



# Interested in the Science of Food?

Continue the fun with these Bubbles in Food Experiments you can do at home!



## Yeast-air Balloon Experiment

### Materials:

- 1 packet of active dry yeast
- 1 cup very warm water (105° F – 115° F)
- 2 tablespoons sugar
- a large rubber balloon
- a small (1-pint to 1-liter) empty water bottle

### Experimental procedure:

1. Stretch out the balloon by blowing it up repeatedly, and then lay it aside.
2. Add the packet of yeast and the sugar to the cup of warm water and stir.
3. Once the yeast and sugar have dissolved, pour the mixture into the bottle. You'll notice the water bubbling as the yeast produces carbon dioxide.
4. Attach the balloon to the mouth of the bottle, and set both aside.
5. After several minutes, you'll notice the balloon standing upright. If you don't see anything happen, keep waiting. Eventually, the balloon will inflate.

### What's going on?

As the yeast feeds on the sugar, it produces carbon dioxide. With no place to go but up, this gas slowly fills the balloon. A very similar process happens as bread rises. Carbon dioxide from yeast fills thousands of balloon like bubbles in the dough. Once the bread has baked, this is what gives the loaf its airy texture.

"Yeast-air Balloons" <https://www.exploratorium.edu/cooking/bread/activity-yeast.html>

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## Cream to Butter Experiment

### Materials:

- Liquid measuring cup
- Heavy whipping cream ( $\frac{1}{2}$  cup) at room temperature
- Clean glass jar with lid and a tight seal (1 quart) – a canning jar with a lid, seal, and ring works best

### Experimental procedure:

1. Using your liquid measuring cup, pour  $\frac{1}{2}$  cup of room temperature heavy whipping cream into the clean glass jar. Tightly put the lid on the jar.
2. Start shaking the jar. Initially, you will see and hear the cream slosh around. Keep shaking!
3. The cream will gradually thicken as the jar is shaken. Eventually, after several seconds (but less than two minutes), the cream will get so thick that it will not move much as you are shaking. At this point the cream has likely turned into whipped cream. Keep shaking the jar, even if you do not hear any sloshing!
4. Once you have shaken the cream enough (after around 5 to 20 minutes), the liquid (which can be made into buttermilk) will separate from the butter. This change happens very suddenly, over a few seconds. The butter will be a pale-yellow color, while the liquid will be thin and milky.
5. Carefully pour the liquid out of the jar.
6. Replace the lid and shake the jar for about another 10 seconds to smooth out the butter and to separate out any more liquid. Pour out any remaining liquid.
7. Remove the lump of butter from the jar and place it in a bowl of cold water. Wash your hands and gently knead the butter to remove any extra liquid. Use your fingers to drain the liquid from the bowl.

### What's going on?

To make butter from the cream, the cream is agitated (stirred up) so that the fat particles get shaken out of position and clump together with other fat particles. The clumping first allows tiny air bubbles to be trapped in the cream, forming a light and airy product you might have had, called whipped cream. But, if the agitation is continued, the fat particles start to clump so much that the air can no longer be held by the cream, and butter forms. As you can probably see now, butter is basically the milk's fat. By time the butter forms from the cream, the fat particles have clearly separated from the liquid in the cream. This liquid can be removed and made into buttermilk. This entire butter-making process is called churning.



"Shaking for Butter" Science Buddies.

[https://www.sciencebuddies.org/science-fair-projects/project-ideas/FoodSci\\_p050/cooking-food-science/shaking-for-butter](https://www.sciencebuddies.org/science-fair-projects/project-ideas/FoodSci_p050/cooking-food-science/shaking-for-butter)

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