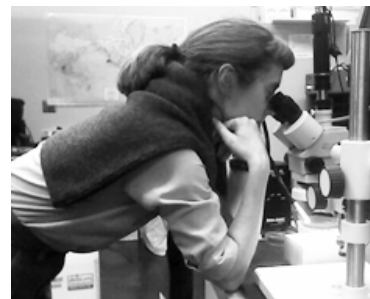


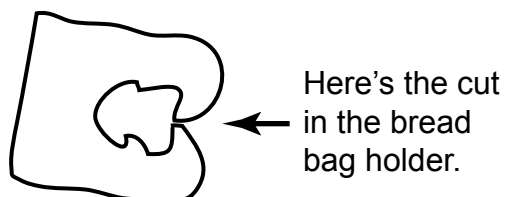
SURFACTANT ROCKETS

Hello. My name is Dr. Sarah Keller. I am a scientist in charge of a laboratory where six other scientists work in the Department of Chemistry at the University of Washington. We do experiments with surfactants, which get their name by being “surface active”. This means that they like to spread out on surfaces, for example on the surface of clean water in your bath tub. Dish soap is made of surfactants.



We can watch dish soap spread out on the surface of water by doing the following experiment. You need:

- A clean bowl (not soapy)
- A clean bread bag holder (not soapy)
- Clean water (not soapy)
- A toothpick or pencil
- Some dish soap



1. Put clean water in the bowl.
2. Float the bread bag holder flat on top of the water in the middle of the bowl.
3. Pick up the toothpick and pretend that you are quickly making a period at the end of a sentence. In other words, put the toothpick down and back up quickly.
4. Now do this same quick motion to dip the toothpick into the dish soap.
5. Do the same quick motion to dip the toothpick into the CENTER of the bread bag holder. The holder should move in the direction away from the cut in the holder.

What is going on? Using the toothpick, you plopped a pile of surfactants into the center of the bread bag holder. The surfactants want to spread out. They run out of the back door (the cut in the bread bag holder) so that they can spread out over the entire surface of the water. This pushes the bread bag holder forward. (This is the same concept of how a rocket works – when gas escapes out of the back of a rocket, the rocket shoots forward.) This bread bag holder trick works only one or two times until you have to start over. Once the entire surface of the water is covered in surfactants, you will have to rinse all of the soap off of the bowl and the bread bag holder before the trick works again.

About me: I am called Dr. Keller because I earned a Ph.D. in physics. To do that, I thought of and did many experiments that nobody else had ever thought of. It took me 3 years to do the experiments. Then I wrote a book called a dissertation containing my results. Other scientists looked at the book and said “Yes, these experiments are good,” and after that I was Dr. Keller. When that happened, I called my grandparents and said, “I just graduated from 22nd grade!” They were very happy to hear the news. Now, I am one of the scientists who gets to say “Yes, these experiments are good” when somebody new is earning a Ph.D. Maybe someday I will get a chance to say that to you because of the work that you do in a laboratory! That would be fun!