

Oobleck

What are some items around you that are solid? What makes them a solid? Solids have a defined shape and do not flow. Are there any liquids near you? What are some properties of liquids? Liquids take the shape of the container they are in and they also flow. Some liquids flow easier than others; this is called viscosity. If you had a race between water and syrup, water would get to the finish line first because syrup has a greater viscosity. What about ketchup, jello, yogurt, pudding, or silly putty? Are these items liquids or solids? None of these follow the traditional definition of a liquid but are not solids. We will be exploring this phenomenon more by creating some Oobleck. Once you are finished experimenting, be sure to read below to discover what category these items are in and why.

Materials:

- Corn Starch
- Water
- Food Coloring (optional)
- Container

Procedure:

1. Place some cornstarch in a small bowl, cup, or sandwich-sized Tupperware (Super Science teacher favorite). Depending on how much Oobleck you want to make, you can use anywhere from $\frac{1}{4}$ to 1 cup of corn starch. More is more fun; it's also more mess!
2. Feel the corn starch. Notice how smooth and fine the particles are.
3. Decision time: Do you want white Oobleck, green in Dr. Seuss tradition, or a color of your own? If you would like your Oobleck to be colorful, now is the time to add food coloring to the water.
4. Take an amount of water approximately equal in volume to your corn starch and slowly add this to the corn starch.
5. Mix well. Ideally Oobleck will be thick and will seem hard/solid when you tap it abruptly, but it will also slowly flow if given the opportunity.
6. If your Oobleck is too runny, add more corn starch. Too thick, add more water. Oobleck is very forgiving.
7. Experiment with the Oobleck. Observe how it responds.

Oobleck Experimentation Suggestions:

- Run your fingers quickly through the Oobleck. Now try this again slowly.
- Grab a handful of Oobleck. What happens when you try to hold it in your hand?

- Smack the Oobleck; what happens?
- Using a spoon, scrape a path through the Oobleck. Watch as the Oobleck cracks and breaks.
- Slowly tilt the container holding the Oobleck. Watch the Oobleck flow.
- PARENTS if you have an old stereo speaker lying around, you can pour a bunch of Oobleck onto it and then watch the stuff respond to the musical beat.

Oobleck Science:

Oobleck is a suspension, or a substance that can mimic the qualities of a solid or a liquid. These materials are also classified as non-Newtonian fluids. A Newtonian fluid has a constant viscosity, such as water or lemonade. As you might guess, the viscosity of a non-Newtonian liquid changes. Examples include silly putty, ketchup and, oobleck.

Oobleck's viscosity changes when subject to stress. The viscosity of a fluid is its resistance to flow. Materials with low viscosity (water or milk) flow readily; whereas, materials with higher viscosities (honey, or molasses) are much more resistant to flow. The viscosity of Oobleck changes in response to forces. Notice that when you tap it abruptly or drag your finger or a spoon through it rapidly, it behaves almost like a solid. When placed in the palm of your hand, it slowly flows and drips.

Fascinating Fun Fact: Molten lava is also an example of a non-Newtonian fluid.

Other Ideas:

If you are interested in viscosity, try a viscosity race. Make a ramp out of a cookie sheet or tray, and then "race" some household fluids down the ramp. Suggested fluids include water, syrup, honey, molasses, oil, toothpaste, and mustard. Be sure to make a hypothesis before the race begins. Then watch as the least-viscous fluid wins!

Literature Connection:

Read *Bartholomew and the Oobleck* by Dr. Seuss. Would you want Oobleck falling from the sky?

Notes:

When you are finished with your Oobleck, it is best to throw it in the trash can or dilute it heavily before washing it down the drain.