Oobleck and Non-Newtonian Fluids: Crash Course Kids #46.1

Physical Science
https://youtube.com/watch?v=Fnd-2jetT1w
https://nerdfighteria.info/v/Fnd-2jetT1w

=====Introduction=====

You know what we haven't talked about in a while? Things that matter. Like mass and materials and particles. I guess what I mean is things that have to do with matter.
We've already talked a lot about the different states of matter. You know, some matter comes in the form of a solid, others in a liquid, and still others in a gas. But are you ready for a question that will bend your brain a little? What if there's matter that fits into more than one of these categories? (0:33) Is there such a thing? If there is, what's it like? And can I make some? Maybe... in my kitchen.

=====States of Matter=====

Before I answer any of these questions, let's take a closer look at different states of matter. (0:49) You remember what a solid is. It's matter that has a definite size and shape, like this desk that I'm sitting at or the clothes that I'm wearing and well all of me. I'm a person with a definite size and shape.
(1:00) Liquid is matter that has a definite size, but no definite shape. The water in this glass is a liquid. It has a definite size, but no definite shape. Like you could say that my desk is "desk-shaped", but there's no such thing as "water-shaped".
(1:13) And a gas is matter that has no definite size or shape. The air around me and you is a gas. It's not shaped like anything and its size changes depending on how big the container is that it's in.
(1:24) Now all solids, liquids, and gases are materials or objects made of matter. And all materials have properties, or traits that help identify them like their color or shape or size or temperature or weight.
=====Non-Newtonian Fluids=====
(1:36)And now that you're properly refreshed on the states of matter, I'm going to cheat and answer our big question a little early. Or at least part of it.
Yes, some materials aren't so easily lumped into just one state of matter. (1:47) These unusual materials can actually act like multiple states of matter. Neat, right?
(1:52) Wanna meet just such a material? Then let me introduce you to Non-Newtonian Fluids. The non-what-now?
(1:58) Non-Newtonian fluids are substances that don't behave like we'd expect them to. These fluids might look like one thing, but they behave like another.
So, what makes a substance Non-Newtonian? (2:09) Let's find out by making a Non-Newtonian mixture of our own. Say hello to Oobleck.

=====Investigation=====

(2:18) Believe it or not, I didn't make this word up. It comes from a book written by Dr. Seuss. You know the guy who wrote The Cat in the Hat? In another book he wrote called Bartholomew and the Oobleck there's a king who gets bored with normal, everyday weather so instead he makes sticky stuff fall from the sky.
(2:33) That's where oobleck, the stuff that we're going to play with today, gets its name. But the stuff we're talking about is real. Our oobleck is a Non-Newtonian substance with a pretty simple recipe. No magical kings required.
(2:45) All you need is about one and a half cups of cornstarch, about one cup of water a big bowl, and a spoon. Pour the cornstarch into your bowl and slowly add some water. Keep stirring until the mixture feels kind of like honey. In the end, it should look like this.
(2:58) Now grab some of this goo in your hand. When you squeeze it, it will form a solid ball in your palm. But, when you unclench your fists and release the pressure it will slide between your fingers, like a liquid.
(3:10) All fluids have a property known as viscosity, which is basically the rate at which a fluid flows. And Newtonian fluids or "normal fluids" flow at a consistent rate. But Non-Newtownian fluids or "non-normal" fluids flow at a different rate depending on how much force or pressure is applied to them.
(3:27) So your oobleck flows at a much slower rate when pressure is applied to it, acting like a solid. But, when the pressure is removed, it flows faster and behaves like a liquid.
(3:36) Good for you oobleck! Being normal is overrated, right?

=====Conclusion=====

(3:44) So if an object's viscosity, or flow rate, is not constant, or changes depending on the pressure applied to it, it's a Non-Newtonian fluid. Which means, yes, some materials can fit into more than just one state of matter.
(3:57) These materials are called Non-Newtonian fluids. And they don't play by your regular rules of matter. They'll be a solid sometimes and then a liquid at others. You do you, Non-Newtonian fluids. I like your style.