Simulation: Oil Spill Clean Up

Try this!

1. Take two clear plastic cups and label them Cup 1 and Cup 2.
2. Fill Cup 1 and Cup 2 halfway with water. Put Cup 1 and Cup 2 (with water) on a table. (Do not move the cup & water as you complete the next steps.)
3. Use the spoon labeled Oil Spoon to add 1 spoonful of corn oil on top of the water in both Cup 1 and Cup 2. What happens?
4. Use the spoon 1 to lightly sprinkle 1 spoonful of regular sand over the corn oil in Cup 1. What happens?
5. Sprinkle another spoonful of regular sand over the corn oil in Cup 1. Be sure to sprinkle sand over the entire surface of the water, especially the edges. What happens?
6. Now, keeping the Cup 1 on the table, move it around to "jiggle" the mixture inside. What happens?
7. Now use the spoon 2 to lightly sprinkle 1 spoonful of "nano sand" over the corn oil in Cup 2. What happens?
8. Sprinkle another spoonful of "nano sand" over the corn oil. Be sure to sprinkle sand over the entire surface of the water, especially the edges. What happens?
9. Now, keeping the Cup 2 on the table, move it around to "jiggle" the mixture inside. What happens?
10. Repeat steps 7 and 8. How many spoonfuls of "nano sand" does it take to clean up the oil spill?

Picture Guide

For more information, please email: Catherine Nameth at cnameth@cnsi.ucla.edu

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What's going on?

The silicon-coated sand, also called "nano sand" and "magic sand," is a specially treated product that has **hydrophobic** or "**water-fearing**" properties. In order to make the "nano sand" **hydrophobic**, each grain of sand is completely coated with silicon. The thickness of the silicon coating is extremely small- in fact, it's only one nanometer thick! And because of this microscopic thickness, it feels just like regular sand. However, if you compare what happens in Cup 1 (regular sand) to what happens in Cup 2 ("nano sand"), you can see that the ways they react are completely different.

"Nano sand" is a product that was originally invented to help clean up oil spills in water. Since the "nano sand" is hydrophobic, it does not let water molecules pass through. It does, however, let oil molecules pass through. When oil-contaminated water is exposed to "magic sand", the oil passes through and leaves clean water behind. And when "magic sand" is sprinkled on top of oil spills, the sand binds with the oil and creates oil-filled sand clumps that fall to the bottom of an ocean or lake. If you use a small amount of oil so that it does not make a full layer and instead forms bubbles and then sprinkle the "magic sand", you can actually see the "magic sand" move from the water into the oil.

How is this nano?

The way a type of material behaves on the **macro scale** (big enough to see with your own eyes) differs when it is in the **nano scale**. Although you can't see or feel the silicon coating on the sand, you can still see how it reacts differently than regular sand when mixed with water. "Nano sand" is an example of how nano science has applied useful properties found in macro materials to a smaller, nano scale.

Learning Objectives

In this activity, participants will:

- Follow instructions to construct a model of an oil-spill cleanup.
- Predict physical and chemical reactions between substances
- Observe hydrophobicity and hydrophilicity
- Examine differences between their observations and predictions

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Materials

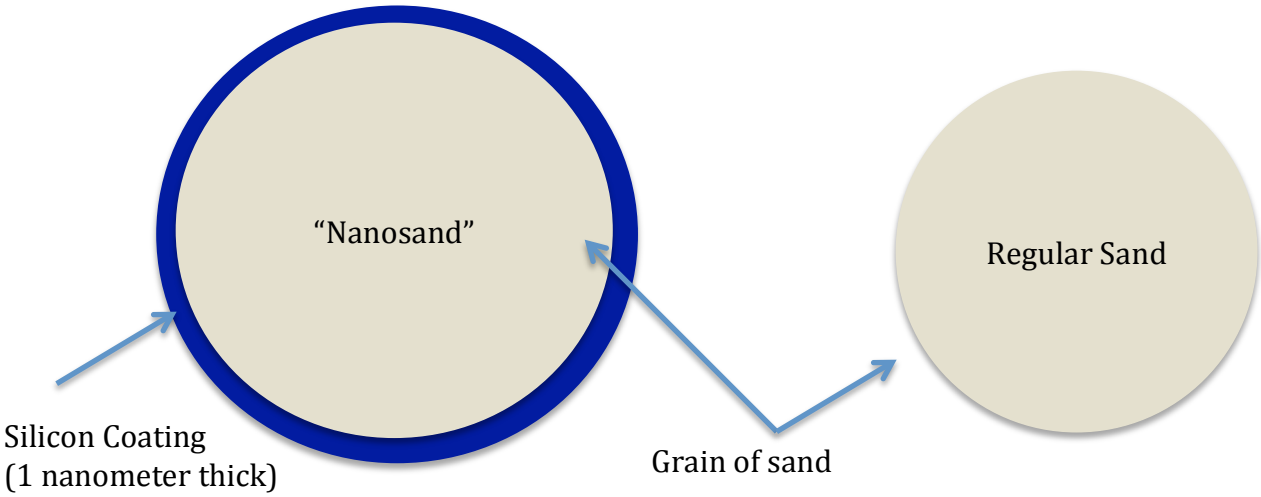
1. 2 clear plastic cups labeled Cup 1 and Cup 2
2. Water
3. Corn oil (Any type of oil may be used, but the bright yellow color of corn oil will make it easy for you to see.)
4. "Nano sand" (also called "Magic sand")
5. Regular sand
6. 3 same-sized spoons labeled Oil Spoon, Spoon 1 and Spoon 2

