



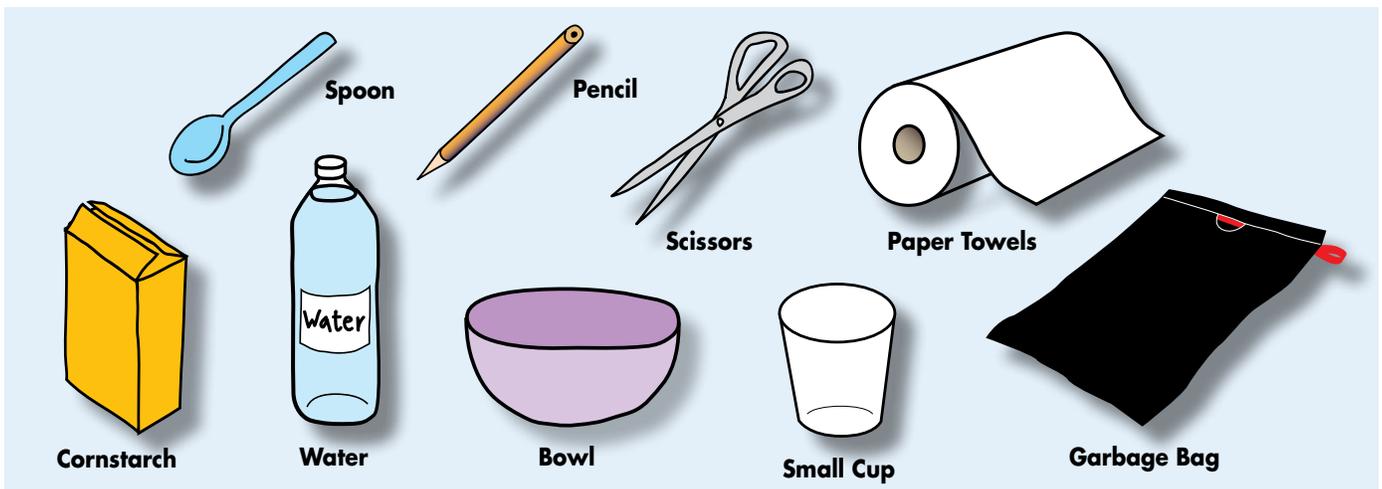
Oobleck

Clean-up notes:

You can wash Oobleck down the drain. If it gets on a carpet or a sofa, let it dry. It will turn back into cornstarch and you can vacuum it up.

Find What You Need...

- Somewhere that you are allowed to make a mess. Outside, on grass, is best
- Cornstarch
- Water
- Bowl in which the cornstarch and water can be mixed
- Small cup
- Scissors
- Spoon
- Pencil
- Roll of paper towel (for cleaning hands – and for wiping up spills if you are indoors)
- Garbage bag (for clean up and disposal)



Could one thing act like both a solid and a liquid?

You know some properties of liquids. You can pour them, and if you try to pick up a handful you'll make a mess. And you know some properties of solids. They hold their shapes even if you play catch with them. But have you ever seen something that can act like a solid *and* a liquid? If not, you're about to.

When you mix water (which is a liquid) with cornstarch (which is a powdery solid), you get Oobleck. Cornstarch is a *polymer*, meaning it consists of very long molecules. Depending what you do to your Oobleck, these molecules can slide past each other in a liquid manner, or form a tighter structure that acts like a solid. Materials that can act like liquids or solids are called *non-Newtonian fluids*.

Mix up a batch of Oobleck, and learn how to make it go from liquid to solid and back again.

Fact:

Quicksand is a non-Newtonian fluid, like Oobleck

Activity Instructions:

1. To make Oobleck, you will need 1.5 to 2 parts cornstarch into 1 part water. For example: If you use 1 cup of cornstarch, try $\frac{1}{2}$ to $\frac{3}{4}$ cup of water. Dump the cornstarch into a bowl first.
2. Slowly pour in the water as you gently knead the mixture with your hands. You will find it increasingly difficult to knead the Oobleck quickly as the Oobleck becomes more concentrated!
3. Play with the Oobleck. Things that you can do include:
 - Quickly pluck a lump of Oobleck out of the bowl and toss it at a friend. If your friend catches the Oobleck and immediately tosses it back, and you then catch it and immediately toss it back to your friend, you will be able to keep the Oobleck in play, like a ball. But if either of you pauses while holding the Oobleck, it will behave very differently.
 - Fill a cup with Oobleck. Slowly pour the Oobleck back into the bowl. Use the scissors to snip the stream of Oobleck into pieces as it pours.
 - Hit the Oobleck with the spoon, or punch it with your fist, or poke it quickly with a finger or the pencil.
 - Try to rest the spoon gently on the surface of the Oobleck, or poke the Oobleck gently with a finger or the pencil.

Conclusions

What makes Oobleck behave like a liquid? What made it turn solid? What happens if you slowly put your finger into the Oobleck? What happens if you punch the Oobleck surface? How is that different punching cornstarch, or plain water? What is happening to the molecules of water and particles of cornstarch in the mixture when a force is applied suddenly?

Brain Buster:

Experiment to make the best - or the yuckiest - possible Oobleck! Change the proportion of water and cornstarch and see what happens. What would happen if you added other substances from your kitchen? Try it and see.

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EPICS (Engineering Projects in Community Service) Program Team Get S.E.T. (mentor: Prof. C. Viney)

(See Bartholomew and the Oobleck by Dr. Seuss to learn more about where this strange name came from.)



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