OOBLECK LAB

Materials Needed:

- One box of corn starch
- Large container (mixing bowl or similar)
- 400 mL beaker
- Food coloring
- Something to stir the water
- Lots of clean up materials

Directions:

1. Empty the box of corn starch into the container.
2. Pour 400 mL of water in the beaker.
3. Add many drops of food coloring to the water and stir.
4. **ADD 100 mL OF WATER. DO NOT ADD ALL OF THE WATER AT ONCE.**
5. Mix with hands.
6. **ADD 100 mL OF WATER. DO NOT ADD ALL OF THE WATER AT ONCE.**
7. Mix with hands.
8. **ADD 100 mL OF WATER. DO NOT ADD ALL OF THE WATER AT ONCE.**
9. Mix with hands.
10. Have your teacher check the consistency of your Oobleck.
11. Add water as directed by your teacher to reach the proper consistency.
12. Play with the Oobleck. Try holding the Oobleck in your hand, punching it, and pushing a finger slowly into it. Have someone write down physical properties of your Oobleck to share with the rest of the group.
13. When your teacher tells you, dump the leftover Oobleck in the trash (**NO, YOU CANNOT TAKE IT WITH YOU)** and clean your hands.
14. Create a Venn diagram comparing the Oobleck from the story and the Oobleck you made.
15. On the same paper, write a paragraph comparing the two Ooblecks.

TEACHER NOTES

When I taught, I had a 4'X4' marker board section in the front of the room. I called it the "What Are We Gonna Do Today?" board because it would keep me from having to answer that question many times during the day. That's where I put the tentative agenda for the week. When it came time for this lab, I would write, "Story Time!!" That usually conjured up memories of kindergarten and first grade for the students. I would have the students gather round the front of the room, sit on the floor with paper and pencil, and show them the book, Bartholomew and the Oobleck. This was a story not a lot of students had heard before. It is, however, a Caldecott Honor Book. I would tell the students they were to take notes on the physical properties of the Oobleck. The moans and groans that came were hilarious ("Take notes on a Dr. Seuss book?"). I would read the book up to the part where Bartholomew noticed something starting to fall from the sky then ask for volunteers to read a page or two at a time.

This lab gets pretty messy so allow for a decent amount of clean-up time. It cleans up pretty easily with a little water but will probably take some time. I put in the instructions, "many drops of food coloring" because the color will be severely diluted when added to the cornstarch. I would write directions 1-10 on the board. When we went over them, I'd ask the students which direction they thought was extremely important. They could figure it out pretty easily. Invariably, sometime during the day, a group would pour the entire beaker of water in at once. This *could* ruin the Oobleck. Sometimes, it takes a little less than 400 mL of water, sometimes a little more, sometimes it's just right. That's why I have #10 in there. You will need to take a look at the Oobleck to see what the consistency is after 300 mL of water has been added. From there, you can guide the students on how much more water to add. I always had a couple of extra boxes of corn starch just in case I needed to add some.

So how does Dr. Seuss work in to a science class? Besides the writing practice, this works well when discussing states of matter. A discussion of what physical properties are needs to take place beforehand. You can also throw in the word "viscosity". The harder you stir it, the thicker it gets and the more it resists your stirring. Hit it hard enough, say with a hammer, and it instantly hardens enough to shatter. If you tap, slap or hit the surface of Oobleck it will feel hard, because it forces the cornstarch particles together and increases its viscosity. However, if you slowly press your hand into the mixture your hand slides in as easily as through water. Moving slowly gives the cornstarch particles time to move out of the way.

Oobleck is a non-Newtonian fluid. If you have no idea what that means, you're not alone. Most people wouldn't know a non-Newtonian fluid if they had it for lunch every day (and many students do). In more understandable terms, Oobleck is also a type of heterogeneous mixture called 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, such as water or gasoline, has a constant viscosity. The viscosity of a non-Newtonian fluid (such as silly putty, ketchup, and Oobleck) changes.

This phenomenon, called "shear thickening," occurs in materials made up of microscopic solid particles suspended in a fluid. Important examples of this type of material include drilling mud used in oil wells and fluid used to couple automobile transmissions to the wheels. One type of body armor uses a solution of polymer particles soaked into porous fiber; ordinarily flexible, the impact of a bullet turns it solid. Shear thickening is a challenge in many industrial processes where the goal is to get fluids to flow smoothly.

On YouTube you can find videos of people running across pools filled with Oobleck: The pressure of a foot striking the surface causes the liquid to thicken under it enough to support the runner. The one with the guys from Myth Busters is really good.

If you feel particularly adventurous, check out these sites:

Oobleck with Legos
https://www.steampoweredfamily.com/bartholomew-and-the-oobleck/

Color-Changing Oobleck
https://www.steampoweredfamily.com/color-changing-oobleck-science-experiment/

Glow in the Dark Oobleck
https://www.steampoweredfamily.com/glow-in-the-dark-oobleck/

And one final demonstration with Oobleck:
Find an old piece of AV equipment with a large speaker. Place the speaker so it is facing up. Stretch plastic wrap over the entire speaker. Pour some Oobleck on the wrap in the center of the speaker. Turn the volume up nice and loud. Flip the power switch on. Laugh at the Dancing Oobleck (thank you, Big Bang Theory).