Indie's Oobleck Adventure: A Non-Newtonian Exploration!

Get ready for a super fun, slightly messy, and totally mind-bending science experiment, Indie! Today, we're diving into the world of oobleck, a mysterious substance that acts like a liquid sometimes and a solid at other times. How cool is that?

What You'll Learn Today:

- What a 'non-Newtonian fluid' is (sounds fancy, but it's fun!).
- How to make your very own oobleck.
- The super weird and wonderful ways oobleck behaves.
- The science behind why oobleck is so special.

Let's Get Started!

Part 1: The Great Oobleck Creation (Approx. 15 minutes)

Time to get our hands a little messy! Safety first: you might want to cover your workspace with newspaper or a plastic tablecloth for easier cleanup.

Instructions:

1. **Gather Your Ingredients:** Make sure you have your cornstarch, water, large mixing bowl, measuring cups, and spoon ready.
2. **Cornstarch First:** Pour about 1.5 cups of cornstarch into the large mixing bowl.
3. **Add Water Slowly:** Gradually add about 1 cup of water to the cornstarch. Start mixing with your spoon. You can switch to using your hands once it starts to get thick – it’s part of the fun!
4. **Perfect Consistency:** You're looking for a mixture that feels hard when you tap it, but flows like a liquid when you tilt the bowl or try to pour it.
    - If it’s too watery, add a little more cornstarch, a tablespoon at a time.
    - If it’s too thick or crumbly, add a tiny bit more water, a teaspoon at a time.
5. **Optional Color:** If you want to add food coloring, now's the time! Add a few drops and mix it in. It can be tricky to mix, which is another fun property to observe!

Part 2: Oobleck Investigation! (Approx. 20-25 minutes)

Now that you've made oobleck, it's time to explore its amazing properties! Try these experiments and think about what's happening. You can even jot down your observations in a notebook.

- **The Quick Poke vs. Slow Sink:** Quickly poke the surface of the oobleck with your finger. What happens? Now, slowly lower your hand into the oobleck. What’s the difference?
- **The Grip Test:** Scoop up a handful of oobleck and squeeze it hard. What does it feel like? Now, open your hand and let it relax. What happens to the oobleck?
- **Roll and Relax:** Try to quickly roll some oobleck between your palms to make a ball. Can you do it? What happens when you stop rolling?
- **The Pour Test:** Try pouring the oobleck from one container to another (or just tilt your bowl). Does it pour like water?
- **Tap, Tap, Tap:** Gently tap the surface repeatedly. Does it feel like a liquid or a solid?

Think about it: Why do you think the oobleck behaves so differently depending on how you interact with it?

Part 3: The Science Behind the Slime (Approx. 10-15 minutes)

So, what's the secret behind oobleck? It's all about being a **non-Newtonian fluid**!

Most liquids you know, like water or juice, are Newtonian fluids. This means their 'thickness' (scientists call this **viscosity**) stays pretty much the same. Water is always watery, honey is always gooey.

Oobleck is different. It’s a type of non-Newtonian fluid called a **shear-thickening fluid**. This means its viscosity changes depending on the stress or force applied to it.

- When you apply **quick, strong force** (like punching it, squeezing it, or rolling it quickly), the tiny cornstarch particles don't have time to move out of the way. They jam together and make the oobleck feel like a solid.
- When you apply **slow, gentle force** (like slowly sinking your hand in or letting it rest), the cornstarch particles have time to slide past each other, allowing the water to flow and the oobleck to act like a liquid.

Isn't that fascinating? The cornstarch isn't dissolving in the water; it's suspended. The particles are just big enough that they can get locked together under pressure.

Part 4: Wrap-up & Clean-up (Approx. 10 minutes)

Let's discuss what you discovered, Indie!

- What was the most surprising thing about oobleck?
- Can you describe in your own words what makes oobleck a non-Newtonian fluid?
- How would you explain oobleck to a friend who has never seen it?

Clean-up Time:

- Oobleck can be tricky! Scrape as much as you can into the trash bin. **Do NOT pour large amounts of oobleck down the drain**, as it can clog pipes when it settles.
- You can dilute very small amounts with lots of running hot water if you must, but trash is best.
- Wipe down surfaces with a damp cloth.

Optional Extension Activities:

- **Ratio Experiment:** Try making oobleck with slightly different ratios of cornstarch to water. How does it change its properties? Record your findings!
- **Sound Waves:** If you have a subwoofer or a large speaker you can place a tray of oobleck on (with permission and supervision!), you can see it 'dance' to low-frequency sounds. (Research 'oobleck on speaker' online for examples).
- **Oobleck Art:** Try 'drawing' on the surface of oobleck with a chopstick by pressing firmly.
- **Research Project:** Investigate other non-Newtonian fluids. Ketchup and quicksand are famous examples (though ketchup is shear-thinning, the opposite of oobleck!).

Great job today, Indie! You've not only made something super cool but also learned some amazing science behind it!