



Try This at Home Science

Scattered Pepper

Activity Overview:

Use pepper flakes to demonstrate how soap impacts surface tension of water and helps remove germs.

Materials:

- A plate or bowl
- Water
- Dish soap
- Ground black pepper

Try this!

1. Pour water into your plate or bowl., just enough to cover the entire surface.
2. Sprinkle a dusting of ground black pepper all over your pool of water. Notice that the pepper sits on the surface of the water and does not sink.
3. Try dipping your fingertip into the water and make observations. What do you notice? Is the pepper staying in one place or moving across the water?
4. Dip a clean finger into dish soap, then place your finger in the middle of the pepper covered plate. What do you notice? Did the results change from step 3?
5. Now, take your dish soap and dab a small amount on the tip of your finger. Dip that finger into the center of the water. What happens? Was your hypothesis correct?

What's happening?

Notice that when soap was introduced to the pepper, the pepper immediately scattered away from your finger. This is due to the cleaning properties of soap which are known for breaking down barriers between water and proteins, which is why dish soap cleans dishes so well!



Additionally, every liquid has surface tension, which essentially means where air and liquid meet, there is still a stronger attraction of liquid molecules to one another than to the air molecules. This gives rise to surface tension. The pepper floats on top of the water because of how strong the surface tension is and how little the pepper weighs. However, the addition of the soap interrupts the bonds at the surface of the water, which then allows the particles to scatter.

Where does this occur in nature?

Some small insects, such as mosquitoes, water skippers, and some spiders utilize the surface tension of water to be able to walk on top of it. This is similar to how the pepper stayed floating until that surface tension was broken.



When we wash our dishes without soap, it is difficult to get a lot of the grease and grime off. This is because the water molecules stay tightly together and do not mix with the grease on the dishes. Once soap is added that strong protein bond breaks down and allows the grease and grime to mix with water so the dishes can be rinsed off more easily.

Bacteria and some viruses also have a protein coat surrounding them, which is why washing your hands with soap and water is so important for removing germs from your hands during cold and flu season.

Now try...

- Experiment using different types of cleaners: toothpaste, glass cleaner, laundry detergent... What do you notice?
- Try using different liquids as the base of your experiment. Does the pepper still float on milk?

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