



## The Society of Rheology K12 Outreach Activities

Science  
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FUN!

# Oobleck 101

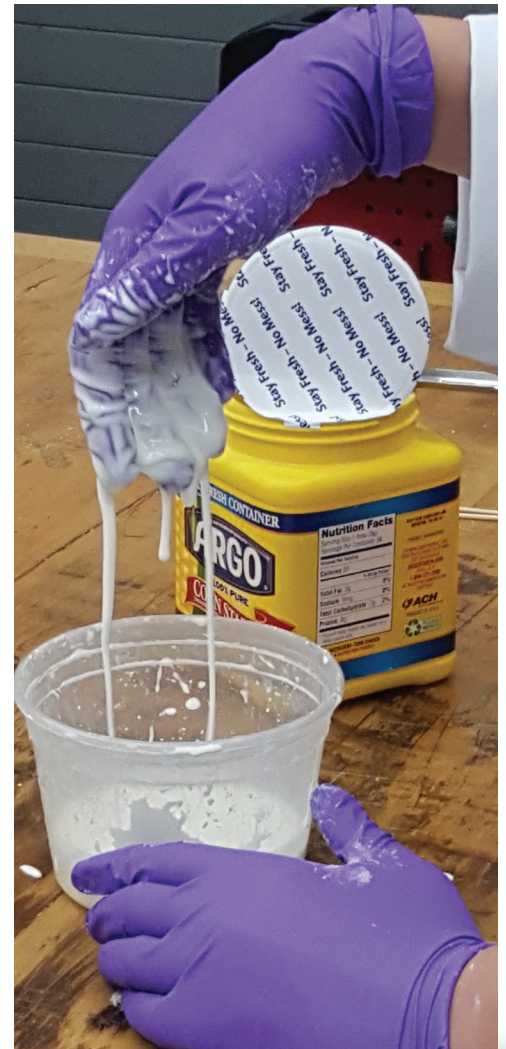
Oobleck is a substance that has some really interesting physical properties. It is an example of a non-Newtonian fluid. Many common fluids like water and air have a constant viscosity. The viscosity of Oobleck increases the faster you probe it. In fact, Oobleck will behave like a liquid when you hold it gently in your hand, but it will behave like a solid if you hit it with a hammer or throw it against a wall. The name originates from Dr. Seuss's 1949 children's book, *Bartholomew and the Oobleck*, and it's made by mixing cornstarch with water.

### What you will need to get started

- Cornstarch
- Water
- Probes – wooden sticks, plastic spoons, etc.
- Clear plastic cups
- Paper towels and a small dust pin and broom

### How to make Oobleck

1. In a medium sized bowl mix one cup of cornstarch with 1/2 cup of water. For those with access to a scale, the ratio should be 55% cornstarch and 45% water by weight.
2. Add a few drops of food coloring for fun.
3. Slowly stir the Oobleck mixture together. You can use a spoon or your hands. It all depends on how messy you want to get.
4. Test the Oobleck's consistency. If you can make it into a ball in your hands you've got it right. If its too runny add a little more cornstarch if its too chalky add some more water.





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### Let's experiment!

1. Using a probe (stick, spoon, etc.) place it in the Oobleck and move it around. Poke it, prod it and mix it. What do you feel? What happens when you mix it faster or slower?
2. Using your spoon, try to scoop some Oobleck out of the cup? What happens when you try slowly? What about when you try quickly?
3. Visually, what does the Oobleck look like when you try to scoop it out? Does it look like it's melting?
4. Now let's have some more fun. Collect some Oobleck in your hands. Knead it, squeeze it, roll it into a ball, slap it with your hand. What does it feel like as you work it? What does it feel like when you stop working it? If you mold it into a shape like clay, will it keep its form?



### More experimental fun

1. You can use Oobleck to walk on water. Fill a small kiddie pool (or perhaps just a cooking tray) up with Oobleck. With a running start run across the top of the pool. Just don't stop or you will sink in.
2. You can use Oobleck to make kinetic art. Place a speaker on its side with the cone facing up. Cover the speaker with plastic wrap to keep it from getting damaged. Place a large blob of Oobleck on top of the speaker and place some music. Watch the Oobleck dance!



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### **How does it work?**

In this activity, we make a substance that can act like a solid sometimes and a liquid at other times. This concoction is an example of a suspension (a mixture of two substances), it's a solid dispersed in a liquid.

All fluids have a property known as viscosity—the measurable thickness or resistance to flow in a fluid. Honey and ketchup are liquids that have a high resistance to flow, or a high viscosity. Water has a low viscosity. Sir Issac Newton stated that individual liquids flow at consistent, predictable rates. This Oobleck does NOT follow those rules – it can act almost like a solid, and then flow like a liquid. The grains of cornstarch are not dissolved, they are just suspended and spread out in the water. If you let the Oobleck sit for a while, the cornstarch would settle to the bottom of the bowl.



Many substances can change states (from solids to liquids to gases) when we change the temperature, such as freezing water into ice or boiling it away into steam. But this simple mixture shows how motion, instead of temperature, can change the properties of some materials. Applying motion to the Oobleck increases its viscosity. A quick tap on the surface of Oobleck will make it feel hard, because it forces the cornstarch particles come together and interact with each other. But when you dip your hand slowly into the mix, your fingers slide in as easily as through water. Moving slowly gives the cornstarch particles time to avoid each other and move out of each other's way with colliding. This Oobleck mixture is referred to as a “Non-Newtonian” liquid.