 1-3 days or in a 37°C incubation oven overnight (if no growth occurs, continue incubation).
10. **OBSERVE** plates and **ANSWER** study questions.

Alternative Experiment:

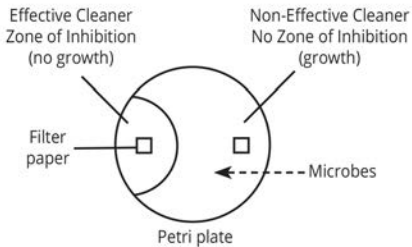
Allow plates from different groups to remain open for different time intervals.

RECORD YOUR RESULTS

1. **OBSERVE** the plates after 24 hours and **RECORD** your observations on the table provided or in your lab notebook.
2. **INCUBATE** the plates for another 24 hours and **RECORD** your observations in the 48 hour column. **INCUBATE** another 24 hours if necessary.

EXPECTED RESULTS

If the cleaning agent is effective in killing the microbes, there will be a “zone of inhibition” around the disc. That is, there will not be any microbial growth around the square. If there is microbial growth around the disc, the cleanser is not effective in killing microbes.



STUDY QUESTIONS

1. What are examples of products that bacteria participate in their preparation?
2. Why is it important to wash our hands several times a day?
3. How does a person fight microbes that are all around us including in the air we breathe and some of the food we may eat?

RECORD OF RESULTS (DATA FROM EACH PLATE)

Name/Group:

Sample Number	Cleaning Agent	Observation of Results (24 hours)	Observation of Results (48 hours)	Observation of Results (72 hours)
1				
2				

GENERAL SAFETY PRECAUTIONS

Parental or adult supervision required.

1. Designate a clean and uncluttered area for performing experiments.
2. Read all instructions before you begin.
3. Do not eat or drink. Do not apply make-up or contact lenses. Adult(s) should not smoke while performing experiments.
4. Wash your hands before and after performing the experiment.
5. Gloves and goggles should be worn routinely as good laboratory practice.
6. Disinfect the counter top or bench with 70% isopropyl alcohol (rubbing alcohol, or place clean newspaper over the area to be used.

SPECIFIC SAFETY PRECAUTIONS

All used petri plates must be soaked in 10% bleach for a minimum of 20 minutes to overnight before discarding in regular trash.

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Answers to Study Questions:
1. Examples of foods include bread, cheese and yogurt, antibiotics and various alcoholic drinks such as wine and beer
2. Everyday we are in contact with various individuals in close proximity in schools and work places. We often touch each other by shaking hands and touching shared objects such as books, computer keyboards and door handles. By washing our hands with soap and water or an antibacterial cleanser we avoid introducing bacteria in our mouths, eyes, ears and noses and avoiding infections.
3. Our immune system provides us with protection against bacterial and viral infections. We should wash our hands more often, especially before eating, and avoid touching our eyes, mouths, and nose with unclean hands.