

# Invention Project

## *Title: Stale Sandwiches*

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### **Problem:**

How can I better preserve my sandwiches so the one I eat on Friday is as fresh as the one on Monday? My family makes sandwiches on Sunday evening, and then put them in our lunches each morning. The problem is, by Friday, my sandwich bread tastes kind of stale and the sandwich is soggy from the spread I use.

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### **Research:**

After reading about what makes sandwiches go bad, I realized I have two problems. First, the bread goes stale. Second, the spread or any other liquid thing in the sandwich leaks out into the bread to make it soggy. How to keep these from happening was my challenge.

I found out that bread goes stale mostly because it loses water and dries out. But there is something else that happens. Bread is made with sugar and starch and these ingredients change when it is baked. As soon as the baking stops, the sugar and starch start to go back to the way they were. Heating the bread up again helps to reverse this process a little and make it taste more like fresh bread. Also, within three or four days, bacteria and fungi can begin to grow on the bread. A little of them won't hurt you, but they ruin the taste of the bread.

The only way to keep wet things from soaking into bread in a sandwich is to keep them separate until it's time to eat the sandwich.

### **Sources:**

National Center for Home Food Preservation: <http://www.uga.edu/nchfp/>

How Stuff Works: Food Preservation: <http://www.howstuffworks.com/food-preservation.htm>

Joe Pastry, August 6, 2006: How Does Bread Go Stale?

[http://joepastry.web.aplus.net/index.php?title=how\\_does\\_bread\\_go\\_stale&more=1&c=1&tb=1&pb=1](http://joepastry.web.aplus.net/index.php?title=how_does_bread_go_stale&more=1&c=1&tb=1&pb=1)

### **Solution:**

To keep the sandwiches tasting better, I believe that I need to do two things.

1. The bread has to be preserved in a dry place. This also means that wet ingredients need to be kept separate from the bread until it's time to eat the sandwich.
2. The bread needs to be warmed up just before eating to get the chemicals right again. The problem is that what is used to warm the bread has to be available at lunch. The school has a warming oven and a microwave that they let me use for this investigation.



## Design:

I developed a Sandwich Saver kit that I use now.

To keep the moist things separate, I measured out how much sandwich spread I use on each sandwich and put that amount into a small baggie that I store in the Sandwich Saver with a plastic knife. I also keep any meat or cheese in a separate baggie. Just before I eat the sandwich, I add the spread to the bread and then any meat or cheese. My brother uses lettuce, and that would be kept separate as well.

For the bread, I used the same kind of delicious fresh sliced bread bought from a local bakery. I tested a couple of different methods to keep the bread fresh and to freshen it up before eating it. First, I stored the bread in a plastic baggie which keeps moisture from escaping from the bread. Second, I tried some different ways to warm up the bread. I got five friends to taste test the bread after five days to test the bread for dryness and for freshness. I set out five pieces of bread with no covering to have one example of bread that has gone completely stale. I also had two pieces of bread that were bought fresh from the baker.

Bread treatments: all pieces of bread except the five stale pieces, were kept in a baggie for the five days (Sunday to Friday). To re-warm the bread, four methods were used: microwave (15 seconds); oven at 100 degrees C (1 minute); oven at 100 degrees C (2 minutes); hand warmer (2 minutes).

I had the five testers test for hardness and for stale taste.

## Data:

My test data is based on how stiff the bread is and also a taste test by five other people. We used a hardness scale to determine how hard the bread was. We used a taste scale for staleness. We all agreed on the scale using fresh bread as a 1 for both and stale bread that had sat out for five days as a 5 for both measures.

Bread Staleness Test After Five Days												
Treatment	H 1	T 1	H 2	T 2	H 3	T 3	H 4	T 4	H 5	T 5	H Av.	T Av.
Stale bread	5	5	5	5	5	5	5	5	5	5	5	5
Stored bread	1	2	1	3	2	2	1	2	1	2	1.2	2.2
Microwave (30 sec)	2	2	1	1	1	3	1	2	1	2	1.2	2
Microwave (1 minute)	1	2	1	2	2	2	1	1	2	1	1.4	1.6
Oven (1 minute)	1	2	1	1	2	1	1	2	2	1	1.4	1.4
Oven (2 minutes)	2	1	3	2	2	1	2	1	3	1	2.4	1.2
Hand Warmer	2	3	1	1	1	2	1	2	1	2	1.2	2
Fresh Bread	1	1	1	1	1	1	1	1	1	1	1	1

## Testing Scales:

### Hardness

- 1 soft
- 2 soft but a little hard on the surface
- 3 soft in the middle, but stiff on surface
- 4 stiff in the middle and crunchy on the surface
- 5 stale – hard all the way through

### Taste

- 1 fresh, yeasty, sweet
- 2 less fresh, just a hint of yeast
- 3 not much bread taste, not sweet
- 4 dry and a little stale taste
- 5 completely stale taste – stinky

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### Analysis:

Based on the data from my five friends, it is clear that all of these measures are better than letting the bread sit out for five days getting stale. However, just storing the bread in the baggie seemed to be not that much different from the fresh bread. So although other methods made it a little better, it's not that much different. I found that heating bread in an oven helps to improve its flavor, but can dry it out. The microwave did not dry it out as much, but also didn't bring out the flavor as much. Using the hand warmer to warm up the bread didn't really help. It was rated just slightly higher than just leaving the bread in the baggie alone. So much for that idea!

### Conclusion:

Storing the bread separately in a baggie makes a big difference in the quality of the sandwich. If it is possible to heat up the bread before you make the sandwich, that brings out the flavor and softens the bread up so that it is really close to being like it is when it comes fresh out of the oven.

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