California Education Standards

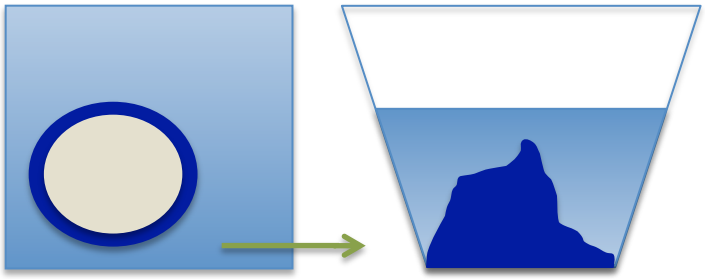
Investigation and Experimentation

- 4a (2nd grade). Make predictions based on observed patterns and not random guessing.
- 5d (3rd grade). Predict the outcome of a simple investigation and compare the result with the prediction.
- 6c (4th grade). Formulate and justify predictions based on cause-and-effect relationships.
- 6f (4th grade). Follow a set of written instructions for a scientific investigation.

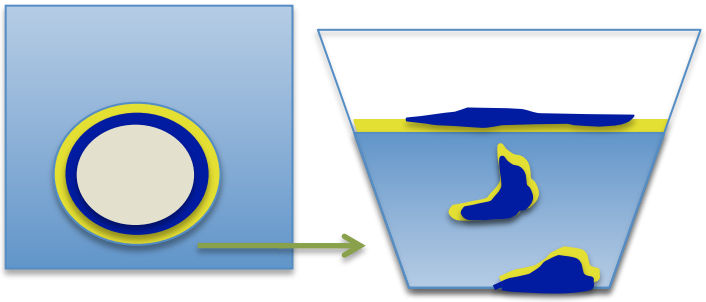
Simulation: Oil Spill Clean Up Diagram



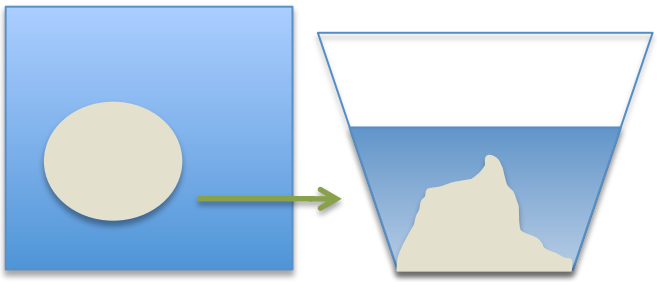
Water & "Nanosand"



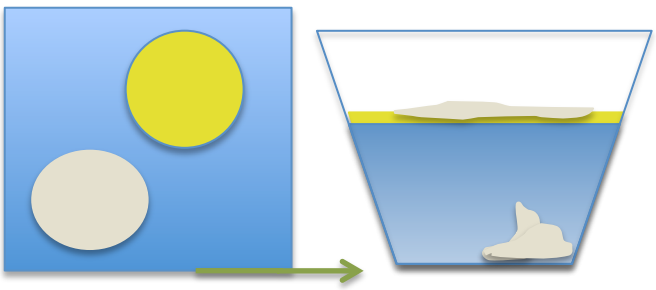
Water ,"Nanosand", Corn oil



Water & Regular Sand



Water ,Regular Sand, Corn oil



UC-CEIN: Oil Spill Clean Up Simulation
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