NC STATE UNIVERSITY

safe plates

Safe Plates Mad Science Experiments

Tiny Microbes vs. Temperature

Intro:

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 and yogurt. Some are mischievous and just make food look, smell, taste or feel strange. We call those ones spoilage microbes. And 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. One of those ways is with controlling how long a food is at a certain temperature. In this experiment we will see what happens when milk is left out on the counter and when it is refrigerated. 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)
- Milk

Instructions:

1. Find your containers and make sure they are clean and dry
2. Pour milk into the containers so you have at least one inch of milk.
3. Close the lids on the containers and leave one out at room temperature and keep the other refrigerated for a few days. What differences do you see and smell?

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.
- **For safety reasons, students should not touch or taste experiments. Those allergic to mold should not smell experiments.**

Debrief:

You should probably start seeing changes rather quickly in the milk left on the counter. At first, you might see some separation between a clear liquid and white liquid. Then, you might see some thickening of the white liquid. If you use a flexible container like a plastic storage container or bag you might start seeing some puffiness. Eventually, you will see that the milk left on the counter starts to thicken and curdle. If you smell it, it will smell sour, and possibly even hiss when you open the container. What is happening is the growth of certain types of bacteria. Some of that bacteria produces the gas as a grows, which causes the hissing sound and the expansion of a flexible container. The other type of bacteria growing produces lactic acid, that acid causes the protein in the milk to separate from the liquid part of the milk. As the protein changes, the texture of the milk changes as well. This is a similar process to making cheese, yogurt and sour cream. However, in those products there is intentional growth of the lactic acid bacteria and control to make sure other things do not grow.

The milk in the refrigerator most likely didn't have any of these changes in a couple days, but it would if you left the milk there for a long time it would show those changes slowly. That is because bacteria grow faster in warmer temperatures and slower in cooler temperatures. Because of this, people use refrigeration and freezing to keep food good longer.

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Tiny Microbes vs. Temperature 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	