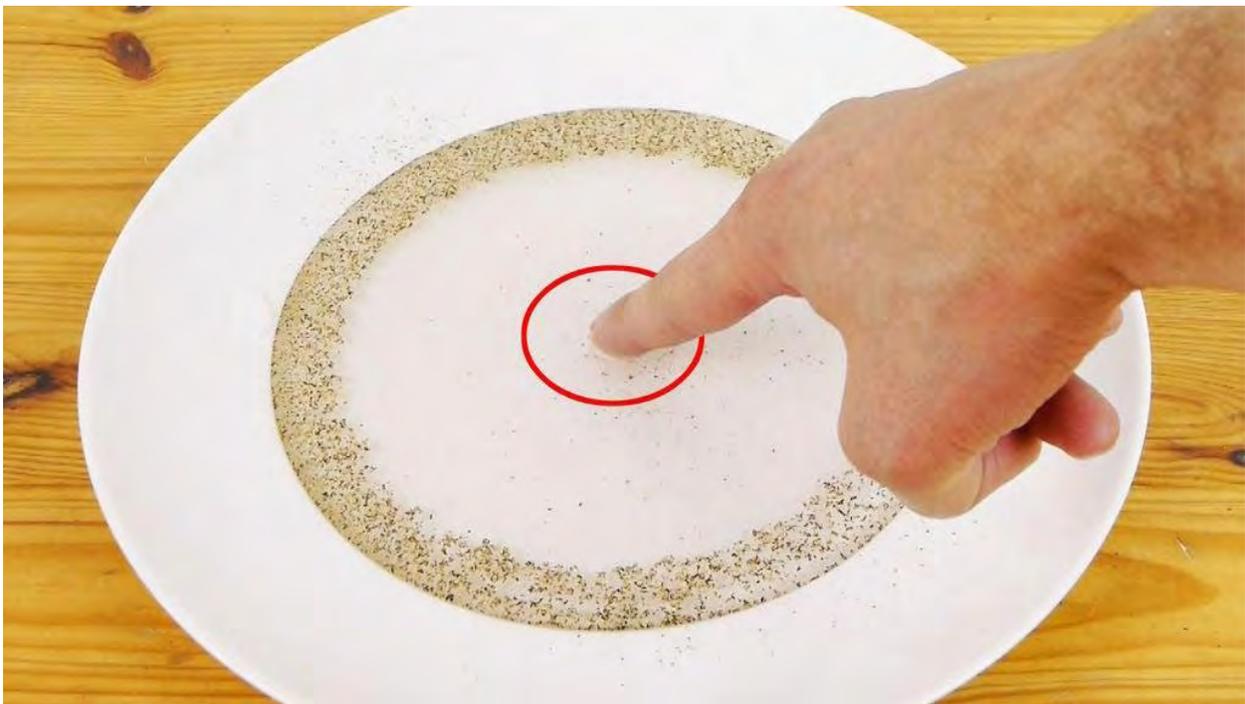


How Dish Soap Works - Water Surface Tension Experiment

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Introduction: How Dish Soap Works - Water Surface Tension Experiment



See how soap breakdowns the surface tension of water. This demonstration visualizes the effect dish soap has on the surface tension of water, and it helps to explain why soap is good for cleaning dirty dishes. The experiment is simple to follow and easy to try. It's

great fun to do with children as a simple science experiment with dramatic effects, or you could perform it as a party trick.

Step 1: Getting Started

What you need:

- A plate or bowl
- Water
- Dish Soap
- Ground Black Pepper

When you have everything you need, go ahead and follow the instructions or watch the video for a visual demonstration and full instructions.

Step 2: Set Up



Take your plate or bowl, (I like to use a white one to give good contrast with the black pepper) and pour on a pool of water approximately 1cm deep or more.

Step 3: Add the Pepper





Sprinkle over a dusting of ground black pepper all over the pool of water. You should find the pepper sits on the surface of the water. This is because water has a high surface tension, meaning the water molecules have a strong attraction to each other and they like to stick together. Water has a higher surface tension than most liquids, this is the reason you're able to slightly overfill a glass with water, and why some insects are able to sit on the surface of pond water.

As the pepper is so light, it sits on the surface of the water rather than sinking to the bottom. The pepper is also hydrophobic which means water is not attracted to it, and as such the pepper does not dissolve into the water, it just remains resting on the surface.

Step 4: The Control





Try dipping your finger tip into the water. You should see it has no real effect on the pepper. You may find some of the pepper sticks to your finger, but nothing else really happens.

Step 5: Dish Soap



Next take a bottle of dish soap and wipe a bit on the tip of a finger.

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Step 6: The Results





Then dip that finger into the center of the water. You should find the pepper immediately scatters and darts away from your finger, towards the edge of the water. The result is quite impressive to watch and can be seen in the video at the start of this Instructable.

I found that the demonstration works even better if you reduce the amount of pepper you use, because it's able to move further before it bunches up, so the effect is even more impressive.

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Step 7: Discussion

So what's happening here? Is the pepper reacting to the dish soap? Well no, what's actually happening is by adding soap to the water, we break down the surface tension of the water. This is one of the reasons why soap makes a good cleaner. When soap is added, the surface tension is reduced, and the water wants to spread out flat (water normally bulges up slightly, like when you overfill a glass of water, or if you have a single drop of water sitting proud on a table top). As it spreads out it flattens on the dish and carries any pepper that's floating on the surface with it, away from the source of the soap and to the edge of the water. You may also find that now the surface tension of the water is lower some pepper grains sink to the bottom of the water.

When cleaning dirty dishes, detergents help break down the grease because it acts as an emulsifier (this means it allows the oil and water

to mix), so the oily leftovers on the plate can be rinsed off easier. As explained above and in our demonstration, soap also lowers the water surface tension, this means rather than the water molecules sticking together tightly because of their strong attraction to one another, the water is now able to mix with the grease better, and thus help to clean off the grime.