elevate science
Grades K–8

Experience *IT!* Activity

What the Oobleck!?

What Is *IT!*

In 1949, Dr. Seuss published a book called *Bartholomew and the Oobleck*. This book tells the adventures of a young boy named Bartholomew Cubbins and how he rescues his kingdom from a nasty, sticky green substance called "Oobleck." This book inspired the name of a scientific, non-Newtonian substance that is made from cornstarch and water. But, what does non-Newtonian mean?

Non-Newtonian substances are firm and take the shape of whatever holds them, but then at rest, they become runny. Some examples of non-Newtonian substances may be whipped cream, honey, Ketchup, toothpaste, and nail polish. So then, the question is are these substances solids or liquids?

Think About *IT!*

Is it a solid or is it a liquid?
In order to classify whether something is a solid or liquid, it is important to understand certain characteristics of these basic states of matter. A solid, for example, has a definite shape like an ice cube. A liquid, however, has a definite volume but does not have a definite shape. So if your ice cube melts, it changes its shape to a more fluid-like matter called water which is representative of a liquid. So, again, is oobleck a solid or liquid? Let's explore!

Mix in a small bowl 2 parts cornstarch with 1 part bottled water. Stir with a stir stick or your hands until it becomes sticky. Use the datasheet to analyze and record your observations of the substance.

Materials List:

- Tonic Water
- Seltzer Water
- Bottled Water
- (3) Small Bowls
- Box of Cornstarch
- Stirring Sticks
- Blacklight

Extend *IT!*

How do different liquids affect the appearance of the mixture? Is all water the same? If you were to go to the grocery store you would find there different types and brands of bottled water, seltzer water, and tonic waters! Each of them has a different purpose, different qualities, and flavors.

- What would happen if the variables changed, such as adding more or less water?
- Do different types of water change the appearance of the mixture?
- Try using other types of liquids. How does this change the appearance of the substance?

Dare to Change *IT!*

How can your understanding of oobleck help design a unique catcher's mitt?

Scenario: The average speed of a pro baseball player's pitch is around 90 mph. Catchers on several major league baseball teams have reported injuries to their hands due to the frequent, high-speed baseballs hitting their glove during the catch. The baseball league organization has brought on board a team of scientists and glove designers to collaborate on a solution to protect the hands of these valuable players.

Challenge: Using your knowledge of the behavior of oobleck, research, design, and test a special type of catcher's mitt that will absorb the shock of a high-speed pitch and protect the catcher's hand.

Suggested Resources and Articles:

Science Explorers: What Is Oobleck? August 16, 2018

Science Learning Hub: Non-Newtonian Fluids

ReoSense: Viscosity of Newtonian and non-Newtonian Fluids

Rader's Chem4Kids.com: States of Matter

Industrial Intellectual Property Blog: Surprising Uses of Oobleck

YouTube: Wilson Glove Lab: How a Glove is Made

Player Health and Safety: Future Football Helmets That Bend, Crumple and Twist by Design

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Directions: Place 2 parts of cornstarch in each of the bowls. Pour gradually and stir with a stick 1 part of the bottled water in the first bowl, 1 part of seltzer water in the second, and 1 part of tonic water in the third until the cornstarch dissolves and thickens. Compare the differences.

Anaylze and Interpret Data:

	Bottled Water	Seltzer Water	Tonic Water	Other
What are the ingredients in the water?				
Did the mixture take the shape of the bowl?				
Can you form the mixture into a ball with your hands?				
Does the substance maintain its shape?				
What happens when you shine an ultraviolet light on the mixture?				

State your claim. Is oobleck a solid or is it a liquid? Use evidence to support your reasoning.