

Safe Plates Mad Science Experiments

Tiny Microbes vs. Acid

Introduction:

Tiny microbes can be everywhere, and often like to hang out on food. Some tiny microbes are good guys, and help make things like bread, cheese and yogurt. Some are mischievous and just make food look, smell, taste or feel strange. We call those ones spoilage microbes. Still others are the bad guys that will make you sick. Those are called pathogens. Pathogens are really sneaky and often don't change the way food looks, tastes or smells. But, they do often hang out in the same places and grow in the same conditions as the spoilage microbes.

There are lots of ways to stop the spoilage microbes from making food taste strange and stop pathogens from making you sick. If there is enough acid in a food, certain types of microbes won't grow or live. One of those ways is with acid. In this experiment we will see what happens when a vegetable is left out with and without acid, and how that changes what grows. With spoilage microbes, they grow and make changes to food that we can see, smell, taste and feel, so you will get to see the evidence of tiny microbes.

Materials:

- Two clear plastic or glass containers with lids (canning jars, storage containers, even plastic zip bags)
- White vinegar
- Cucumber

Instructions:

1. Find your containers and make sure they are clean and dry
2. Cut a few pieces of cucumber and divide between the two jars
3. Pour enough vinegar into one jar to cover the cucumber pieces
4. Close the lids on the containers and leave out at room temperature for a few days. What differences do you see?

For Teachers/Parents:

- Have students fill out the observation sheet with what they are expecting will happen (this is called a hypothesis.)
- Every day or every other day, have students check in with their experiments and see what is actually going on. Students should write down descriptions of what they see and smell (this is called data collection.)

- For older students, have them research what microbes might be causing the changes they see.
- **For safety reasons, students should not touch or taste experiments. Those allergic to mold should not smell experiments.**

Debrief:

At first, the changes seen in the cucumbers are based on the breakdown of the vegetable. This is caused by breaking the cells (cells are the building blocks of living things) from cutting, as well as reactions that the different parts of the cucumber have with each other and with air. There are chemicals called enzymes that are found in fruits and vegetables that can cause some changes to how something looks and feels. Similar reactions happen in fruits like pears, apples, bananas and avocados and cause them to brown. The cucumber will start to look mushy from these reactions.

Next thing that happens is that microbes can start growing. Microbes need food too, and once the cucumber starts to breakdown microbes like bacteria, yeast and mold will begin to grow. If you see fuzzy spots on the pieces, you have mold. If you smell a sour smell, that is most likely bacteria that is producing acid. If the smell is more like alcohol, that is caused by yeast.

The cucumber in the vinegar should not have any growth. Instead, it should keep its shape and stay firm. This is because the acid in the vinegar prevents the microbes from growing.

Tiny Microbes vs. Acid Observation Sheet

Name:

Date:

Hypothesis (What do you think is going to happen?)

What do you think might change? What will the experiment look like after two weeks? Write or draw what you think will happen.

Results (What actually happened)

Write or draw what is happening with your experiment. What does it look and smell like? Please do not taste the experiments

Day 1	
Day 2	
Day 3	
Day 4	
Day 5	

Day 6	
Day 7	
Day 8	
Day 9	
Day 10	
Day 11	
Day 12	
Day 13	
Day 14	